



APPLICATION TO PARTICIPATE IN AN IODP EXPEDITION

ESSAC Office ECORD Science Support & Advisory Committee

GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
24148 Kiel, Germany

Hanno Kinkel (ESSAC Science Coordinator):

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Web Page: <http://www.essac.ecord.org> Email: essac@geomar.de

Please type information

Apply to Sail Application Form

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: Amsler

First name: Helen ERI

Current Position: PhD student

Institution: Institute of Geological Sciences and Oeschger Centre for Climate Change Research,
University of Bern

Address: Baltzerstrasse 1+3

City, Postcode, Country: CH-3012 Bern, Switzerland

Tel. work: +41 31 631 8974

Tel. home: +41 76 416 9547

Fax: +41 31 631 4843

Email: helen-eri.amsler@geo.unibe.ch

Country of citizenship: Switzerland

Place of birth/date of birth: Tokyo, Japan, 5. July 1986

Gender: female

Education (highest degree, including year PhD was received / is expected): MSc Earth Sciences,
Major Geology & Geochemistry at ETH Zürich, PhD expected spring 2020

Are you currently a student? YES/NO Expected Graduation Date: spring 2020

2. EXPEDITION INFORMATION

Summary of proposed participation, including area of scientific interest, current research and participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

Now: ACC flow in last glacial cycle: lat. transect of cores in SW Indian Oc. Sortable silt (current), ^{230}Th -normalization (flux)
Plan: current reconstruction (sortable silt), detritic input (^{232}Th), flux reconstruction (^{230}Th -normalization)

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

2011-12: Exp. 314/315/316 and Exp. 333: sediment samples for Master thesis
2013: Exp. 348 shipboard participation as publications specialist
2014-15: Non-IODP cruises on D/V Chikyu: shipboard participation as publications specialist and laboratory technician
2016: Non-IODP cruise on R/V Hakuho-maru: shipboard participation as sedimentologist

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

- 1) Swiss National Science Foundation (grant 20021_163003) until Jan. 2018. A funding request to seek continuation of research project will be submitted in spring 2017.
- 2) Infrastructure for all proposed analysis is provided and lab expenses are covered by home institute.

Three scientific and/or personal references

Prof. Dr. Michael Strasser, University of Innsbruck, Austria

michael.strasser@uibk.ac.at, +43 512 507 54213

Dr. Nobuhisa Eguchi, JAMSTEC, Japan

neguchi@jamstec.go.jp, +81 45 778 5812

Prof. emeritus Judith McKenzie, ETH Zürich, Switzerland

judy.mckenzie@erdw.ethz.ch, +41 44 632 3828

3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist		
physical properties specialist		
sedimentologist	X	VCD, grain size, Th-isotopes, XRF
structural geologist		
paleontologist		
paleomagnetist		
petrologist		
hydrogeologist		
Other		

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for%20Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants *must inform their national office* (if applicable) *and national delegate* and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.

Institute of Geology, Baltzerstrasse 1+3, CH-3012 Bern

ECORD Science Support & Advisory Committee
GEOMAR Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
D-24148 Kiel
Germany

Bern, 15. August 2016

Application to sail – Exp. 374

To whom it may concern,

I wish to express my strong interest in participating in IODP Exp. 374 as a shipboard scientist. This unique opportunity would provide me with the possibility to apply and broaden my knowledge and expand my research skills with the supervision from more experienced researchers and would beautifully complement the research I am currently undertaking.

I am currently enrolled in the climate science doctoral programme at the Oeschger Centre of Climate Change Research at the University of Bern, Switzerland. I am conducting research on marine sediment cores retrieved from the SW Indian sector of the Southern Ocean under the supervision of Prof. Samuel Jaccard at the Institute of Geological Sciences. My project aims at investigating the interplay between the physical and biological processes and the atmosphere through time. My research focuses on the Antarctic Circumpolar Current (ACC) and how it varied, both geographically and dynamically, during the last glacial cycle with implications for a better understanding of its future behaviour in the face of global warming. As this deep-reaching current connects all main ocean basins it greatly affects the global transport of heat, fresh water, CO₂, nutrients and other trace gases. At least partly driven by the southern westerly winds, the ACC allows subsurface water with high CO₂ and nutrient concentrations to upwell to the surface ocean along tilted density surfaces. The latitudinal position of the frontal system, along which the ACC flow strength is maximal, thus largely regulates the communication between the voluminous deep ocean and the atmosphere. The westerly wind belt is thought to have shifted northwards during cold periods, influencing the main flow position of the ACC. This consequently, affects the upwelling intensity of relatively warm waters, which imposes a control on the distribution of sea-ice.

Specifically, my research project aims at unravelling the temporal and latitudinal evolution in ACC flow speed in a series of sediment cores retrieved from the SW Indian Ocean, spanning the modern locations of the Subantarctic Front (SAF) and the Antarctic Polar Front (APF).

The method used to infer the current flow velocity is based on the mean grain-size of the sortable silt (\overline{SS}) fraction. The mean size of the re-deposited silt fraction was found to be linearly proportional to the bottom current speed and can therefore provide useful insights on past changes in the dynamical properties of the ACC along with climate change. Furthermore, U/Th systematics provides additional constraints on sediment re-deposition (focusing/winnowing) on the seafloor. Using an independent age model, the ^{230}Th -method provides constraints on the lateral re-distribution of sediments, which is crucial for regimes experiencing strong currents. In addition, ^{232}Th that is almost exclusively found in the lithogenic fraction is used to quantify the detrital input.

Within the framework of Exp. 374, I would be interested in better understanding the intertwined link between ocean dynamics and ice sheet stability. Upwelling of (relatively) warm waters imposes a tight forcing on the stability of ice sheets. On the other hand, seasonal sea ice dynamics modulate the formation of abyssal waters, which play an outstanding role in driving climate variability, through their control on the air-sea partitioning of carbon. The proposed research would focus on the more distal sites from the continental margin, which would allow reconstructing deep water formation. The interval of interest would span the warmer-than-today early/mid Pliocene, the onset of Northern Hemisphere Glaciation, the mid-Pleistocene transition and the late Quaternary glacial/interglacial climatic cycles. I would propose to apply a multi-proxy approach combining sortable silt, U/Th systematics (where applicable) and redox-sensitive trace metals to unravel deep water formation dynamics across specific climate intervals. In addition, I would like to measure ^{232}Th – typically enriched in crustal material – which would provide useful information on changes in ice sheet growth and retreat.

During my Master studies at ETH Zurich I worked on sediment cores recovered during IODP expeditions 314/315/316 and 333, the focus of this work being related to the chemical signal of erosional and depositional surfaces of mass transport deposits in the accretionary prism offshore Japan. I had the opportunity to describe the sediment material and perform core-scanning XRF elemental analysis at the core repository in Kochi, Japan. After graduating I worked several years as a publications specialist and laboratory technician for Marine Works Japan Ltd. in Yokohama, a company providing technical support for IODP and industrial expeditions on D/V Chikyu and other research vessels. During this time I had the opportunity to participate in Exp. 348 as well as in other national and international non-IODP expeditions to assist the onboard scientists with the compilation of the Expedition Report, preparation of graphics and the use of associated software and I created standardized visual core descriptions. In addition to that, as a laboratory technician I was mainly involved in core handling, data acquisition with MSCL-C, MSCL-W, MAD, particle size analysis and XRD. More recently, I participated in Exp. KH-16-01 on R/V Hakuho-maru to the Southern Indian Ocean in February 2016, where I assisted the sampling of diatoms, organic matter and CTDs.

My PhD project is funded by the Swiss National Science Foundation (grant 20021_163003) for two years. The infrastructure for the proposed analysis is provided by the University of Bern and all lab expenses are covered by the project grant. A proposal will be submitted in spring 2017 to seek continuation of the research project.

I am very enthusiastic about the prospect of participating in this unique endeavour. I believe my expertise as a sedimentologist and previous experience within IODP together with my excitement, curiosity and motivation will contribute to the success of the expedition.

Thank you for your time and consideration.
With best regards,

Eri Amsler

Personal Data:

Name, family name: Helen Eri Amsler
Address: University of Bern, Institute of Geological Sciences
Baltzerstrasse 1+3, CH-3012 Bern
Telephone number: +41(0)31 631 89 74 / +41(0)76 416 95 47
Email: helen-eri.amsler@geo.unibe.ch
Date and place of birth: July 5th 1986 in Tokyo, Japan
Nationality: Swiss



Education:

Since Jan 2016: **PhD candidate, Climate Sciences, University of Bern, Switzerland**
– Subject: Reconstructing ACC dynamics during the past glacial cycle using a latitudinal transect of sediment cores in the SW Indian Ocean (Supervised by Prof. Samuel L. Jaccard)

Sept 2010 – Sept 2012: **Master of Science in Earth Sciences, ETH Zürich, Switzerland**
– Major in Geology and Geochemistry
– Thesis: Element distribution across different types of sedimentary contacts in the Nankai accretionary prism. (Supervised by Prof. Michael Strasser)

Sept 2009 – Sept 2010: **Gap year** with internship at Hydrographic Institute of Croatia, seasonal employment, and travels

Sept 2006 – Sept 2009: **Bachelor of Science in Earth Sciences, ETH Zürich, Switzerland**
– Major in Geology
– Thesis: Variations in time and space of the tin concentration in lake sediments (written in German) (Supervised by Dr. Adrian Gilli)

Aug 2005 – July 2006: **High school education, Kantonsschule Wettingen, Switzerland**
– Matriculation project on the Noahide Laws in three Religions (awarded first prize by the faculty of theology of the University of Basel)

Work experiences, further education:

13.7.2016 – 29.7.2016: Urbino Summer School of Paleoclimatology, Italy
1.10.2013 – 31.8.2015: Employed as publications specialist and laboratory technician, Marine Works Japan Ltd., Yokohama
4.3.2013 – 30.6.2013: Employed at a geological consulting bureau Jäckli Geologie AG, Zürich

Publications:

Amsler, H.E., Reusser, E., Milliken, K., Strasser, M., (2014). Elemental distribution and microfabric characterization across a buried slump scar: New insights on the long-term development and reactivation of scar surfaces from a microscopic perspective. *Advances in Natural and Technological Hazard Research*, 37, 23-32. DOI: 10.1007/978-3-319-00972-8_3

Expeditions:

29.1.2016 – 25.2.2016: Non-IODP cruise on R/V Hakuho-maru, SW Indian Ocean, sedimentologist
2014 – 2015: Non-IODP cruises on D/V Chikyu offshore Japan and in Bay of Bengal, laboratory technician, publications specialist
13.9.2013 – 29.1.2014: Exp. 348, NanTroSEIZE, offshore Japan, publications specialist

Bern, August, 19th 2016

Letter of recommendation on behalf of Eri Amsler to participate in IODP Exp. 374 as a shipboard scientist

To whom it may concern –

I am pleased to provide a letter in strong support of Eri Amsler, PhD candidate at the Institute of Geological Sciences, University of Bern, for her application to participate in IODP Expedition 374 as a shipboard scientist. I have been supervising Eri's PhD research project since the beginning of the year, but have known her for a number of years, as we overlapped at the time I was a lecturer at ETHZ. Eri is a really enthusiastic and talented student. She has shown great engagement ever since the beginning of her project and promptly acquired the scientific knowledge to fulfill her research objectives. She wrote a great research proposal, providing a testimony on her independence and capacity to embrace a novel scientific discipline.

Her current research focuses on the reconstruction of past changes in Southern Ocean circulation using a wide array of sedimentological and geochemical tools. Specifically, Eri is investigating a suite of sediment cores spanning a latitudinal- and bathymetric transect across the Antarctic Polar Front in the Indian sector of the Southern Ocean to constrain the dynamical behavior of the Antarctic Circumpolar Current (ACC) from the last glacial inception, 70 kyr ago, to the Holocene. Her project will help understanding to which degree changes in ocean circulation and marine biogeochemistry contributed to the rise in atmospheric CO₂ as the Earth emerged from the last ice age.

Her participation in IODP Exp. 374 would provide her a unique opportunity to further learn how sediment samples are recovered, described and investigated within a stimulating international environment. There is no doubt that this experience will prove to be a great asset not only to her current research project, but foremost for her scientific career as a young, promising climate scientist. Despite her relatively young academic career, Eri has gathered a thorough experience within the IODP program. She has participated in several expeditions as a shipboard sedimentologist and has provided shore-based support. Furthermore, Eri has worked on IODP-related sediment material for her MSc project she conducted under the supervision of Prof. M. Strasser.

To summarize, I can only strongly recommend Eri Amsler as a shipboard participant to Exp. 374. It will provide her the opportunity to nurture her scientific experience and gather a unique insight on Antarctic sea-going research.

Please do not hesitate to come back to me had you any further inquiry. Best regards,

Prof. Samuel Jaccard



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Please type information

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Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: BENY

First name: François

Current Position: PhD student

Institution: Laboratoire d'Océanologie et de Géosciences, Université de Lille 1-UMR 8187
CNRS/Univ Lille/ULCO

Address: Bâtiment SN5, UFR science de la terre, cité scientifique

City, Postcode, Country: Villeneuve d'Ascq, 59655, France

Tel. work: -

Tel. home: +33 672 33 58 39

Fax: -

Email: beny.francois@gmail.com

Country of citizenship: France

Place of birth/date of birth: Roubaix (59), France / 25/02/1991

Gender: male

Education (highest degree, including year PhD was received / is expected):
1st year PhD. Double PhD at Faculty of Earth and Sciences, Vrije Universiteit Amsterdam
(Nederland) and Laboratoire d'Océanologie et de Géosciences, Université de Lille (France)
expected for 2018.

Are you currently a student? YES Expected Graduation Date: 2018

2. EXPEDITION INFORMATION

Full participation

Summary of proposed participation, including area of scientific interest, current research and participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

Area of interest: paleoclimate, sedimentology, geochemistry, oceanography.
Current work: study of Antarctic Circumpolar Current and deep water masses associated using geochemical and mineralogical proxy.
Participation plan: core treatment, cruise report

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

Expedition number: IODP 346 "Asian Monsoon"
Nature of the involvement: shore-based participation; Geochemical characterization (Major, trace, REE, Nd isotopes) of sediment from the site U1429 (last 400kyrs only) and its implication for the Asian River discharge and ITCZ migration. A paper on this work will be submitted before the end of 2016.
Work carried at the IFREMER under the direction of Samuel TOUCANNE and Charlotte SKONIECZNY (now lecturer at the university of Paris Sud).

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

1) Future funding scheme
I plan to apply to the following financial support in order to achieve the proposed scientific objectives

- national support application: INSU-LEFE, Labex-Mer
- international support application: European MSCA (Marie Skłodowska-Curie Fellowship)

2) Support from the host institution

- I would have total access to staff and facilities in the host institutions
- Moreover other structures (as LSCE, France, or IFREMER) would also be interested in the proposed scientific objectives

Three scientific and/or personal references:

Charlotte Skonieczny, Université Paris Sud, France

Samuel Toucanne, IFREMER, France (Samuel.Toucanne@ifremer.fr)

Viviane Bout Roumazeilles, Université de Lille, Laboratoire d'Océanologie et de Géosciences (Viviane.Bout@univ-lille1.fr)

3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist		
physical properties specialist		
sedimentologist	x	Sedimentary geochemistry
structural geologist		
paleontologist		
paleomagnetist		
petrologist		
hydrogeologist		
Other	X	Geochemistry (mainly Nd, Sr, Pb, REE), paleoclimate

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for_Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants must inform their national office (if applicable) and national delegate and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.

My main areas of scientist interest are related to paleoclimate, sedimentology, geochemistry, and oceanography. My bachelor thesis was on the Late Jurassic succession in the Boulonnais (Northern France), which is the French equivalent of the Jurassic succession in the North Sea where hydrocarbons are extracted. This work can be considered as a good introduction to sequential stratigraphy. To start my master's degree, I went to the National Institute of Oceanography (India) to work on the paleoproductivity of the Andaman Sea during the last 50 kyrs thanks to the phosphorus speciation. This results were compared to monsoon paleoproxies. This work was mainly supervised by Bejugam NAGENDER NATH. During all my studies (bachelor and master's degree), I worked a few on littoral risks such as submersion or sedimentary transport along coastal line. My master's degree thesis was at the French IFREMER, where I worked under the supervision of Charlotte SKONIECZNY and Samuel TOUCANNE. My scientific objectives were to reconstruct the input of the Asian rivers to the East China Sea using Nd (neodymium) isotopes, major, trace, and rare earth elements. This study allows tracking the ITCZ migrations and associated monsoon variations. The material for this study comes from site U1429 recovered during the IODP 346 expedition "Asian Monsoon". To conclude, I mainly work on paleoclimate at different times scale, and mainly in the oceanic domain. My main tools are radiogenic isotopes (by MC-ICPMS), clay and heavy minerals (X-Ray diffraction), as well as standard sedimentological methods (grain size distribution, magnetic susceptibility, carbonate content, etc.).

Currently, I mainly work on my PhD subject, but I also write a paper with my supervisors from IFREMER on samples from site U1429. During this PhD, I am working on the variation of the circumpolar current (i.e. Upper/Lower Circum Polar Deep Water) and associated deep-water masses (i.e. Antarctic Bottom Waters, North Atlantic Deep Waters) through the last climatic cycle, using geochemical proxies. My objective is to characterize the geochemical composition of the terrigenous sediment carried by deep-water masses in order to reconstruct their variations through the last climatic cycles. Through this approach, I want to provide new information carried by the terrigenous fraction, which could be different from the one carried by other proxy for salinity, temperature, etc. Since the Ross Sea is an area where bottom waters are formed, it constitutes an ideal target for the understanding of Antarctic Bottom Water in the Pacific sector.

During this expedition, I can participate to the usual work such as core description, classic sedimentological approach (including XRD and XRF measurements), sampling, etc. During my previous scientific expedition (10 days on the French R/V Pourquoi Pas ? in the Gulf of Biscay, 3 weeks on the French R/V Marion Dufresne in the South Atlantic/Southern Ocean), I had to handle core treatment on deck (cutting, cleaning, packing, storing), time log, sedimentary description, XRF core scanner measurements, and synthetic lithostratigraphic section under adobe illustrator. I could carry out all these type of work, and wish to actively contribute to the expedition report.

As explained previously, I work on the circumpolar currents and associated deep-water masses, and the Ross Sea is a key area for the understanding of bottom water formation. In my PhD, I am only using sediment from the Atlantic and the Indian sector of the Southern Ocean, and I have no material from the Pacific sector. Sediment from the Ross Sea would constitute a first step to fill this gap. Because this course is at the end of my PhD program (expected for the end of October 2018), it would not be possible to finish all this work during my PhD. My two PhD -host institutions give their agreement to provide access to staff and facilities in order to

process my samples during the last year of my PhD. However, I would like to propose a postdoctoral fellowship based on samples from this course. The objectives would be double: Firstly, I would like to understand the nature and the provenance of the sediment in the Ross Sea using radiogenic isotopes (Nd, Sr, Pb), and possibly clay and heavy minerals. Ice Rafted Debris could be extracted from the sediment to identify the provenances of the sediment carried by the ice and the contribution of the different sources as it is already done for winds or rivers. This may help to reconstruct the potential movement of the ice sheet through time. Secondly, the remaining terrigenous sediment (not brought by the ice) may give information about the water masses present in the area, and their evolution. This work would help to reconstruct both history from the ice sheet, and water masse evolutions in the Ross Sea. Because this date is quite far for a PhD student, I don't have any certitude concerning the future funding for this work. However, many organisms may contribute to it such as the grant Marie Skłodowska-Curie fellowship of the European Commission, the Labex Mer (Brest, France), or a structure interested in this king of work (universities, LSCE, IFREMER,...).

BENY François

Date of birth : 25/02/1991
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FRANCE
+33 6.72.33.58.39
beny.francois@gmail.com

**PhD Student in paleoclimatology, and
sedimentological geochemistry at
Université Lille 1 and Vrije
Universiteit, Amsterdam**

Education:

- 2015-2018 **PhD at Laboratoire d'Océanologie et de Géosciences (LOG) and at Vrije Universiteit, Amsterdam**
on : "High-resolution investigation of oceanic circulation over the last climatic cycle in **the Southern ocean**, using **terrigenous tracers in marine sediments** deposited on the Kerguelen Plateau and along the Antarctic Circumpolar Current pathway" (main supervisor: Viviane Bout-Roumazeilles).
- 2014-2015 **Master's degree in marine geosciences at University of Occidental Brittany**, for a **double diploma**, course **external earth**.
- 2010-2015 **Polytechnic Institute Lasalle Beauvais -formerly IGAL- in geosciences speciality mines and quarries** (equivalent to a bachelor degree + master's degree)
- 2009-2010 First year of bachelor's degree Sciences of Life, Earth and Environment at **Lille 1 University**
- 2008-2009 French equivalent to A-level, with honour. Concentration: sciences.

Professional experience:**Internship:**

- 2015 **IFREMER: Brest's centre**
(6months) Intern in geology: Geochemical constraints on continent-ocean transfer to Northern East China Sea over the last 400kyrs: insight onto Yellow River discharge and ITCZ motion (supervisors: Charlotte Skonieczny and Samuel Toucanne).
- 2013 **NIO: National Institute of Oceanography (India), Dona Paula's centre**
(3months) Intern in geology: Study of oceanic paleoproductivity with phosphorus in Andaman Sea for the past 50kyrs and comparison with monsoon proxy (supervisor: Bejugam Nagender Nath).

Scientific Cruises:

- 2016 **MD203 Acclimate** cruise on the **French R/V Marion Dufresne** in the South Atlantic and **Southern Ocean**
(3weeks) Calypso and casq core treatment (cutting, packing, storing), XRF core scanner, sedimentological description, time log tables.
- 2015 **GITAN** cruise on the **French R/V Pourquoi pas ?** in the Gulf of Biscay
(10days) Calypso core treatment (cutting, packing, storing), XRF core scanner, interface core (for 212Pb and foraminifera) treatment, synthetic log on CAD. (for more information on the cruise, see DOI: 10.17600/15017800)

Academic project:

- 2014 Research project on submersion risk in the Bas-Champ of Cailleux sur Mer
(1month) Bibliographic synthesis
- 2012-2013 Dissertation: The late Jurassic in the Boulonnais (Northern France)
(1year) Twosome work

Other skills:

- Language French: mother tongue.
English: TOEIC 790.
German: ZD level B1, Bulats level A2.
- Computer skills Advanced skills in windows environment
Notion in programming (JAVA, language C), data base creation, and matlab.
ENVI, ARCGIS, adobe illustrator, auto-formation in QGIS in progress

Publication list

- Beny, F., Toucanne, S., Skonieczny, C., Bayon, G., Ziegler, M., Ponzevera, E. 2016. Continent-Ocean sediment transfer to the Northern East China Sea (IODP 346) over the last 400kyr: insights into Yellow River discharge and ITCZ motion. . *International Conference on Paleoceanography*, ICP12, August 29-September 2, Utrecht, Netherlands.
- Beny, F., Toucanne, S., Skonieczny, C., Bayon, G., Ziegler, M., Ponzevera, E. Geochemical constraints on continent-ocean transfer to Northern East China Sea over the last 400kyrs: insight onto Yellow River discharge and ITCZ migration. To be submitted to *Earth and Planetary Science Letters* before the end of 2016.
- Beny, F., Bout-Roumazeilles, V., Bory, A., Delattre, M., Abraham, R., Wealboeck, C., Michel, E., Mazaud, A., Davies, G. 2016. Mineralogical and geochemical –Sr, Nd, Pb, Hf- tracing of varying northern vs. Southern water-masses contributions in the sub Antarctic Atlantic ocean (MD07-3076) since the last glacial maximum. *International Conference on Paleoceanography*, ICP12, August 29-September 2, Utrecht, Netherlands.
- Mazaud, A., Michel, E., Crosta, X., Paterne, M. Isguder, G., Bout-Roumazeilles, V., Beny, F., Jaccard, S., 2016. How the Antarctic Circumpolar Current (ACC) and the Austral ocean has varied in the Kerguelen sector during the deglaciation and the last climatic cycles. *International Conference on Paleoceanography*, ICP12, August 29-September 2, Utrecht, Netherlands.

Object : Letter of support

To whom it may concern,

I know François BENY since one year when he started his PhD thesis under my supervision.

I strongly support his application to the IODP expedition 374: Ross Sea West Antarctic Ice Sheet History on board of the Joides Resolution for the following reasons:

François has strong skills and competences in sedimentology and geochemistry, as well as an advanced knowledge in paleoceanography and paleoclimate, which are obviously fundamental tools for studying and deciphering sedimentary archives.

François has already a good experience in scientific cruises since he recently participated in two oceanographic cruises on board of two French R/V where he has the opportunity to handle cores on deck and to get familiar with standard shipboard procedures.

The main scientific objectives of François PhD thesis are to reconstruct the paleoceanographic and paleoclimatic evolutions of the Southern Ocean since the last climatic cycles, with specific emphasis on the use of the mineralogical and geochemical signatures of detrital particles to retrace deep-water masses provenance and variations. As a consequence, his scientific knowledge perfectly fits in the scientific objectives of the IODP expedition. Moreover, the scientific objectives of the IODP expedition as well as targeted drilling sites provide complementary archives that would nicely complete the approach developed by Francois and by our research group.

Finally, participating in the expedition would allow François to develop and to prepare his own research project and to apply for a Marie Skłodowska-Curie fellowship, with the support of his two actual host institutions (University Lille and University of Amsterdam).

Our two research groups would guarantee François a total access to facilities and staff support, scientific expertise and financial support for producing and disseminating scientific results.

To summarize, I thereby strongly support François Beny's application for the IODP expedition.

Viviane Bout-Roumazeilles
Senior Researcher – CNRS





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Hanno Kinkel (ESSAC Science Coordinator):

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Web Page: <http://www.essac.ecord.org> Email: essac@geomar.de

Please type information

Apply to Sail Application Form

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: *Bertram*

First name: *Rachel*

Current Position: *Ph.D. Student (2nd Year)*

Institution: *Imperial College London*

Address: *2.49M Royal School of Mines, Department of Earth Science and Engineering, South Kensington Campus*

City, Postcode, Country: *London, SW7 2AZ, United Kingdom*

Tel. work: *+44 (0)2075 947 137*

Tel. home: *+44 (0)7896 604 795*

Fax: *n/a*

Email: *r.bertram14@imperial.ac.uk*

Country of citizenship: *United Kingdom*

Place of birth/date of birth: *Frimley, UK, 21/04/1992*

Gender: *Female*

Education (highest degree, including year PhD was received / is expected):

MSci. Natural Sciences in Geography and Earth Science (Durham, UK, 2014)

Ph.D. (Imperial College London, UK, Expected 2018)

Are you currently a student? *YES/NO*

Expected Graduation Date: *October 2018*

2. EXPEDITION INFORMATION

Requested participation on JR expedition: Full

Summary of proposed participation, including area of scientific interest, current research and participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

Marine sediments provide vital archives Antarctic paleoclimate. I utilise geochemical provenance studies to infer ice extent and dynamics in Wilkes Land and hope to extend my studies to the Eastern Ross Sea during Expedition 374 (Objective 1).

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

My Ph.D. project will achieve a Plio-Pleistocene provenance record from Site U1361 (IODP Expedition 318) and I collaborate with other scientists from this expedition. Additionally I have attended many IODP and ECORD conferences and workshops.

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

I would complete post-expedition research at Imperial College London under my Ph.D. funding. Here I will have access to the MAGIC laboratories (clean and mass spectrometry laboratories) and the support of my supervisor and funding body.

Three scientific and/or personal references

1. **Dr. Tina van de Flierdt (Ph.D. Supervisor)**, Reader in Isotope Geochemistry
Address: Room 4.45, Royal School of Mines, Department of Earth Science and Engineering, South Kensington Campus, London SW7 2AZ
Tel.: +44 (0)207 59 41290
Email: tina.vandeflierdt@imperial.ac.uk
2. **Carlota Escutia (Expedition 318 Scientists Collaborator)**
Address: Instituto Andaluz de Ciencias de la Tierra, CSIC - Univ. de Granada, Avda de las Palmeras 4, 18100 Armilla (Granada), Spain
Tel.: +34 958 230000 Ext. 190219
Email: cescutia@ugr.es
3. **Dr. James Baldini (MSci. Supervisor)**, Reader in the Department of Earth Sciences
Address: Room 315, Department of Earth Sciences, Durham University, Science Labs, Durham, DH1 3LE
Tel.: +44 (0) 191 33 42334
Email: james.baldini@durham.ac.uk

3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist	X	Sedimentary provenance, laboratory geochemist
physical properties specialist	X	Basic training at ECORD virtual drillship workshop
sedimentologist		
structural geologist		
paleontologist		
paleomagnetist		
petrologist		
hydrogeologist		
Other		

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for_Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants *must inform their national office* (if applicable) *and national delegate* and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.

15th August 2016

ESSAC Office ECORD Science Support & Advisory Committee
GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
24148 Kiel, Germany

Dear Jan Behrmann and Hanno Kinkel,

I am writing to express my interest in participating as a shipboard scientist on the IODP Expedition 374: Ross Sea West Antarctic Ice Sheet History, scheduled to sail in early 2018. Partaking in this expedition would be a fantastic opportunity to utilise geochemical skills I have learnt during my PhD in an IODP ship environment. Furthermore it would enable me to continue exploring the provenance of Antarctica marine sediments following my studies from the Wilkes Land coast (IODP Expedition 318, U1361) and the Ross Sea (CIROS II).

Following an undergraduate lecture course at Durham University (Antarctic Environments, Prof. Mike Bentley), Antarctica has captivated my interest. Despite being an isolate continent, changes in ice dynamics would have global implications. It is my view that one of the best ways to understand and assess these impacts is by observing past climate events. As such, studying the warmer-than-present Pliocene is the focus of my ongoing Ph.D. at Imperial College London, supervised by Dr. Tina van de Flierdt. My research utilises marine sediment of Plio-Pleistocene age from U1361 collected during IODP Expedition 318 to Wilkes Land, Antarctica in 2010.

In my current research I study ice sheet stability in the Wilkes Subglacial Basin using provenance analysis (strontium and neodymium) during intervals of warmer-than-present conditions in the Pliocene (building on low-resolution work by Cook et al., 2013). My high-resolution studies have shown that a substantial change in provenance occurs gradually on the order of a few thousand years as warmer conditions prevail. Through collaborations with other IODP Expedition 318 scientists I have directly compared my provenance record with other studies from the same core, including XRF scan records (Carlota Escutia and Francisco Jimenez Espejo) and iceberg rafted debris data (Rob McKay, Patterson et al., 2014). My data also corroborates recent modelling studies. During the remainder of my Ph.D. I will focus on two further projects: (1) completing the first Plio-Pleistocene provenance record from U1361 and (2) studying the Pliocene section of the CIROS II core, an existing inner continental shelf record from the Ross Sea, in a new collaboration with Richard Levy.

At the UK IODP Conference in London (November 2014), I was inspired by the phenomenal records extracted from marine sediments and the inspiring work of IODP and the participating scientists. I gained vastly more experience and understanding of the processes, activities and duties that are required by scientists prior to, on-board and post-expedition at the "ECORD Training Course: The Virtual Drillship Experience" in Bremen in March 2015. More recently in May 2016 I had the

opportunity to attend IODP Workshop “Antarctica’s Cenozoic Ice and Climate History: New Science and New Challenges of Drilling in Antarctic Waters”. Whilst at College Station I took the opportunity to visit the core repository for sampling and core description purposes and observed the XRF scanner in use.

These opportunities, and the IODP and ECORD workshops in particular, have greatly improved my understanding of the IODP process and given me experience with on-board and science party duties. I would feel confident sailing as either a geochemist or a physical property scientist given my Ph.D. experiences. The roles that fall under the geochemist on board the ship will utilise my laboratory skills that I have gained in the MAss Spectrometry and Isotope Geochemistry at Imperial College London (MAGIC) laboratories. Using the physical property data as part of my project and having basic training in the running of the machine during the ECORD training workshop has given me hands-on experience in this area of expertise. Finally, having now sampled at College Station I am aware of the procedures that I would need to follow to help with the on-shore phase of the cruise.

Given my current provenance studies from around the Antarctic continent, Wilkes Subglacial Basin and Ross Sea, I would greatly appreciate the opportunity to conduct provenance work for Expedition 374 during the post-expedition moratorium period. My research plan (included below) focuses on Plio-Pleistocene studies to assess variability and ice extent in the Eastern Ross Sea. Through analysis of detrital strontium and neodymium isotopes the source region of continental bedrock can be inferred and hence Ross Sea ice sheet dynamics. Using a combination of high-resolution and low-resolution studies will enable provenance changes to be assessed over the full Plio-Pleistocene epoch whilst accounting for potential discontinuities in the recovery of shelf sediment. Additionally, during climatic transitions and events of particular interest, sub-orbital provenance records could be obtained in order to study characteristics of past shifts and details such as the rate of change. Previous records of transitions from other drill cores (including my own work) will allow for comparisons between records to assess Antarctic changes on a continental scale.

The scheduling for Expedition 374 allows me to complete the expedition itself, the on-shore party and the committed research within the timeframe of my Ph.D. funding. I am funded by the Kristian Gerhard Jebsen Foundation until October 2018. With the expedition finishing in early March 2018, I would have seven months in which to complete my desired research. Following discussions with my supervisors and funding body, I plan to complete my Ph.D. chapters prior to the expedition in January 2018. The final months of my funding could then be entirely focused on the new project commitments working on Expedition 374 sediment.

As a current Ph.D. student working on IODP material I have directly benefited from the work of previous IODP expeditions. I would relish the opportunity to contribute to this process myself by participating in IODP Expedition 374.

Thank you in advance for taking the time to review my application. I look forward to hearing from you in the future.

Kind regards,

A handwritten signature in black ink that reads "R Bertram". The signature is written in a cursive, slightly stylized font.

Rachel Bertram

Rachel Bertram Post-Expedition 374 Research Plan

Utilising recovered continental-shelf sediment for provenance studies, this research aims to understand Plio-Pleistocene variability and ice extent in the Ross Sea. Results will constrain the West Antarctic Ice Sheet (WAIS) contribution to past sea level variability.

Objectives

- 1) Understand Pliocene ice sheet variability within the Ross Sea and constrain its contribution to sea level change during warmer-than-present temperatures during the Mid-Pliocene warmth
- 2) Determine the extent of the Ross Sea ice sheet during the Plio-Pleistocene focusing on the timing of stability in the Pleistocene

Research Summary and Rationale

Understanding of Antarctic ice sheet's variability is needed to constrain estimates of past sea level. Of particular interest are the Pliocene and Pleistocene epochs. In the Pliocene, temperatures were warmer-than-present and vulnerable areas such as the Ross Sea are likely to have had a dynamic margin (Naish et al., 2009; McKay et al., 2012). By the Pleistocene, the ice sheet persisted through most interglacials but the exact timing of stability is not clear.

Objective 1 of Expedition 374 aims to constrain sea level variability; geochemical provenance analysis is an effective method to achieve this. Analysing strontium and neodymium on marine sediment recovered from the continental shelf will determine the source of the eroded continental bedrock and by inference the ice sheet margin extent (e.g. Cook et al., 2013). Additionally use of Nd model ages would be utilised to better define the source region of sediment (Roy et al., 2007). Comparison of this record with other Pliocene records from Antarctica (including my Ph.D. work on Wilkes Land and CIROS II cores) would provide a better estimate of continental scale variations during the Plio-Pleistocene and a measure of how significantly Antarctica has contributed to sea level change in the past (Expedition 374 Objective 1).

Provenance studies will additionally help to constrain the nature of the ice sheet (grounded ice or ice cap) during the Plio-Pleistocene and the timing of stability in the Pleistocene. This work would focus on specific intervals of interest at high-resolution, collecting a sub-orbital record of provenance (Expedition 374 Objective 4). The intervals would preferably be associated with palaeomagnetic age tie points so they can be better constrained, a technique previously used for successful sample selection from U1361. Depending on the sediment recovered, targeted intervals would include the M2 glacial to determine whether the ice sheet was grounded or if an ice cap was covering the site during glacial maxima during the Pliocene) and studying the early to middle Pleistocene to assess changes in the ice margin extent given the cooling climatic conditions. Provenance analysis would be conducted on the fine fraction of sediment and samples of 5cc would be sufficient for full analysis of multiple provenance proxies.

Funding and Financial Support

The expedition itself and post-expedition research would take place within my Ph.D. funding at Imperial College London (funded by the Kirsten Gerard Jebesen Scholarship, guaranteed until October 2018). During the period for post-cruise research I will have access to the MAss Spectrometry and Isotope Geochemistry at Imperial College London (MAGIC) laboratories consisting of a general chemistry laboratory, high-quality clean rooms and a mass spectrometry laboratory. This would provide me with sufficient resources for conducting sample preparation, isotopic separation methods to extract strontium and neodymium and isotopic measurements on both a multiple collector inductively coupled plasma mass spectrometer (MC-ICPMS) and on a thermal ionization mass spectrometer (TIMS). Additionally I would hope that my work on Antarctic paleoclimate studies continues past my Ph.D. into a post-doctoral research position.

References

- Cook, C.P., et al., 2013. Dynamic behaviour of the East Antarctic ice sheet during Pliocene warmth. *Nature Geoscience*. DOI: 10.1038/NGEO1889
- McKay, R., et al., 2012. Antarctic and Southern Ocean influences on Late Pliocene global cooling. *PNAS* 109, 6423–6428.
- Naish, T., et al., 2009. Obliquity-paced Pliocene West Antarctic ice sheet oscillations. *Nature* 458, 322–328.
- Roy, M., et al., 2007. $^{40}\text{Ar}/^{39}\text{Ar}$ ages of hornblende grains and bulk Sm/Nd isotopes of circum-Antarctic glacio-marine sediments: Implications for sediment provenance in the southern ocean. *Chemical Geology*, 244, 507–519
- Patterson, M. O., et al., 2014. Orbital forcing of the East Antarctic ice sheet during the Pliocene and Early Pleistocene. *Nature Geosci*, 7, 841–847

RACHEL BERTRAM Curriculum Vitae

Second Year Ph.D. Research Student, Imperial College London, UK

Email: r.bertram14@imperial.ac.uk

Institute Address: Dept. Earth Science and Engineering, Imperial College London, London, SW7 2AZ

Home Address: 73 Woodstock Road, London, N4 3EU

Work Phone Number: +44 (0)20 759 47137 Mobile Phone Number: +44 (0)7896 604 795

Personal Web Page: <http://www.imperial.ac.uk/people/r.bertram14/research.html>

EDUCATION

- Ph.D. 2014 – Reconstructing the East Antarctic Ice Sheet during the Plio-Pleistocene using Geochemical Provenance Analysis (*working title*)**
Department of Earth Science and Engineering, Imperial College London
Grantham Institute of Climate Change and the Environment, Imperial College London
Supervised by Dr. Tina van de Flierdt Funded by Kristian Gerhard Jebsen Scholarship
- MSci 2010 – Natural Science in Geography and Earth Sciences**
2014 Durham University First Class Honours
- Research Project (2013 – 2014): **Assessing and Quantifying the “Ground Air” Store of Carbon Dioxide Located in the Unsaturated Zone** supervised by Dr. James Baldini
- Dissertation (2012 – 2013): **The Influence of Solar Activity on Precipitation Variability in Europe** supervised by Dr. James Baldini

AREAS OF SCIENTIFIC INTEREST

Paleoclimate, Antarctic Science, Provenance Tracing, Climate Change, Pliocene Studies, Pleistocene Studies, Isotope Geochemistry

PUBLICATION

- Baldini, J.U.L., **Bertram, R.A.**, and Ridley, H.E. (under revision), “Quantifying the Earth’s second largest reservoir of carbon dioxide gas: “ground air” and its role in glacial-interglacial atmospheric CO₂”, Global and Planetary Change

CONFERENCE ABSTRACTS

- Bertram, R.A.**, van de Flierdt, T., Wilson, D.J., Jimenez-Espejo, F., McKay, R., and Escutia, C., (2016), “Rates of East Antarctic Ice Sheet retreat during Plio-Pleistocene warm periods from detrital provenance analysis at IODP Site U1361”, [Poster], To be exhibited at 12th International Conference of Palaeoceanography, 28th August – 2nd September 2016, Utrecht, Netherlands
- Bertram, R.A.**, van de Flierdt, T., Jimenez-Espejo, F., and McKay, R. (2015), “Exploring the Rate of East Antarctic Ice Retreat during the Pliocene using Geochemical Provenance Analysis”, [Oral Presentation], Exhibited at Goldschmidt 2016, 27th June – 1st July 2016, Yokohama, Japan
- Bertram, R.A.**, van de Flierdt, T., Jimenez-Espejo, F., and McKay, R. (2015), “Exploring the Rate of East Antarctic Ice Retreat during the Pliocene using Geochemical Provenance Analysis”, [Oral Presentation], Exhibited at Geochemistry Group Research in Progress Meeting 2016, 30th – 31st March 2016, Leeds, UK **Honorary Mention for Oral Presentation**
- Bertram, R.A.** and Baldini, J.U.L., (2014) “Quantifying the Large Terrestrial “Ground Air” Carbon Reservoir on Geological Timescales”, [Poster], Exhibited at The Karst Record VII International Conference, 29th September – 3rd October 2014, Melbourne, Australia

ADDITIONAL CONFERENCES ATTENDED

- Geochemistry Group Research in Progress Meeting 2015, University of Southampton, March 2015
- 2014 UK IODP Conference, Royal Geographical Society London, November 2014
- UK Antarctic Research Symposium, University of Bristol, September 2014

WORKSHOPS/TRAINING COURSES ATTENDED

- IODP Core Sampling at College Station, 12th-13th May 2016, Texas, USA
- U.S. Science Support Program – International Ocean Discovery Program Workshop: Antarctica's Cenozoic Ice and Climate History: New Science and New Challenges of Drilling in Antarctic Waters, 9– 11th May 2016, Texas, USA
- ECORD Training Course: The Virtual Drillship Experience, 9th– 13th March 2015, Bremen, Germany
- The Imperial Residential: Enhancing Collaboration and Impact, 3rd – 6th March 2015, London, UK

FUNDING AWARDS

- Geochemistry Group Student Travel Bursary for Goldschmidt 2016 - £200
- SCAR Travel Funding to attend IODP Antarctica's Cenozoic Ice and Climate History Workshop - £527
- Scholarship from the Kristian Gerhard Jebsen Foundation for PhD project (4 year duration)
- Van Mildert College Principle's Award 2014, Durham University - £1,000

POSITIONS OF RESPONSIBILITY

- 2015 - Earth Science and Engineering Graduate Society Committee Secretary, Imperial College London
- 2015 - Earth Science and Engineering Athena SWAN Committee PhD Student Representative, Imperial College London
- 2014 - Earth Science and Engineering Undergraduate Module Graduate Teaching Assistant
 - *Climate*: Teaching assistant and marking of written exam (lecturer: Dr. Tina van de Flierdt)
 - *Undergraduate Independent Project First Year*: Conducting oral assessments and marking written essay (lecturer: Dr. Elizabeth Day)
 - *Ice and Fire*: Teaching assistant and formative feedback (lecturer: Prof. Martin Siegert)
 - *Paleoceanography*: Teaching assistant and marking group presentations (lecturer: Dr. Tina van de Flierdt)
- 2014 - Ambassador for the Science and Solutions for a Changing Planet Doctoral Training Program in the
- 2015 Grantham Institute for Climate Change and the Environment, Imperial College London

ACADEMIC COMPETITIONS

- Imperial College London 3 Minute Thesis Competition, 21st April 2016, London, UK
- Department of Earth Science and Engineering Internal 3 Minute Thesis Competition, 15th February 2016, London, UK - **Winner of Judges Choice Award**
- Science and Solutions for a Changing Planet Doctoral Training Partnership Conference 2015 3 Minute Thesis Competition, 14th September 2015, London, UK - **Winner of Audience Choice Award**
- Durham University 2014 Rising Stars Research Symposium, 23rd June 2014, Durham, UK - **Winner of Audience Choice Award for Best Presentation**

COMMUNICATION AND OUTREACH ACTIVITIES

- **Public Engagement**: Organise and implement activities for general public including “Drawing Climate Change” (Grantham Institute event, April 2016) and “The Carbon Footprint of Christmas” (Imperial Fringe, December 2014)
- **Outreach Activities**: Published a successful blog with a group of peers (“Ozzy’s Odyssey”, 2014-2015) making current climate change issues accessible to the general public
- **Disseminating Scientific Research**: Communicated Ph.D. research in three minutes to lay audiences at various competitions (September 2015, February 2016 and April 2016)

PERSONAL INTERESTS

Rachel enjoys walking and recently completed the 26.2 mile “London Moonwalk” in May 2016. Rachel also enjoys travelling and aims to visit all the continents: she has already visited four, will be visiting the fifth later this year, is planning a trip to the sixth after finishing her Ph.D., and studies the seventh.



13 August 2016

IODP Expedition 374 application of Ms Rachel Bertram

To Whom it May Concern,

I am the principal PhD advisor for Ms Rachel Bertram, who is applying to participate in IODP Expedition 374 to the Ross Sea.

Rachel is a second year PhD student in the Department of Earth Science and Engineering at Imperial College London, supervised by myself and collaborating with a number of IODP Expedition 318 scientists (i.e. Carlota Escutia, Francisco Jimenez Espejo, Rob McKay).

Her project is to study the stability of the East Antarctic Ice Sheet (EAIS) during times of past warmth in the Plio-Pleistocene (past ~4 million years), building on initial provenance work by my former student (Cook et al., 2013). Rachel started with picking four time intervals from the middle to late Pliocene at rise Site U1361 to produce the first sub-orbital records of sediment provenance and by inference ice dynamics. Her results on detrital neodymium and strontium isotopes, which track the bedrock eroded from the continent, are absolutely stunning, and suggest that retreat of the EAIS into the Wilkes Subglacial basin takes a few thousand years during Pliocene warm events (Bertram et al., in prep). After sampling at College Station in May 2016, Rachel is now completing the first Plio-Pleistocene record of sediment provenance from offshore the vulnerable Wilkes Subglacial basin, to then move into mid to Late Pleistocene ice dynamics in the region. In parallel she is performing some groundtruthing work on the provenance tracing method. In September we will start a new collaboration with Richard Levy at GNS, to work on one of the CIROS cores from the Ross Sea to combine provenance tracing in a very defined setting with ice sheet modelling.

Rachel came to Imperial with high praise from Durham, and a paper from her MSci thesis in the pipeline for publication. She is a bundle of energy and enthusiasm, and a real joy to have in the group. Her project requires frequent interaction with other Exp 318 scientists, and Rachel is absolutely superb in handling these interactions in an efficient, professional and engaging way. She also stands out through her great science communication skills. Rachel had no prior knowledge in isotope geochemistry before coming to Imperial, with the steep

task of learning it all ahead of her. She is now fully independent and competent in sediment processing, ion chromatography and mass spectrometry for the elements strontium and neodymium. In addition, she carried out major and trace element analysis in collaboration with Sam Hammond at the Open University (Milton Keynes, UK).

I have no doubt that Rachel will do very well in a ship environment, even though she has not sailed before. She will probably be the one still smiling after eight weeks, when everybody else starts running out of energy. If selected, I would be happy for her to take on the provenance work on Expedition 374. I would of course support her towards this goal. Her PhD funding comes from the Kristian Gerhard Jebsen Foundation, and is fully guaranteed for four years, including laboratory consumables (until October 2018). I am confident that Rachel can finish the work on her planned PhD chapters by January 2018 so that she would have ~ 7 months after the cruise to work full time on creating results for IODP Expedition 374. She will have my full support and the facilities to do so, and I have no doubt that she will be able to deliver a large amount of fantastic provenance work within this time frame.

Please let me know should you have any further questions.

Best regards,
Tina van de Flierdt

A handwritten signature in black ink, reading "T. van de Flierdt". The signature is written in a cursive style with a long horizontal stroke at the top.



APPLICATION TO PARTICIPATE IN AN IODP EXPEDITION

ESSAC Office ECORD Science Support & Advisory Committee

GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
24148 Kiel, Germany

Hanno Kinkel (ESSAC Science Coordinator):

Tel: +49 431 600 2418

Fax: +49 431 600 2922

Web Page: <http://www.essac.ecord.org> Email: essac@geomar.de

Please type information

Apply to Sail Application Form

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: Blake-Mizen

First name: Keziah

Current Position: PhD Student

Institution: University of Exeter

Address: Camborne School of Mines, University of Exeter Penryn Campus

City, Postcode, Country: Truro TR10 9FE, United Kingdom

Tel. work: (+44)1326 254112 (College Secretary, Ms Jo Shepherd)

Tel. home: (+44)7963 962886

Fax: 01326 370450

Email: krb210@exeter.ac.uk

Country of citizenship: United Kingdom

Place of birth/date of birth: United Kingdom/10th May 1992

Gender: Female

Education (highest degree, including year PhD was received / is expected): Masters (MESci), PhD expected 2018

Are you currently a student? YES Expected Graduation Date: 21st September 2018

2. EXPEDITION INFORMATION

Summary of proposed participation, including area of scientific interest, current research and participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

Building orbital-scale records of ice-rafting and sea-ice extents to investigate the link between WAIS and Northern Hemisphere ice-sheet growth over the Plio-Pleistocene climate transition. Proxies to be used are IRD and quartz-grain microfeatures.

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

Extensive hands-on experience with ODP/IODP legacy material (ODP Site 918 and IODP Site U1307). Discrete and u-channel samples analysed for IRD, grain type compositions (QEMSCAN), XRF and magnetic properties (NRM, ARM, magnetic susceptibility).

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

1) Post-cruise funding will be provided by a UKIODP Moratorium Award up to a value of £50k for 6 months. 2) Penryn Campus is equipped with a brand-new sedimentology lab and FEG SEM, providing all necessary facilities to carry out the proposed work in continued collaboration with my current supervisor, Dr. Ian Bailey, and Dr. Kristen St John at James Madison University (Virginia, U.S.A.).

Three scientific and/or personal references

Dr. Ian Bailey

Camborne School of Mines
University of Exeter
Penryn Campus
Cornwall TR10 9FE
U.K.

Prof. Stephen Hesselbo

Camborne School of Mines
University of Exeter
Penryn Campus
Cornwall TR10 9FE
U.K.

Prof. Paul Pearson

School of Earth and Ocean Sciences
Cardiff University Main Building
Cardiff CF10 3AT
U.K.

3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist		
physical properties specialist	x	Running cores for magnetic susceptibility/XRF
sedimentologist	x	Ice-rafted debris/biogenics/clay proportion estimations
structural geologist		
paleontologist		
paleomagnetist		
petrologist		
hydrogeologist		
Other		

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for%20Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants *must inform their national office* (if applicable) *and national delegate* and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.



Keziah Blake-Mizen
Camborne School of Mines
University of Exeter
Penryn Campus
Cornwall TR10 9FE
U.K.

10 August 2016

RE: Ross Sea West Antarctic Ice Sheet History, IODP Expedition 374 – Application to Sail

Dear Prof. Behrmann, Dr. Kinkel and Prof. Morris,

I am writing to express my keen interest in being a shipboard participant onboard IODP Expedition 374, “Ross Sea West Antarctic Ice Sheet History”, in the capacity of a Sedimentologist. Please accept this letter of interest, along with the attached completed webform, CV and letter of support, as my application.

On-board contribution

I have extensive hands-on experience working with (I)ODP legacy material, which is crucial to my PhD work. I am based at the University of Exeter but my PhD is a large international collaborative effort, involving researchers at the British Geological Survey, National Oceanography Centre Southampton, Oregon State University, Lafayette College and the University of Florida. My work includes handling and sampling cores following IODP procedure at MARUM (September 2014), identifying lithologies and deformation structures, processing discrete samples for estimation and analysis of various components (ice-rafted debris, biogenic material and clays), scanning u-channels for XRF and magnetic properties, and reading and interpreting IODP reports and proceedings. This experience makes me well-suited to being a shipboard Sedimentologist, a role I would be happy to undertake on Exp. 374.

I would additionally be able to perform the task of Physical Properties specialist due to my experience using automated loggers to measure magnetic susceptibility and other properties (NRM, ARM and XRF) on u-channels at Oregon State University. This role would be my second preference should there be no remaining openings for ECORD Sedimentologists.

Post-cruise scientific plans

The proposed work outlined in this application constitutes a natural extension of research already underway as part of my PhD, which focuses on utilising samples from North Atlantic ODP Site 918 and IODP Site U1307 to reconstruct past extents of the southern Greenland Ice Sheet (sGrIS) and palaeocirculation of the deep North Atlantic Ocean over the Plio-Pleistocene intensification of Northern Hemisphere glaciation (iNHG). I have worked primarily with Dr. Ian Bailey at the University of Exeter and secondarily with Dr. Kira Lawrence at Lafayette College, Dr. Chuang Xuan at the University of Southampton, Dr. Robert Hatfield, Dr. Joseph Stoner and Dr. Anders Carlson at Oregon State University, and Prof. Jim Channell at the University of Florida. This work has enabled orbital-scale reconstruction of Plio-Pleistocene sGrIS extents and iceberg production through lead-isotope provenance analysis of individual feldspars, and calculation of IRD mass accumulation rates. In addition, the acquisition of XRF and

palaeomagnetic data has facilitated the construction of an improved splice and orbital-scale age model for the interval (since, as will be the case for this Antarctic expedition, the cores lack the abundant carbonates usually used for biostratigraphy), as well as the identification of a palaeocurrent signature.

A key interest of mine that has evolved from this research is in understanding the driver(s) behind iNHG and the interesting and complex oceanographic changes measured by myself and other researchers in the deep North Atlantic, of which the Pliocene expansion of the West Antarctic Ice Sheet has recently emerged as a strong contender. I am keen to weave this interest into the overarching scientific objectives of Exp. 374, in particular aims (1) evaluating WAIS contribution to far-field ice volume and sea level estimates; and (4) documenting WAIS sensitivity to Earth's orbital configuration under varying climate boundary conditions.

Mechanisms behind iNHG, a time of significant ice-sheet growth on Greenland, North America and Scandinavia from ~2.7 Ma (Bailey *et al.*, 2013; *QSR*), are presently very poorly understood. Leading views on AIS evolution, however, have emphasised its newly-realised driving role in initiating iNHG. A common theme in proposed hypotheses is the state of the Atlantic Meridional Overturning Circulation, with authors contradictingly invoking a spin-up (e.g. Bartoli *et al.*, 2005; *EPSL*) or a slow-down (e.g. McKay *et al.*, 2012; *PNAS*) over iNHG. My new magnetic property data from Site U1307 (Blake-Mizen *et al.*, 2016; *EGU General Assembly Conference Abstracts*) supports the latter, suggesting a significant reduction in strength of a northern branch of AMOC – the Western Boundary Undercurrent, which flows over the site – between ~2.7 and 2.4 Ma, coeval with increased sGrIS ice-raftering.

In addition, Lang *et al.* (2016; *Nat. Geosci.*) have found evidence for significant incursions of Southern Component Water into the deep North Atlantic prior to and during the onset of iNHG, possibly as far back at 3.3 Ma. This led them to propose NADW/AABW boundary shoaling during this period is likely to have been driven from the south by deepwater densification, related to enhanced Antarctic sea-ice formation (as is hypothesised for the Last Glacial Maximum; Ferrari *et al.*, 2014; *PNAS*). This may have reduced AMOC strength and thus heat transport to high latitudes of the North Atlantic, acting as a positive feedback to amplify glacial cycles from ~2.7 Ma. Acquiring further proof to support this proposed link between the expansions of both polar ice-sheets would be extremely exciting.

To investigate this link, I envisage taking advantage of the planned proximal–distal transect of Exp. 374 target sites to obtain orbital-resolution records of complementary land- and sea-ice extent proxies across the iNHG target interval (~3.3–2.2 Ma). This would involve firstly building a record of IRD mass accumulation rates, a factor directly related to ice-sheet extent; and secondly reconstructing sea-ice presence via a new method involving microscopic evidence for the transport mechanism of individual grains. This novel technique has been developed in the Arctic by St John *et al.* (2015; *Ann. Glaciol.*), and demonstrates that quartz-grain microfeatures can be used to infer relative changes in the dominance of sea-ice vs. iceberg transport to a site over time. Existing sedimentological proxies for palaeo-sea-ice are few and limited, but this method could prove to be very effective as well as being fairly inexpensive. St John *et al.* (2015) call for further analyses from both poles in order to broaden representation and refine limitations; Exp. 374 thus represents a unique and exciting opportunity to further develop this method in the context of Antarctica.

Comparing at least two sites in the proposed transect (e.g. EBOCS-02B and RSCR-02B) should enable identification of key expansions and retreats of both the WAIS and sea-ice, while

avoiding preservation issues. While the ANDRILL project greatly improved our knowledge of Antarctic sea-ice during iNHG, a higher-fidelity record is needed from more distal sites not eroded by ice-sheet grounding. This work has the potential to produce the first orbital-resolution record of ice-rafting for the Plio-Pleistocene WAIS, which would complement and improve on previous work in the area (such as the AND-1B core; McKay *et al.*, 2012; Naish *et al.*, 2001; *Nature*) and shed new light on obliquity vs. precession forcing during this period (Patterson *et al.*, 2014; *Nat. Geosci.*). I would also plan to XRF scan the cores of interest for key element ratios that would enhance this record further. The data I produce should be highly complementary to other participants' goals (particularly to non-sedimentological sea-ice proxies, such as IP₂₅ and diatoms), as well as aiding with stratigraphy and age model generation.

Planned post-cruise support

1) Funding

I will have almost completed my PhD by the time the expedition sails, and therefore will pause the clock for six months in order to complete the post-cruise workplan, funded by a UKIODP Moratorium Award up to a value of £25k that I will apply for prior to sailing. I envisage that this would easily support the generation of an IRD record with an initial target resolution of at least ~500 kyr; as well as a pilot study into the relative abundance of sea-ice-rafted material for key glacials and interglacials using the quartz-microfeature method. In order to avoid any delay in generating this data I would request a modest subset of shipboard-acquired P-Mag/MAD and/or core-catcher samples, which would be adequate for this sort of work. XRF scanning of the cores of interest will take place after the official sampling party. This research would be carried out in continued collaboration with my current supervisor at CSM, Dr. Ian Bailey (who has strong interests in iNHG ocean circulation change), and I am seeking additional support from Dr. Kristen St. John who I have previously collaborated with on ODP Site 918. Any necessary travel to visit Dr. St John at James Madison University in Virginia will be covered by the UKIODP Moratorium Award. The generated pilot dataset would provide an excellent springboard for a UK NERC Standard Grant application with myself as the named PDRA, and I will seek collaboration with other shipboard and shorebased participants to complement and strengthen my approach.

2) Facilities available

As of August 2016 we have a brand-new sediment processing and optical microscopy lab within the Deep Time Global Change group at CSM, which is ideally equipped to isolate, measure and visually analyse IRD from discrete samples. For the quartz-microfeature method I will use the same washing facilities at CSM to isolate the correct fraction, and the new FEG SEM in Penryn Campus' Environment and Sustainability Institute to image grain samples and identify microfeatures under the guidance of Dr. Kristen St John.

I am happy to clarify any information and answer any further queries you may have, and I hope you will consider me as a participant on this expedition.

Yours sincerely,



Keziah Blake-Mizen
University of Exeter

CV: KEZIAH BLAKE-MIZEN

Camborne School of Mines, University of Exeter Penryn Campus, Cornwall TR10 9FE, U.K.

Tel: (+44) 7963 962 886 E-mail: krb210@exeter.ac.uk

Research Interests

My research interests are focussed on reconstructing past ice-sheet behaviour for both warmer- and colder-than present climate states, in order to constrain their natural variability and inform models that make projections for the future. My work has a particular emphasis on understanding how the Greenland Ice Sheet grew over the Plio-Pleistocene intensification of Northern Hemisphere glaciation, and feedbacks transferred via the deep North Atlantic Ocean during this key climatic transition.

I have used a variety of techniques and proxies in my work. These include using optical microscopy to identify and estimate proportions of ice-rafted debris, laser-ablation MC-ICP-MS to measure IRD lead-isotope compositions (linked to provenance), and SEM QEMSCAN software to quantify changes in grain types. I have also used u-channel magnetometry to obtain records of palaeointensity and magnetic grain size, to constrain the age-model and changes in circulation strength for my key study site, as well as u-channel XRF to track changes in sediment source (K/Sr, Ti/Fe ratios).

Education

Sept 2014 – Present

PhD – Camborne School of Mines, University of Exeter

“Reconstructing iceberg-calving locations and spatial extents of the Greenland Ice Sheet over the Plio-Pleistocene intensification of Northern Hemisphere glaciation.”

1. Isolating and optically analysing the coarse sand fraction from discrete core samples to construct a record of south Greenland ice-rafting over the Plio-Pleistocene climate transition (~3.3 to 2.2 million years ago). 2. Measuring the lead-isotopic composition of individual ice-rafted feldspars through LA-MC-ICP-MS to establish provenance records for major expansions and retreats. 3. Using QEMSCAN SEM to establish a quantitative measure of changing grain types deposited over iNHG. 4. Constructing an improved splice between Site U1307 Holes A and B using high-resolution XRF and magnetic property data. 5. Constructing an orbital-resolution age model through measurement and correlation of the relative palaeointensity record with other published records (EPAPIS-3000, IODP Site U1308). 6. Constructing magnetic grain size and clastic grain size distribution records to investigate palaeocirculation strength changes over iNHG.

Supervised by Dr. Ian Bailey and Prof. Stephen Hesselbo

Funding type: University of Exeter Scholarship

Sept 2010 – July 2014

Earth Sciences MESci (First Class Honours) – Cardiff University

Independent research project: *“Investigating the global pattern of stilosomellid diversity and climate change: new data from the Late Cretaceous to Oligocene of Tanzania.”*

Supervised by Prof. Paul Pearson

Practical / Analytical Experience

- Sediment core sampling and preparation for analysis
 - Optical and polarising microscopy
 - Stable isotope (carbon and oxygen) mass spectroscopy
 - Laser-ablation MC-ICP-MS: lead-isotope analysis
 - SEM: QEMSCAN petrographic analysis, imaging
 - U-channel magnetometry: palaeomagnetic stratigraphy and properties (NRM, ARM, MS)
 - U-channel XRF: elemental analysis
 - Microsoft Excel: data synthesis and analysis
 - Analyseries for core-splicing using multiple proxies (RPI, GRA, XRF data)
 - Kaleidagraph, Grapher: plotting data
 - Illustrator, Photoshop: figure and poster construction
-

Teaching Experience

- 42 hours (to date) practical demonstrating in first-year undergraduate Geology modules (stratigraphy, palaeontology, mapping)
 - Learning and Teaching in Higher Education Stage 1 and 2 certificates
-

Awards

- Best poster, Exploring Research in Cornwall Conference: March 2016
 - Gill Harwood Memorial Fund (£340) to attend EGU General Assembly, Vienna: March 2016
 - Evan Llewelyn Davies Prize for best performance in final-year MESci Earth Sciences: July 2014
-

Major Conferences Presented At

- EGU General Assembly, Vienna: April 2016
Blake-Mizen, K., Bailey, I., Carlson, A., Stoner, J., Hatfield, R., Xuan, C. and Lawrence, K., 2016, April. Reconstructing southern Greenland Ice Sheet history during the intensification of Northern Hemisphere glaciation: Insights from IODP Site U1307. In *EGU General Assembly Conference Abstracts* (Vol. 18, p. 701).
-

Professional Affiliations

- Fellow of the Geological Society of London
 - Student Member of the International Association of Sedimentologists and the European Geosciences Union (EGU)
-

Activities

- Activities Officer of the Penryn Campus Postgraduate Society: April 2016 – Present
- Regular participator in the CSM 'Deep Time Global Change' research group's Reading Group meetings: February 2015 – Present

Scientific / Personal References

Dr. Ian Bailey

Camborne School of Mines
University of Exeter
Penryn Campus
Cornwall TR10 9FE
U.K.

Prof. Stephen Hesselbo

Camborne School of Mines
University of Exeter
Penryn Campus
Cornwall TR10 9FE
U.K.

Prof. Paul Pearson

School of Earth and Ocean
Sciences
Cardiff University Main Building
Cardiff CF10 3AT
U.K.

Dr. Ian Bailey

Lecturer in Geology and CSM Deputy
Director of Education

Email: I.Bailey@exeter.ac.uk

10th August 2016

CONFIDENTIAL: Letter in support of Keziah Blake-Mizen's application to sail on IODP Expedition 374

Dear Prof. Behrmann, Dr. Kinkel and Prof. Morris,

I am writing to you in my capacity as the PhD supervisor of Keziah Blake-Mizen at the University of Exeter to support her application to participate as a shipboard scientist in the forthcoming 2018 Ross Sea IODP Expedition 374. Keziah is a highly impressive, hard-working and strongly ambitious person and someone I have absolutely no doubt would make an excellent member of the 374 science team.

For her PhD, Keziah is examining the history of the Greenland Ice Sheet and North Atlantic Ocean circulation during the late Pliocene intensification of Northern Hemisphere glaciation using a variety of sedimentological, palaeomagnetic and radiogenic isotope techniques with (I)ODP sediments. She will begin her third year this September and has already made a great success of her research. She is on time to meet her thesis submission deadline of early Spring 2018, so Expedition 374 represents an excellent and timely opportunity to expand her research interests and to forge new collaborations as she seeks to gain a foothold in the world of academia.

I have no doubt that Keziah would flourish onboard the JR. She is a team player with a proven track record of working effectively in large and internationally collaborative groups. For example, for her PhD she is successfully and independently orchestrating a highly fruitful working relationship with a large international team of scientists from Oregon State University (Carlson, Stoner, Hatfield), Florida (Channell), Lafayette (Lawrence) and the University of Southampton (Xuan). She clearly understands the importance of collaboration in the Earth Sciences and I know from talking to her that she would jump at the chance to form new and diverse partnerships with the 374 science team. Keziah is a fast learner. She requires minimal guidance from me, but has demonstrated the capacity readily and gratefully to seek out and take guidance from experienced colleagues. Her time spent (over 5 weeks) working long shifts in both the Bremen IODP core repository and the palaeomagnetic and core scanning facilities in Corvallis (COAS, Oregon State University) provides me with every confidence that she would cope very well intellectually with the environment of rapidly changing information that characterises the shipboard JR experience, but also with the highly demanding two months of 12 hour shifts.

In the past two years she has developed many key skills. I would describe her chiefly as a sedimentologist and a stratigrapher with considerable practical experience in measuring and interpreting palaeomagnetic and XRF core scanning data and in generating first hand MC-ICP-MS radiogenic isotope data for detrital sediment provenance studies. For her PhD, she has developed from scratch the stratigraphy and age model for the late Pliocene and Early Pleistocene cores recovered from IODP Site U1307, Eirik Drift. This record already had a shipboard-derived splice for the past 2.2 Ma, but only a discontinuous un-spliced record for 3.3–2.2 Ma that had been largely avoided for research by the Expedition 303/306 shipboard party as well as

by other post moratorium researchers. Despite this significant hurdle, Keziah used physical property, XRF core-scanning data, core images and core inspections to extend the U1307 splice and to generate a Relative Palaeointensity-based age model for this site for the past 3.3 Ma. This represents the first high-fidelity age model for a circum-Greenland late Pliocene marine core, which we all know are devoid of suitable carbonate for stable isotope stratigraphies. The environmental palaeomagnetic data that she produced have also provided the first clear evidence that the Pliocene intensification of northern hemisphere glaciation was associated with a change in the flow speed of Iceland-Scotland Overflow Water during iNHG, and potential evidence for a considerable reduction in the strength of AMOC in response to glaciation at this time. This work was recently presented at EGU 2016 and despite only being in the second year of her PhD, these data are already forming the basis of a publication that Keziah is currently writing up for submission to EPSL. She is also using her geochemical XRF data and individual sand feldspar Pb-isotope data to shed considerable important new light on the glacial (erosive) history of the GIS during the mid Piacenzian Warm Period and the subsequent onset of major Northern Hemisphere glaciation. In short, I am hugely impressed with Keziah's progress.

One aspect of Keziah that has also impressed me significantly is her desire to network. With one eye firmly on her future she is not content only to make excellent progress on the current matter at hand, but she is also keen to establish new links to forge future post-doctorate opportunities. Her participation in Expedition 374 would therefore represent an outstanding opportunity to further this goal. I have no doubt that Keziah will be highly competitive in any applications she makes for advertised post-doc positions/research fellowships when the time comes.

Looking at Keziah's 'case to sail', it is clear that her post-cruise scientific plans will help meet the main objectives of Expedition 374 and are well tailored to promote collaboration with other shipboard participants interested in, e.g. geochemical and palaeontological indicators of sea-ice extent. To support her post-cruise research, she plans to pause the clock on her PhD for six months and apply for UK IODP Moratorium Award. This will provide six months of support (March-August 2018) for Keziah to work on the Exp 374 material as a graduate researcher at Exeter under my supervision. She would work in our brand new state-of-the-art Cornwall Campus Deep Time Global Change sedimentology and SEM laboratories on a modest subset of the shipboard acquired p-mag, MAD and/or core-catcher samples and generate post-cruise XRF core scanning data. While the research she proposes would test the findings of her PhD, it would represent a unique study unrelated to her thesis. Her goal is to generate pilot datasets that, alongside the shipboard data, would support a NERC Standard Grant application from the University of Exeter with her as the named PDRA. If for whatever circumstances, Keziah's future does not permit her fulfilling the work herself, I will underwrite the proposed study to ensure that it is completed.

Yours Sincerely



Ian Bailey



APPLICATION TO PARTICIPATE IN AN IODP EXPEDITION

ESSAC Office ECORD Science Support & Advisory Committee

GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
24148 Kiel, Germany

Hanno Kinkel (ESSAC Science Coordinator):

Tel: +49 431 600 2418

Fax: +49 431 600 2922

Web Page: <http://www.essac.ecord.org> Email: essac@geomar.de

Please type information

Apply to Sail Application Form

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: Ferreira

First name: Joana

Current Position: Master's student in Paleontology

Institution: Faculty of Science and Technology, New University of Lisbon

Address: Rua dos Olivais, nº29, Solposto, Santa-Joana

City, Postcode, Country: Aveiro, 3810-299, Portugal

Tel. work:

Tel. home: 91 232 82 72

Fax:

Email: jn.ferreira@campus.fct.unl.pt , joana_nagf@hotmail.com

Country of citizenship: Portugal

Place of birth/date of birth: Aveiro, 10/12/1992

Gender: Female

Education (highest degree, including year PhD was received / is expected): Master Degree expected in September 2016

Are you currently a student? YES Expected Graduation Date: September 2016

2. EXPEDITION INFORMATION

Summary of proposed participation, including area of scientific interest, current research and participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

I'm interested in paleoclimatology and paleoceanography through proxies such as foraminifera and isotope signatures. I worked with the Montemayor-1 core on the influence of orbital parameters in planktonic foraminifera in the Messinian, with F. Sierro (U. Salamanca), but I'd work on lines other than foraminifera too.

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

Three scientific and/or personal references

In May this year I presented at the conference "NovaPaleo - Symposium of Paleontology", organized by the Department of Earth Sciences, Faculty of Science and Technology of the New University of Lisbon, the work to date on my thesis entitled "Montemayor-1 Foraminifera (Huelva, Spain) and inference of climate change between 5.6 to 5.5 Ma", oriented by professor Francisco Sierro from the University of Salamanca and professor Paulo Legoinha from the Faculty of Science and Technology of the New University of Lisbon.

3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist		
physical properties specialist		
sedimentologist		
structural geologist		
paleontologist	x	Planktonic foraminifera
paleomagnetist		
petrologist		
hydrogeologist		
Other		

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for_Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants *must inform their national office* (if applicable) *and national delegate* and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.

APPLICATION TO PARTICIPATE IN AN IODP EXPEDITION

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

Interest letter

I am strongly interested in paleoclimatology and paleoceanography through the study of climate proxies such as foraminifera and isotope signatures. I am currently finishing my master's thesis, which deals with planktonic foraminifera in the Messinian and the influence of the orbital astronomical parameters (eccentricity, obliquity and precession) in their associations.

I worked with the Montemayor-1 core, collected on the Atlantic side of the Guadalquivir corridor, the last Betic corridor to close before the Messinian Salinity Crisis. While working on this core under the guidance of a world-class expert such as Prof. F. Sierro (Univ. Salamanca), I acquired an extensive (practical and theoretical) experience. As a result, I feel entirely comfortable working with foraminifera in practice and I am well familiarized with the relevant taxa and groups.

I'm convinced that my recent work has prepared me to the challenges raised by this expedition, but I am also an open-minded person ready to consider other research lines. I have good communication skills and I enjoy team work. Because of this, I am sure that I would be capable of integrating a group and bring my best to it. I feel 100% motivated and enthusiastic about this opportunity.

Joana Nunes Amaral Gonçalves Ferreira

CURRICULUM VITAE

JOANA NUNES AMARAL GONÇALVES FERREIRA



PERSONAL INFORMATION

Nationality: Portuguese

Date of birth: 10 December 1992

Email: jn.ferreira@campus.fct.unl.pt • joana_nagf@hotmail.com

Telephone: (M) +351 91 232 82 72 • (H) +351 234 197 599

Driving license: AV – 426329 0

CURRENT GOALS

Candidate to participate in IODP Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

Candidate to participate in IODP Expedition Number 369: Australia Cretaceous Climate and Tectonics

EDUCATION

<i>Master of Paleontology (currently developing the thesis)</i>	Faculty of Science and Technology, New University of Lisbon, Portugal
---	--

2014 – 2016	Classification of first year classes: 16,5/20 Main disciplines: Micropaleontology, Stratigraphy and Sedimentary Processes, Taphonomy and Paleoecology, Paleobotany and Palynology, Systematics and Taxonomy, Vertebrate Paleontology and Invertebrate Paleontology
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<i>Degree in Conservation and Restoration</i>	Faculty of Science and Technology, New University of Lisbon, Portugal
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2011 – 2014	Final classification: 15,1/20 Main disciplines: Physical Chemistry, Inorganic Chemistry, Organic Chemistry, Biochemistry Principles of Mathematics I and II, Physics I C, Principles of Mineralogy and Geology, Preventive Conservation, Diagnosis and Stone Conservation, Diagnosis and Metals Conservation, Diagnosis and Conservation of Ceramics and Glass.
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Seminars/ Symposiums

- 2014 Seminar/Workshop in Conservation and Restauration (theme: *Collections Care*) – the sculptural works by the artist Angêlo de Sousa (1938-2011) were inventoried, cleaned and neatly stored at the home of the artist, in Porto, Foz, Portugal, in places where the humidity and temperature were controlled, with inert materials to the pieces in question and support structures were made according to the needs of each sculpture.
- 2016 Symposium *NovaPaleo – Symposium of Paleontology*, organized by the Department of Earth Sciences, Faculty of Science and Technology of the New University of Lisbon – oral presentation of the work to date on my thesis entitled "Montemayor-1 Foraminifera (Huelva, Spain) and inference of climate change between 5.6 to 5.5 Ma", oriented by professor Francisco Sierro from the University of Salamanca and professor Paulo Legoinha from the Faculty of Science and Technology of the New University of Lisbon.

OTHER ACTIVITIES

- Volunteering work at the Project *Clean Portugal 2010* Participation in the collection of waste in 3 km long sandy beach of São Jacinto, Aveiro.

LANGUAGES

	<i>Spoken</i>	<i>Reading</i>	<i>Writing</i>
<i>Portuguese</i>	Mother tongue	Mother tongue	Mother tongue
<i>English</i>	Fluent	Advanced	Advanced
<i>Spanish</i>	Good	Good	Elementar
<i>French</i>	Elementar	Good	Elementar

13/08/2016



APPLICATION TO PARTICIPATE IN AN IODP EXPEDITION

ESSAC Office ECORD Science Support & Advisory Committee

GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
24148 Kiel, Germany

Hanno Kinkel (ESSAC Science Coordinator):

Tel: +49 431 600 2418

Fax: +49 431 600 2922

Web Page: <http://www.essac.ecord.org> Email: essac@geomar.de

Please type information

Apply to Sail Application Form

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: Gariboldi

First name: Karen

Current Position: PhD Student, Università di Pisa, Italy (Defense expected by the end of October 2016); I also currently have a scholarship ending in December 2016 at the Università di Milano-Bicocca, Italy. I am applying for a new position after December 2016 in numerous Institutions.

Institution: Università di Pisa, Italy; Università di Milano-Bicocca, Italy.

Address: Dipartimento di Scienze della Terra, Università di Pisa, via Santa Maria 53

City, Postcode, Country: Pisa, 56126, Italy

Tel. work: +39-050-2215750

Tel. home: +39-348-0454862

Fax: +39-050-2210652/3

Email: karen.gariboldi@for.unipi.it ; karengariboldi@gmail.com

Country of citizenship: Italy

Place of birth/date of birth: Monza (MB), Italy, 12th April, 1985

Gender: Female

Education (highest degree, including year PhD was received / is expected): PhD expected by the end of October, 2016; Msc in Geological Sciences and Geotechnologies, 30th March, 2012.

Are you currently a student? YES Expected Graduation Date: PhD expected by the end of October, 2016

2. EXPEDITION INFORMATION

Summary of proposed participation, including area of scientific interest, current research and participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

I am a diatom biostratigrapher. My current research is focused on tropical diatom biostratigraphy and paleoecology. I worked also with Antarctic diatom paleoecology (see CV). I would love to participate to EXP. 374 as a diatom biostratigrapher.

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

I was part of the shipboard scientific staff during IODP EXP. 353 (Indian Monsoon Rainfall) as diatom biostratigrapher.

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

I am currently applying for a new position after December 2016 in numerous Institutions.

Three scientific and/or personal references

- Dr. Giovanni Bianucci, Dipartimento di Scienze della Terra, Università di Pisa, Italia (my PhD supervisor); giovanni.bianucci@unipi.it .
- Dr. Anna Gioncada, Dipartimento di Scienze della Terra, Università di Pisa, Italia (my PhD Assistant Supervisor; see attached letter of support); anna.gioncada@unipi.it .
- Prof. Caterina Morigi, Dipartimento di Scienze della Terra, Università di Pisa, Italia (Associate Professor –Micropaleontology- at the Dipartimento di Scienze della Terra, Università di Pisa; see attached letter of support); caterina.morigi@unipi.it .

3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist		
physical properties specialist		
sedimentologist		
structural geologist		
paleontologist	X	Diatom micropaleontologist
paleomagnetist		
petrologist		
hydrogeologist		
Other		

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for%20Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants *must inform their national office* (if applicable) *and national delegate* and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.

KAREN GARIBOLDI'S LETTER OF INTEREST
IODP Exp. 374, ROSS SEA WEST ANTARCTIC ICE SHEET HISTORY

Karen Gariboldi
PhD student
Tuscan Earth Science PhD Program
Earth Science Department, Pisa University
Via S. Maria 53 - 56126 Pisa, Italy

Pisa, 13th August, 2016

Dear Committee Members,

my name is Karen Gariboldi and I am a PhD Student at the Earth Science Department, University of Pisa, Italy (PhD expected by the end of October 2016).

My PhD is focused on the Mio-Pliocene Pisco Formation, Peru, which I dated by means of diatom biostratigraphy. Thanks to my PhD, I became familiar with the diatom biostratigraphy of the south tropical Pacific Ocean; recently, I also had the opportunity to employ my skills as biostratigrapher during IODP Exp. 353.

Although I have mainly worked with tropical diatom species, I also have experience with diatomaceous sediment from the Ross Sea (see CV).

As a diatom specialist, my on board-contribution to Expedition 374 objectives will be dual: 1) I will contribute to the construction of age models for all the investigated Sites; 2) I will focus on the recognition and dating of the different unconformities related to grounding events of the ice sheet in the continental shelf Sites. Knowing the ages of bioevents and ranges of diatom biostratigraphic markers, I will try both to date the grounding events and to evaluate the time occurred between every single grounding event and the corresponding retreat of the ice sheet at the different Sites. To complete the proposed tasks, before the Cruise I will study in detail the seismic lines for every target Sites and diatom biostratigraphic data available for the Ross Sea (in particular those obtained during the Andriil projects).

As post-cruise research plan, I will propose an integration of the age models with paleoecological data, thus providing important information on the advance and retreat velocity of the ice shelf. This data could be obtained by comparing the increasing/decreasing rate of sea-ice species within diatom assemblages with the sedimentation rates and mass accumulation rates of sediments along the Cores. Such results will be successively coupled and compared to sedimentary facies analysis. Data obtained from this study will give a strong contribution to the Expedition objectives, especially in assessing the ice sheet stability within time. Essential bibliography to be read before conducting these studies, will for sure comprehend the papers by Charlotte Sjunneskog, who treated both diatom assemblages and sedimentary facies in the Ross Sea.

Another potential post-cruise research could be focused on diatom seasonal laminations. During my PhD I applied to the sediments collected from the Pisco Fm. outcrops the technique developed by Jennifer Pike and Alan Kemp. This technique was developed to study diatom laminations in sediment collected by means of corers; it requires sediments to be embedded in epoxy resin. Once embedded in resin, laminations can be studied by means of SEM, obtaining information on the intensity of diatom blooms. The feasibility of this project can only be evaluated on-board after visual core description. If diatom laminations will be identified in strategic Core Intervals, these could potentially give an indirect contribution in understanding how the Earth's orbital configuration was influencing primary production in the Ross Sea.

I really love working on Oceanographic Vessel and I would love to take part to an Antarctic Expedition. My CV will provide additional details concerning my qualifications and experiences. I hope you will consider my application favourably!

Thank You very much for your attention.

Best regards,

Karen Gariboldi

A handwritten signature in black ink that reads "Karen Gariboldi". The script is cursive and fluid, with the first name "Karen" and last name "Gariboldi" clearly legible.

Karen Gariboldi

Earth Sciences PhD Program,
Earth Sciences Department, Pisa University, Via S. Maria 53, Pisa, Italy.
E-mail: karen.gariboldi@for.unipi.it
Office: +39 050 2215750 Mobile: +39 348 0454862

Personal Details:

First name: Karen
Surname: Gariboldi
Male/Female: female
Date of birth: April 12th, 1985

Education:

- PhD in Earth Sciences expected by the end of October, 2016 (Dipartimento di Scienze della Terra, Università di Pisa, Italy);
- MSc in Geological Sciences and Geotechnologies (110/110 cum laude; Dipartimento di Scienze Geologiche e Geotecnologie, Università di Milano-Bicocca, 30th March, 2012).

Areas of scientific interest: Stratigraphy, Micropalaeontology, Diatom Stratigraphy, Marine Diatoms Ecology, Palaeoecology, Sedimentology, Marine Geology, Marine Geomorphology, Marine Geochemistry.

Spoken languages: English (proficient user); German (basic user).

Work/Field Experiences

- 1st January - 31st December, 2016, Università di Milano-Bicocca:
collaboration contract within a PRIN (Italian Projects of Relevant National Interest) project (PRIN Project 2012YJSBMK).
 - ❖ OCCUPATION OR POSITION HELD: diatom biostratigrapher.
 - ❖ MAIN ACTIVITIES AND RESPONSABILITIES: dating Cenozoic formations infilling the Pisco Basin (Peru) by means of diatom stratigraphic markers; correlate different outcrops using diatom biostratigraphy; production of the relative age models.
- 13th - 28th September, 2015;
30th April 2014 - 23rd May, 2014;
3rd - 17th July, 2013, Lima and East Pisco Basin, Ica Desert, south of Ica, Peru:
fieldworks related to my PhD thesis.
1st - 23rd July, 2010. East Pisco Basin, Ica Desert, south of Ica, Peru:
fieldwork related to my Master thesis.
 - ❖ MAIN ACTIVITIES AND RESPONSABILITIES: description, mapping and sampling of diatomaceous outcrops for micropaleontological studies. Description and sampling of fossil marine vertebrates and dolomitic concretions to study the mechanisms of dolomite precipitation related to sulphate reduction and methanogenesis processes.
- 19th-23rd October 2015. IODP Exp. 353 Sampling Party, Kochi Core Centre, Kochi, Japan.
 - ❖ MAIN ACTIVITIES AND RESPONSABILITIES: subsampling of core sections.
- 29th November, 2014 – 29th January, 2015. IODP Exp. 353 “Indian Monsoon Rainfall”, Gulf of Bengala, Indian Ocean.
 - ❖ MAIN ACTIVITIES AND RESPONSABILITIES: dating core sediments by means of diatom biostratigraphy.

- 3rd April - 2nd August, 2012, Università di Milano-Bicocca:
collaboration contract within a PNRA (Italian National Programme for Research in Antarctica) project (Rosslope).
- ❖ OCCUPATION OR POSITION HELD: assistant micropaleontologist.
- ❖ MAIN ACTIVITIES AND RESPONSABILITIES: sample preparation, microscopy analysis, data analysis.

Training:

- 8th September - 10th October, 2014: 5 weeks stay at the School of Earth and Ocean Sciences, Cardiff University under the supervision of Dr. Jennifer Pike. During this stay I learned how to analyse diatom laminations.
- 9th - 20th September, 2013, MARUM, Bremen, Germany: Ecord Summer School "Deep-Sea Sediments: From Stratigraphy to Age Models".
- 11th - 15th June 2012, Plymouth Marine Laboratory, UK.
Primer-e course.
Primer-e is a software for statistical multivariate analyses, and it is now considered a standard for statistical study of marine communities and biodiversity research.

Oceanographic Cruises:

- 29th November 2014 - 29th January 2015:
Diatom Biostratigrapher on board of the RV JOIDES Resolution (IODP exp. 353 "Indian Monsoon Rianfall").
- 6th - 24th April, 2010.
"CoralFish-Magic Santa Maria di Leuca Cruise", Ionian Sea, Italy (RV Universitatis).
- 4th - 15th March, 2010.
"CARG Regione Liguria- RISK NAT Cruise", Ligurian Sea, Italy (RV Universitatis).
- 24th February - 4th March, 2010.
"Magic La Spezia Cruise", Ligurian Sea, Italy (RV Universitatis).
- 15th - 21st June, 2009.
"Magic Calabria Ionica Cruise", Ionian Sea, Italy (RV Universitatis).
- ❖ MAIN ACTIVITIES AND RESPONSABILITIES:
 - diatom biostratigrapher (IODP);
 - navigation;
 - geophysical data acquisition (mainly Chirp and Multibeam operator);
 - direct sampling operator (box-corer and grab operator);
- ❖ TECHNICAL SKILLS AND COMPETENCES ACQUIRED:
 - skills needed to acquire micropaleontological data during drilling operations (IODP);
 - skills needed to follow operations of geophysical data acquisition (mainly acquisition by means of Chirp and Multibeam but also by means of Side Scan Sonar, Minigun and Sparker)
 - skills needed to work with box-corers, grabs, benthic landers, dredges and gravity corers.
- ❖ SOFTWARES USED:
 - navigation and data acquisition: PDS2000, Delphwin V2.511; DESClogic (IODP).
 - countouring, gridding and surface mapping: Surfer, Global Mapper.

Awards and Grants:

ECORD RESEARCH GRANT 2015: award for outstanding graduate students to conduct innovative research related to the International Ocean Discovery Program. I received this grant for the project called : "Role of Volcanic Ashes in Enhancing Primary Production: Evidences in the Deep Time"

July 2013: ESF Short Visit Grant within the ESF activity entitled 'EARTHTIME - The European Contribution' to take part to the Ecord Summer School "Deep-Sea Sediments: From Stratigraphy to Age Models".

August 2012: ESF grant to take part to the COCARDE Workshop: "Fluid flow-related carbonate build-ups: from lacustrine to (early) marine environments – The Ries Impact Crater as a Natural Laboratory"

May 2012: second at the "best poster" competition, XII Paleodays, Catania, Italy, 24th -25th May, 2012.

Other Experiences

- 8th - 15th August, 2009; 5th - 12th July, 2008, Stromboli Island, Aeolian Archipelago, Messina, Italy:
scientific divulgation activities at the INGV (Istituto Nazionale di Geofisica e Vulcanologia, via di Vigna Murata 605, 00143 Roma, Italy).
 - ❖ OCCUPATION OR POSITION HELD: scientific informer.
 - ❖ MAIN ACTIVITIES AND RESPONSABILITIES: my task was to give the tourists information concerning the volcanic nature of the Island and volcanic risk.

Karen Gariboldi's Publication List

Under review

- Gariboldi K., Bosio G., Malinverno E., Gioncada A., Di Celma C., Villa I.M., Urbina M., Bianucci G. Biostratigraphy, geochronology and sedimentation rates of the late Miocene Pisco Formation at two important marine vertebrate fossil bearing sites of southern Peru. Under Review. Newsletter on Stratigraphy.

In publication

- Gariboldi K. A brief note on diatom stratigraphic markers in upper Miocene sediments of the Pisco Formation, Peru, and description of *Delphineis urbinai* sp. nov. Diatom Research.
- Bianucci G., Di Celma C., Collareta A., Landini W., Post K., Tinelli C., de Muizon C., Bosio, Gariboldi K., Gioncada A., Malinverno E., Cantalamessa G., Altamirano-Sierra A., Salas-Gismondi R., Urbina M., Lambert O. Fossil marine vertebrates of Cerro Los Quesos: distribution of cetaceans, seals, crocodiles, seabirds, sharks, and bony fish in a late Miocene locality of the Pisco Basin, Peru. Journal of Maps. DOI: 10.1080/17445647.2015.1115785
- Di Celma C., Malinverno E., Cantalamessa G., Gioncada A., Bosio G., Villa I.M., Gariboldi K., Rustichelli A., Pierantoni P.P., Landini W., Tinelli C., Collareta A., Bianucci G. Geological Map of the Miocene-Pliocene Pisco Formation at Cerros Los Quesos (Ica Desert, Peru). Journal of Maps. DOI: 10.1080/17445647.2015.1115783

Published:

- Clemens S.C., Kuhnt W., LeVay L.J., and the Expedition 353 Scientists, 2016. *Indian Monsoon Rainfall*. Proceedings of the International Ocean Discovery Program, 353: College Station, TX (International Ocean Discovery Program). <http://dx.doi.org/10.14379/iodp.proc.353.2016>. **This Volume contains the following Chapter:** Robinson M.M., Bartol M., Bolton C.T., Ding X., Gariboldi K., Romero O.E., and the Expedition 353 Scientists, 2016. Biostratigraphic summary.
- Malinverno E., Maffioli P., Gariboldi K., 2016. Latitudinal distribution of extant fossilizable phytoplankton in the Southern Ocean: Planktonic provinces, hydrographic fronts and palaeoecological perspectives. Marine Micropaleontology, 123: 41-58.
- Gariboldi K., Gioncada A., Bosio G., Malinverno E., Di Celma C., Tinelli C., Cantalamessa G., Landini W., Urbina M. and Bianucci G. The dolomite nodules enclosing fossil marine vertebrates in the East Pisco Basin, Peru: Field and petrographic insights into the Lagerstätte formation. Palaeogeography, Palaeoclimatology, Palaeoecology, 438: 81–95.
- Clemens S.C., Kuhnt W., LeVay L.J., Anand P., Ando T., Bartol M., Bolton C.T., Ding X., Gariboldi K., Giosan L., Hathorne E.C., Huang Y., Jaiswal P., Kim S., Kirkpatrick J.B., Littler K., Marino G., Martinez P., Naik D., Peketi A., Phillips S.C., Robinson M.M., Romero O.E., Sagar N., Taladay K.B., Taylor S.N., Thirumalai K., Uramoto G., Usui Y., Wang J., Yamamoto M., Zhou L. International ocean discovery program expedition 353 preliminary report Indian Monsoon Rainfall. Integrated Ocean Drilling Program: Preliminary Reports, Issue 353, 1 April 2015, Pages 1-46.
- Bianucci G., Di Celma C., Landini W., Post K., Tinelli C., de Muizon C., Gariboldi K., Malinverno E., Cantalamessa G., Gioncada A., Collareta A., Salas-Gismondi R., Varas-Malca R., Urbina M., Lambert O. Distribution of fossil marine vertebrates in Cerro Colorado, the type locality of the giant raptorial sperm whale *Livyatan melvillei* (Miocene, Pisco Formation, Peru). Journal of Maps, 12(3): 543 –557.
- Di Celma C., Malinverno E., Gariboldi K., Gioncada A., Rustichelli A., Pierantoni P.P., Landini W., Bosio G., Tinelli and Bianucci G. Stratigraphic framework of the late Miocene to Pliocene Pisco Formation at Cerro Colorado (Ica Desert, Peru). Journal of Maps, 12 (3): 515 –529.

Abstract in International Conference Proceedings:

- Gariboldi K., Di Celma C., Malinverno E., Gioncada A. and Bianucci G. Diatom Biostratigraphy at the Miocene Sites of Cerro Colorado and Cerros Los Quesos, Pisco Formation, Peru. STRATI 2015 19-23 Luglio 2015, Graz, Austria.
- Bianucci G., Landini W., Post K., Tinelli C., Cantalamessa G., Di Celma C. N., Gariboldi K., Gioncada A., Malinverno E., Urbina M., Lambert O., 2014. Swimming with *Lyviatan*: a reconstruction of the vertebrate marine fauna that lived with

Livyatan melvillei, the giant raptorial sperm whale from the Miocene of Peru. Abstract, Secondary adaptations of tetrapods to life in the water - 2014 meeting - George Mason University

- Gariboldi K., Bianucci G., Maffioli P. Fossil Diatom Assemblages and their Relation to Fossil-Lagerstätten, Proceedings of XIII International scientific algological conference “The Diatoms: present and future studies”, 24th-29th August 2013, Borok, Russia.

Abstract in National (Italian) Conference Proceedings:

- Collareta A., Gioncada A., Gariboldi K., Lambert O., Di Celma C., Urbina M., Bianucci G. Fossilization of baleen microstructures in the upper Miocene Pisco Lagerstätte (Peru). XVI Edizione delle Giornate di Paleontologia 25-27 maggio 2016, Museo Civico di Scienze Naturali di Faenza.
- Bianucci G., Di Celma C., Landini W., Post K., Tinelli C., de Muizon C., Gariboldi K., Malinverno E., Cantalamessa G., Gioncada A., Collareta A., Salas-Gismondi R., Varas Malca R., Urbina M., Lambert O. Map of the fossils of the type locality of the giant raptorial sperm whale *Livyatan melvillei* (Miocene, Pisco Formation, Peru) XV Edizione delle Giornate di Paleontologia 27-29 maggio 2015, Palermo.
- Bosio G., Gariboldi K., Di Celma C., Gioncada A., Malinverno E., Tinelli C., Villa I. M., Cantalamessa G., Collareta A., Lambert O., Landini W., Urbina M., Bianucci G. Tephrochronology and biostratigraphy of two exceptional fossil localities in the Pisco Formation (Peru). Congresso congiunto SIMP-AIV-SGI-SoGel 2015, Firenze, 2-4 Settembre 2015.
- Gariboldi K., Cantalamessa G., Di Celma C.N., Gioncada A., Landini W., Lambert O., Malinverno E., Tinelli C., Urbina M., Bianucci G. 2014. Diatomaceous mudstones of the Mio-Pliocene Pisco Formation, Peru: implications on vertebrate preservation and role of volcanic ashes in fertilizing ocean surface. In: Marino M., Gioton A. La Perna R., Maiorano P. (eds.) XIX Giornate di Paleontologia, Bari 11-13 giugno 2014. Volume dei riassunti, pp. 43-44.
- Bianucci G., Cantalamessa G., Di Celma C.N., Malinverno E., Gariboldi K., Gioncada A., Landini W., Lambert O., Tinelli C., Urbina M., 2014. Taphonomy and stratigraphic distribution of miocene marine vertebrates from the Pisco Formation (Peru). In: Marino M., Gioton A. La Perna R., Maiorano P. (eds.) XIX Giornate di Paleontologia, Bari 11-13 giugno 2014. Volume dei riassunti, pp. 43-44.
- Colizza E., Bohm G., Giglio F., Malinverno E., Bergami C., Bosio G., Capotondi L., Finocchiaro F., Gariboldi K., Kuhn G., Langone L., Lenaz D., Maffioli P., Mezgec K., Sommariva P. Sediment dynamics on the Ross Sea continental Slope: results from the Rosslope Project. In: FIST GEOITALIA 2013 – IX Forum di Scienze della Terra, Pisa; 09/2013.
- Gariboldi K., Maffioli P., Nick K., Basso D. Paleoecologia delle associazioni a diatomee della successione stratigrafica mio-pliocenica del bacino orientale di Pisco, Perù. XII Giornate di Paleontologia, Catania, Maggio 2012. Volume dei riassunti. POSTER

Maps:

- Project: MAGIC (MARine Geohazard along the Italian Coasts).
Map: Map n° 47 “Santa Maria di Leuca”.
Map Manager: Corselli C.
Scientific institution: CONISMA-University of Milano-Bicocca.
Geological interpretation: Savini A., Marchese F.
Data acquisition and elaboration: Savini A., Marchese F., Palamara S., Gariboldi K., Grimoldi E., Milan L.



Pisa, August 12, 2016

I knew Karen Gariboldi four years ago, when she won a PhD at the Earth Science Department of Pisa for the study of the diatomaceous sedimentary sequences hosting the fossil marine vertebrates of the Pisco Lagerstätte, in Peru, in collaboration with the Pisa vertebrate paleontology team. I immediately became a coadvisor in her research project, for the part regarding the study of the volcanic ashes interbedded in the diatomaceous sequences, with the double purpose of obtaining chronostratigraphic markers and of assessing their role in the paleoproductivity enhancement.

I was impressed by Karen's skills in writing a multidisciplinary research project, interacting with me (a petrologist), sedimentologists, vertebrate paleontologists: she made a deep bibliographic study with a critical eye, brought new working ideas and finally wrote the most part of a research project that was then financed by the Italian Ministero dell'Istruzione dell'Università e della Ricerca, as well as of a project financed by the National Geographic Society Committee on Research Exploration. More recently, she has won an ESSAC Research grant for outstanding students for a project devoted to the study of marine sediments with interbedded volcanic ashes, in which she is working with me and prof. C. Morigi.

She was soon appreciated in our Department, demonstrating the ability of easily integrating herself in a research environment different from that in which she had been a Master's degree student.

During these four years she has worked with me in the optical microscopy, Scanning Electron Microscopy, EDAX and EPMA microanalytical laboratories, demonstrating the capacity to become soon autonomous in the lab procedures. She is able to take decisions in the lab activities, as well as, in a more general sense, in the organization of her research activities. At the same time, she asks her advisors and colleagues for advice and listens to them.

For these characteristics, it was a pleasure for me to be her coadvisor for the PhD thesis and is now a pleasure to work with her in writing some research papers. In this regard, Karen is demonstrating good skills in writing research papers, as is testified by having already a single author paper about her research on diatoms in Peru, and a published paper and a submitted one as the first author of a multidisciplinary research team.

Karen Gariboldi has a real passion for all the subjects concerning marine geology and she is very motivated to make experiences on board of research vessels. I know that she already took part to several oceanographic cruises, including IODP Exp. 353.

Therefore, with pleasure I strongly recommend Karen Gariboldi for IODP Exp. 374.



UNIVERSITÀ DI PISA
DIPARTIMENTO DI SCIENZE DELLA TERRA



Best regards,

Anna Gioncada

Assistant researcher at Earth Science Department, University of
Pisa, Italy

anna.gioncada@unipi.it



Pisa, 5 August 2016

I am very pleased for this opportunity to support the application of Karen Gariboldi.

I have known Karen Gariboldi since I have started to work at the University of Pisa (Italy) as Associate Professor in 2013. Karen has been a PhD student in my department and I had the opportunity to follow her brilliant carrier.

Her doctorate thesis is focused on the Mio-Pliocene Pisco Formation, Peru. Her work on diatom biostratigraphy brought to innovative results regarding the age of the Pisco Fm. and other formations in the East Pisco Basin, Peru.

She gave a lecture about Diatoms, in the framework of the Micropaleontology course (Master level) during two accademic years (2014-2015 and 2015-2016) at the Department of Earth Sciences, Pisa University, Italy. During this collaboration she demonstrated to be an enthusiastic communicator of science and micropaleontology, with a good preparation, and a lot of curiosity for her studying subjects. She showed good knowledge of several fields of Marine Geology, and in particular in paleoceanography/micropaleontology.

In December 2014-January 2015, Karen has participated to IODP Exp. 353 as diatom specialist, and was co-responsible of the construction of the age models during the cruise. In 2015 she applied and won an ESSAC Research grant for the project entitled "Role of Volcanic Ashes in Enhancing Primary Production: Evidences in the Deep Time", which focuses on samples collected during IODP Exp. 353. We are currently collaborating on this project, which requires both micropaleontological (diatom and foraminifera) and geochemical analyses (paleoproductivity proxies and composition of volcanic glasses). To perform some of the geochemical analyses, Karen has been working in collaboration with the team of Prof. Matthias Zabel at Marum, Bremen University, Germany.

She is a very good researcher, very meticulous, and has a great concern for the quality of her results; she is a brilliant manager of the research, who combines a sharp mind with a



large dose of perseverance. Karen can work very independently, but her very pleasant and constructive personality makes it also a great pleasure to work in collaboration or have her in a scientific team.

I have the highest regards for her ability as a scientist and as an organiser of complex integrative activities. In my opinion, her skills are ideally suited for participate to an IODP cruise. For all these reasons, Karen's application has my strongest support.

Yours Faithfully

Caterina Morigi
Associate Professor
Department of Earth Sciences
University of Pisa, Italy



APPLICATION TO PARTICIPATE IN AN IODP EXPEDITION

ESSAC Office ECORD Science Support & Advisory Committee

GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
24148 Kiel, Germany

Hanno Kinkel (ESSAC Science Coordinator):

Tel: +49 431 600 2418

Fax: +49 431 600 2922

Web Page: <http://www.essac.ecord.org> Email: essac@geomar.de

Please type information

Apply to Sail Application Form

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: Hartman

First name: Julian

Current Position: PhD

Institution: Utrecht University

Address: Heidelberglaan 2

City, Postcode, Country: 3584CS, Gouda, The Netherlands

Tel. work: +31 30-2532630

Tel. home: +31 6 38438406

Fax:

Email: J.D.Hartman@uu.nl

Country of citizenship: The Netherlands

Place of birth/date of birth: Hilversum, 20 June 1988

Gender: male

Education (highest degree, including year PhD was received / is expected): MSc, I expect to get my PhD degree in 2018

Are you currently a student? YES Expected Graduation Date: 15 March 2018

2. EXPEDITION INFORMATION

Summary of proposed participation, including area of scientific interest, current research and participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

This IODP expedition is in line with my current PhD project, which involves sea surface – cryosphere interactions during past warm periods, especially in relation to marine-based ice sheets. My expertise lies in a multidisciplinary approach in combining palynology and organic geochemical proxies to reconstruct surface water conditions. I consider this IODP expedition a big step forward in our understanding of the relation between sea surface water conditions and the extent of the Antarctic ice sheet, which is essential for future prognosis. During the past two years I have gained sufficient background knowledge on Antarctic ice sheet dynamics and Southern Ocean paleoceanography. Furthermore, I am familiar with the Ross Sea area, as one of my current research projects is related to the Ross Sea.

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

No other involvement except for sample requests for cores from IODP Leg 318

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

As my PhD will end in March 2018, funding of my research during the post-cruise moratorium period is not yet secured. My goal is to obtain funding through the Netherlands Polar Program of NWO (Netherlands Organisation for Scientific Research) through our research group at Utrecht University. As is stated in the included Letter of Support from the Faculty of Geosciences, Utrecht University, I will have access to all necessary facilities of the department. Should my personal funding not be secured, my research group has sufficient supporting staff available to help meet the required postcruise research obligations of shipboard scientists.

Three scientific and/or personal references

Prof. Dr. Ing. Stefan Schouten

Prof. Dr. Henk Brinkhuis

Prof. Dr. Appy Sluijs

3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist	X	organic geochemistry
physical properties specialist		
sedimentologist	X	sedimentary logs, chronostratigraphy
structural geologist		
paleontologist	X	palynology
paleomagnetist		
petrologist		
hydrogeologist		
Other		

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for%20Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants *must inform their national office* (if applicable) *and national delegate* and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.

Letter of interest

This expedition to the Ross Sea is a perfect continuation of my current studies as PhD at Utrecht University. I am currently involved in several research projects involving Antarctic cryosphere dynamics in relation to changes in oceanographic conditions during warmer-than-today episodes during the Cenozoic. In light of current global warming I believe a thorough understanding of behaviour of marine-based ice sheets during past warm periods is essential for future projections. It is for this reason that the part of my current research is related to the Wilkes Land margin. The objectives of IODP expedition Leg 374 are similar to those of my current research, which is to constrain surface water conditions and ice sheet extend during past episodes of warming to get a better grip on the sensitivity of marine-based ice sheets to surface water warming. I have not been on an IODP expedition before and I see this as a chance to visit my research area for the first time.

Past performance and current research

All my current research is focused on relating reconstructed surface water conditions based on palynology, sedimentology and the use of organic geochemical proxies to Antarctic ice sheet extend and Southern Ocean palaeoceanography during past warm periods.

One of these projects involves a multiproxy approach to assess glacial-interglacial changes in surface water conditions at the continental slope of the Drygalski Basin, Ross Sea, with a focus on Marine Isotope Stage 5. In combining mostly dinoflagellate, diatom and organic geochemical proxies as TEX₈₆ and BIT, I try to reconstruct ice shelf and sea ice dynamics in the western Ross Sea. I am currently in the process of writing this paper.

Other projects that are part of my PhD include a reconstruction of Oligocene sea surface temperatures from IODP Site U1356 (close to submission) and an evaluation of known and undescribed palynomorphs from the exceptionally well preserved 170 m Holocene record of IODP Site U1357 (for which all data is gathered and this will be the next paper to be written). All these research projects have many connections to the aims of Expedition 374, notably my experience with gathering and interpreting sedimentological data, organic geochemical data and palynological data both for biostratigraphic and for paleoecological purposes.

Moreover, I am familiar with the Ross Sea bathymetry, oceanographic setting, and the recent publications on the orbital control on glacial sedimentary processes. This in combination with a Master research project on chronostratigraphic dating of a Miocene turbidite and stormbed sequence in Spain has led me to also mark chronostratigraphy as an expertise, next to palynology and organic geochemistry.

Shipboard science plan

Despite my young academic career, I have sufficient experience in using organic geochemical proxies and palynology as tools to infer surface water conditions close to an ice-sheet margin to be of value to this expedition. Furthermore, I believe that both palynology and organic geochemical proxies, although scarce in these ice-proximal settings, are an essential tool compared to other paleobiological and SST proxies that are much more prone to dissolution. Dinoflagellate cysts have often proved to be the only biostratigraphic marker in the Southern Ocean. Due to my current research and participation of the Advanced course in organic-walled dinoflagellate cysts in Heidelberg, I am familiar with most Oligocene and Neogene dinoflagellate cysts. Apart from a biostratigraphic tool, dinoflagellates can be very good environmental indicators. In the study area of this expedition they can be good recorders of yearly sea-ice cover and melt water pulses, which give information on the oceanographic conditions and can possibly be linked to ice sheet dynamics on land. Especially sea-ice-related dinoflagellates can be powerful tools for reconstructing deep-time ice sheet development.

In addition, I can be of value to this expedition as sedimentologist. I am familiar with sediments from the Ross Sea area and have gained sufficient background and experience in the field during my Bachelor and Master to make detailed sedimentary logs. Moreover, I have also sampled IODP cores myself as part of a job as lab assistant.

Post-cruise research

In combining my knowledge of Southern Ocean palynology and organic geochemical sea surface temperature proxies I believe I can contribute significantly to some of the main research questions of this expedition, in particular objectives 2 and 3 of the proposal. These involve questions related to sea surface temperature and polar amplification of the West Antarctic ice sheet to ocean warming. Although TEX₈₆ generally overestimates absolute temperatures at the high latitudes and probably reflects subsurface temperatures, the calibration to global mean sea surface temperature is indisputable. Therefore, the TEX₈₆-based reconstructed temperature trends can still be very valuable. If these temperatures reflect the surface waters the differences between glacial and interglacials can be used to get more insight into polar amplification in the past. If they reflect subsurface temperatures they might have recorded incursions of (Modified) Circumpolar Deep Water into the Ross Sea. In working together with other shipboard scientists and combining results from dinoflagellates and TEX₈₆ with other environmental indicators and the sedimentological record, I believe this expedition can be a big step forward into gaining insight into the role of basal melt during warm periods in the past.

Furthermore, this expedition allows me to further explore the potential of hydroxy glycerol dialkyl glycerol tetraethers as a proxy for sea surface temperature in the Southern Ocean (Huguet et al. 2013, *Organic Geochemistry* 57); the environmental preferences, e.g., in relation to melt water, of known and undescribed palynomorphs derived from IODP Site U1357; and to further explore differences in surface water conditions between the western and the eastern part of the Ross Sea.

As my PhD will end in March 2018, funding of my research during the post-cruise moratorium period is not yet secured. My goal is to obtain funding through the Netherlands Polar Program of NWO (Netherlands Organisation for Scientific Research) through our research group at Utrecht University. As is stated in the included Letter of Support from the Faculty of Geosciences, Utrecht University, I will have access to all necessary facilities of the department. Should my personal funding not be secured, my research group has sufficient supporting staff available to help meet the required postcruise research obligations of shipboard scientists.

CURRICULUM VITAE – JULIAN HARTMAN

PERSONALIA

Name: Julian Diede Hartman
Address: Oranjepoldererf 36, 2807 NE, Gouda
Date of birth: 20 juni 1988
Mobile phone: +31 6 38438406
E-mail: J.D.Hartman@uu.nl
LinkedIn: <http://www.linkedin.com/profile/view?id=27622493>

PROFILE

I am currently involved in a PhD research project related to Antarctic ocean-cryosphere interactions during past warm periods. If the necessary funding is acquired I see this IODP expedition as an opportunity to extend my research in the field of Antarctic/Southern Ocean climate dynamics, which I believe is essential for our understanding of the global ocean and therefore the global climate and therefore is key to predicting future climate changes. I have an expertise in organic geochemistry, in particular archaeal lipids, marine palynology and palaeoceanography. During my previous Master and Bachelor studies I also gained experience in cyclostratigraphy and biostratigraphy (foraminifers, dinoflagellates), mammal paleontology, taxonomy. Ik heb ervaring in (bio- en cyclo-) stratigrafie, biogeochemie, evolutiebiologie, paleontologie, palynologie, taxonomie, and palaeoecology, in the field as well as in the laboratory. I can work well in a team, but also independantly and I am disciplined. I am motivated to try answer questions and to come with inventive solutions to difficult problems. I can speak and write English fluently.

EDUCATION

- 2015 Advanced course in Jurassic-Cretaceous-Cenozoic organic-walled dinoflagellate cysts in Heidelberg, Germany
- 2014 Urbino Summer School in paleoclimatology, Urbino, Italy.
- 2011 – 2013 MSc Earth, Life and Climate, Universiteit Utrecht. Graduated Cum Laude: 30 augustus 2013 (GPA: 4,0).
- *Specialization Biogeology*
 - *Master thesis: 'A revision of the ctenodactyline genus Sayimys, based on the internal variation of Sayimys giganteus from Keseköy, Anatolia.'* (8.5 out of 10)
 - *Exceptional scores in the following courses: Organic geochemistry (8.2 out of 10), Evolutionary palaeobiology and proxies (8.0 out of 10), Vertebrate evolution (9.1 out of 10).*
 - *I followed other courses related to biogeochemistry and climate change.*
- 2008 – 2011 BSc Earth Sciences, Utrecht University (GPA: 3,78).
- *Bachelor thesis: 'A dinoflagellate induced age for the Badenian-Sarmatian boundary and their potential for investigating the Badenian-Sarmatian extinction.'* (8.5 out of 10)
 - *Exceptional scores in the following courses: Evolution en Ecology (8.4 out of 10), Paleooceanography (8.6 out of 10), Paleoecology (8.5 out of 10).*
 - *I followed other courses related to marine sciences, paleontology, palynology, climate change and sedimentology.*

FIELDWORK EXPERIENCE

- 2012 Spain, Internal Betic Cordillera, in the vicinity of Sorbas ((Bio-)stratigrafic fieldwork within the MSc program). Graded 8.3 out of 10.

- 2011 The Netherlands, Winterswijk, stone quarry.
- *For the purpose of collecting fish and reptile fossils for the University of Bonn.*
- 2011 Romania, southwestern Dacian Basin, Morilor en Cosmina Valley
- *As part of my Bachelor thesis within the Biomarine Sciences and Palaeomagnetism research groups at Utrecht University.*
- 2010 Spain, Southern Pyrenees, in the vicinity of Tremp (Biogeological fieldwork within the BSc program of Earth Sciences, Utrecht University). Graded with 8.5 out of 10.
- *Biogeology research project: 'Isotope ratios in oysters from the Figols Formation, Tremp Basin.'* (9.0 out of 10).
- 2009 Spain, Iberian highlands, in the vicinity of Aliaga (Fieldwork within the BSc program of Earth Sciences, Utrecht University).

WORK EXPERIENCE

- 2014 – today PhD student at Utrecht University, specialized in the ocean-cryosphere interactions during past warm periods since ~34 Ma. Thesis defence planned in the second quarter of 2018. Proposed PhD chapters are listed below.
- *Oligocene TEX₈₆-derived sea surface temperatures from the Wilkes Land coastal margin (status: close to submission)*
 - *Changes in productivity, sea surface temperature and sea-ice cover during the Last Interglacial in the Ross Sea. (status: in the process of writing)*
 - *Palynomorphs from IODP Site U1357 (status: in the process of writing)*
 - *A new SST proxy based on hydroxy-GDGTs for the Southern Ocean (status: in the process of data gathering)*
 - *Description of a new dinoflagellate species (in the process of analyzing the data)*
- Abstracts have been written and posters have been presented for: Nederlands Aardwetenschappelijk Congres 2014 & 2016, Urbino Summer School 2014, Heidelberg Advanced course in dinoflagellate cysts 2015, NWO Polar Symposium 2015, and the European Geosciences Union 2016
- 2013, jan – feb Research Internship Looylab, University of California, Berkeley.
- *Involving the determination of fossil cuticles, statistical analysis of the stomatal distribution and leaf sizes, and developing a new numerical method for stomatal distribution patterns.*
- 2011 – 2012 KNAW-lab assistantship Utrecht University: 'A high-resolution stable isotope analysis of benthic foraminifera from the Pacific Ocean'.
- *Includes sampling of IODP cores and magnetic susceptibility measurements.*



P.O. Box 80.115
3508 TA Utrecht
The Netherlands

Faculty of Geosciences

Department of Earth Sciences

ECORD Science Support and Advisory Committee

Telephone
+ 31 30 253 5098
Fax

E-mail
J.W.deBlok@uu.nl

Date
August 12, 2016
Subject
Letter of support Julian Hartman,
IODP 374

Your reference

Our reference
16.08003u

With this letter, the Department of Earth Sciences strongly supports the application of Mr. J.D. (Julian) Hartman (date of birth June 20, 1988) to join the IODP 374 expedition (Ross Sea West Antarctic Ice Sheet History) on board the *Joides* Resolution as part of his PhD study.

I confirm that Mr. Hartman has enrolled in the PhD programme of Utrecht University in January 2014, with the intend to defend his PhD thesis in 2018.

Mr. Hartman will be granted access to the facilities at our department for the post-cruise research activities.

Yours Sincerely,

Drs. Jan-Willem de Blok
Managing director of the Department of Earth Sciences





To: ECORD Science Support and Advisory committee

From

Dr. Peter K. Bijl

Address

Marine Palynology and Paleoceanography
Heidelberglaan 2
3584CS Utrecht
The Netherlands

Telephone 030 253 93 18
E-mail P.K.Bijl@uu.nl
Date August 15, 2016
Subject Letter of recommendation
for Julian Hartman

Dear sir/madam,

With this letter, I, as direct supervisor, fully and happily support the application of Julian D. Hartman to sail onboard IODP Leg 374. I know Julian through his BSc, MSc and PhD academic studies in Geology here in Utrecht University. In 2014 I selected Julian with my colleagues as PhD student in our group, with his aim and dedication to reconstruct Antarctic and Southern Ocean paleoclimate, ice sheet dynamics and paleoceanography during past warm climate episodes. Although Julians publication record is relatively thin, he has been focused on generating an abundance of new and exciting data and is currently in the process of writing up his results. During his studies and his PhD, Julian has gathered the required sedimentological and palynological expertise required to serve as valuable team member of the onboard crew. In particular his current involvement in postcruise research on sediments from IODP Leg 318 and on short sediment cores from the Ross Sea area, has gained him the biostratigraphic, sedimentological expertise on the oceanography, palynology and climatological setting that is valuable for the success of IODP Leg 374. He has sufficient laboratory experience to process and analyse sedimentary samples for palynological slides, organic geochemistry and sedimentology safely and effectively. If funding is secured for another 2 years through the NWO Netherlands Polar Program or otherwise, he can continue to do research as a Post-doc which is in line with his current PhD research during the moratorium period following the expedition, pending funding availability.

Yours sincerely,

A handwritten signature in blue ink, reading 'Peter Bijl'.

dr. Peter K. Bijl



APPLICATION TO PARTICIPATE IN AN IODP EXPEDITION

ESSAC Office ECORD Science Support & Advisory Committee

GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
24148 Kiel, Germany

Hanno Kinkel (ESSAC Science Coordinator):

Tel: +49 431 600 2418

Fax: +49 431 600 2922

Web Page: <http://www.essac.ecord.org> Email: essac@geomar.de

Please type information

Apply to Sail Application Form

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: Newton

First name: Andrew

Current Position: PhD Student

Institution: University of Manchester

Address: 52 Chanterhill Park

City, Postcode, Country: Enniskillen, BT74 4BG, UK

Tel. work: 07745114143

Tel. home:

Fax:

Email: andrew.newton-3@manchester.ac.uk

Country of citizenship: UK

Place of birth/date of birth: Portsmouth 16th December 1986

Gender: Male

Education (highest degree, including year PhD was received / is expected): PhD expected Spring 2017

Are you currently a student? YES Expected Graduation Date: Spring 2017

2. EXPEDITION INFORMATION

Summary of proposed participation, including area of scientific interest, current research and participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

My main research interests are in the past, present, and future development of high-latitude marine geology and sequence stratigraphy. This research is primarily related, but not restricted, to changes in glacial extents over long-term (Plio-Pleistocene), short-term (since the LGM), and future time scales. More broadly my research interests cover most areas of high-latitude physical geography, geomorphology, and climatology, including records of glaciation, sea-level, and oceanographic changes. As part of the future work, I would use ~100,000 km² of 3D seismic reflection data, ~200,000 km of 2D seismic data, and 100s of well data offshore Norway and Greenland. The core data from Antarctica can be used to develop, refine, and question finer-scale interpretations of the glacial stratigraphy in Greenland and Norway that have used lower resolution seismic and gamma-ray records. Conversely, the larger-scale interpretations from seismic and gamma ray records offshore Greenland and Norway can then be used to aid large-scale interpretation of the Ross Sea where high-resolution seismic data is lacking. This will allow data from different margins to be used to refine, validate, and calibrate records from other complementary margins. The insights from this comparative study will allow for a regional, basin-wide, stratigraphical, and geomorphological record to be developed and to investigate how offshore glacial signatures vary.

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

n/a

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

1) Future funding is currently uncertain, but I am working on two future possibilities at the moment. The first includes a University of Manchester post-doctoral research fellowship which would allow me to drive my own research agenda for five years. Secondly, I am currently writing up a research proposal on seismic geomorphology with the intention of trying to attract funding from the Natural Environmental Research Council.

2) The University of Manchester has a large number of analytical equipment with which to investigate glaciogenic sediments. These include scanning electron microscopy, CT scanning, and comprehensive analytical geochemistry facilities including ICP-MS, ICP-AES, XRF, XRD, pyrolysis, GC-MS. Several colleagues are experts in the use of this equipment and would be interested in working up the data looking at geotechnical and geochemical aspects of the data. This data will then be worked with in combination with geophysical datasets that are investigated in our state-of-the-art computer facilities.

Three scientific and/or personal references

Prof. Mads Huuse – University of Manchester, UK – mads.huuse@manchester.ac.uk

Dr. Simon H. Brocklehurst – University of Manchester, UK – shb@manchester.ac.uk

Prof. Gregory Mountain – Rutgers University, USA - gmtn@rci.rutgers.edu

3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist		
physical properties specialist		
sedimentologist	x	Glacial sedimentology
structural geologist		
paleontologist		
paleomagnetist		
petrologist		
hydrogeologist		
Other		

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for_Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants *must inform their national office* (if applicable) *and national delegate* and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.

Integrating Geophysical and Geological Records of Glaciated Margins.

By Andrew M. W. Newton | University of Manchester

Expertise and Research Interests

My main research interests are in the past, present, and future development of high-latitude marine geology and sequence stratigraphy. This research is primarily related, but not restricted, to changes in glacial extents over long-term (Plio-Pleistocene), short-term (since the LGM), and future time scales. More broadly my research interests cover most areas of high-latitude physical geography, geomorphology, and climatology, including records of glaciation, sea-level, and oceanographic changes.

My ongoing PhD research has utilised my expertise in glacial and seismic geomorphology to reconstruct high-latitude Plio-Pleistocene palaeo-environments. I have used geophysical data from several glaciated margins, including; the North Sea, the Norwegian Sea, the Barents Sea, Baffin Bay, East Greenland, and the North Falklands Basin. This data has allowed me to mine several glaciated margins (Fig. 1a) to construct stratigraphic frameworks and analyse geomorphological timelines throughout the Late Cenozoic (Fig. 1b). This includes the imaging of features such as mega-scale glacial lineations (Clark, 1993) (MSGs), tunnel valleys (Stewart and Lonergan, 2011), iceberg scours (Woodworth-Lynas, 1996), and glacio-tectonics (Huuse and Lykke-Andersen, 2000).

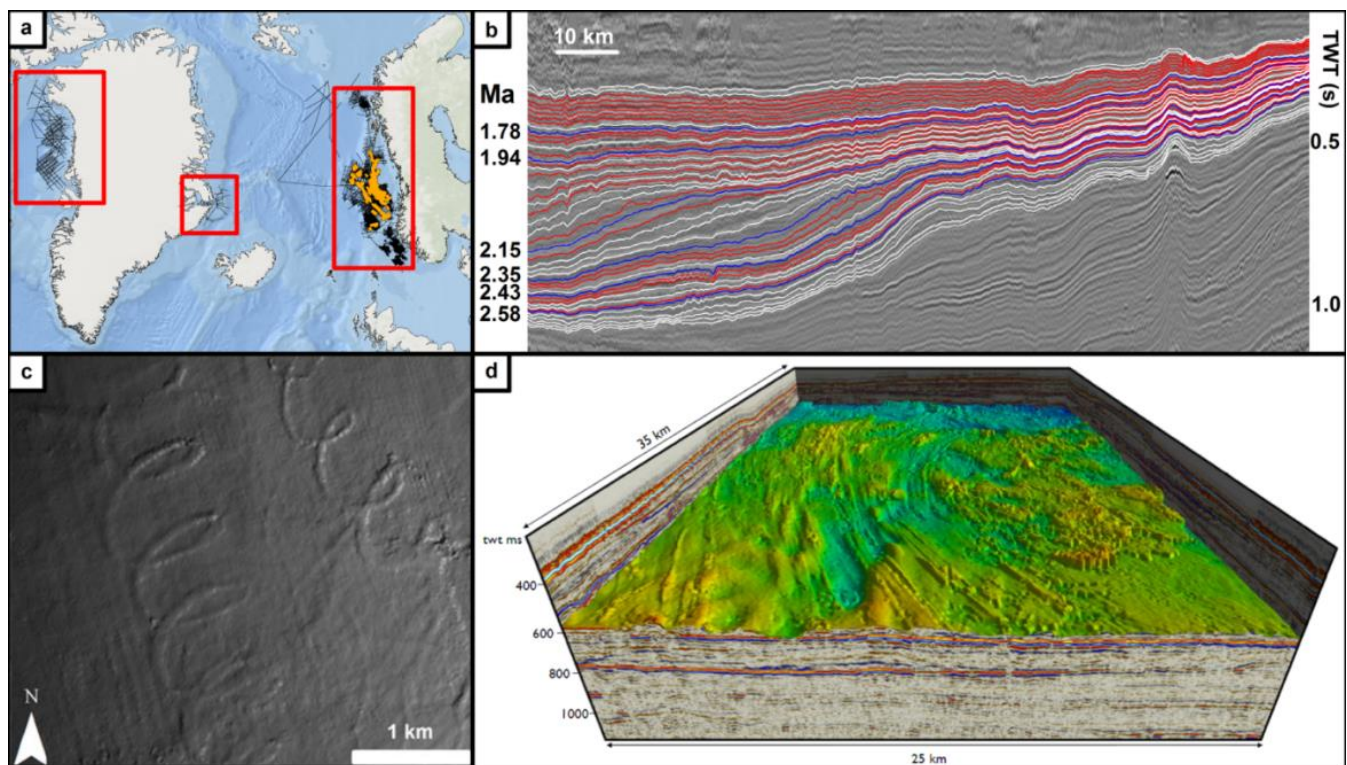


Figure 1: a) Some of the areas I have investigated during my PhD. Thin black lines and orange polygon are 2D and 3D seismic data respectively. b) Seismic line showing high spatio-temporal resolution for environmental reconstruction. All lines are 3D surfaces used for geomorphological analysis. White lines are reflections with landforms from multiple glacial cycles. The Blue lines are dated reflections and red lines are those used for further analysis. Figure from Newton et al. (submission pending). c) example of iceberg scour marks used to reconstruct environmental conditions. Figure from Newton et al. (2016b). d) example of buried MSGs from the mid-Norwegian shelf. Figure from Newton et al. (in review).

The key focus of my present research has been to go well past the most recent glaciations and explore those beyond any records that remain onshore and are extremely poorly documented. Research into the oldest glacial changes has already been carried out on both the West Greenland (Newton et al., 2016a) and mid-Norwegian margins (Huuse and Newton, 2015) and has revealed an extensive suite of glacial landforms (Fig. 1c & Fig. 1d) with many more likely to be found. The current work has been presented at several conferences and includes a paper that has been published in *Nature Communications*. A number of other papers are currently in review with other journals.

I am also currently working on a number of 2-3 m shallow-sediment cores from several parts of West Greenland. This work is looking at subglacial environments and landform sedimentology, whilst colleagues at the University of Manchester are also looking at organics. This work will provide an ideal introduction into investigating sedimentation processes on a glaciated margin.

Research goals from the expedition

As an early-career scientist, it is hugely beneficial to get first-hand experience on an IODP expedition. The opportunities for early-career scientists to actively take part in a drilling campaign carrying out important and potentially high-impact research are limited. As such, an expedition like this is a key research goal of my own, and I hope the experience of taking part will allow me in the future to develop my own IODP drilling proposals in my career. More importantly, this expedition also offers me an opportunity carry out a unique study of glaciated margins that is outlined below.

A key limitation in understanding the long-term evolution of glaciated margins is the poor coverage or inadequate quality of available datasets. For example, several margins have good datasets but their interpretation is limited by the type of data, its resolution, and the inability to compare, correlate, and contradict ideas that come from different types of data. As is seen on the mid-Norwegian margin, there is a very large volume of seismic reflection and gamma-ray logging data that covers the entire glaciogenic succession, but very little information on lithology and age constraints within it. The West Greenland margin has lots of high-resolution seismic data but only limited core and gamma-ray records that has primarily been collected for industry operations rather than investigating the glaciogenic succession. The Ross Sea has limited coverage of seismic data but as a result of this IODP expedition, will have the highest resolution core data that has been collected for the primary purpose of understanding the environmental changes on a glaciated margin.

As part of the future work, I would use $\sim 100,000 \text{ km}^2$ of 3D seismic reflection data, $\sim 200,000 \text{ km}$ of 2D seismic data, and 100s of well data for the project from offshore Norway and Greenland (Fig. 1a). This data has been provided through industry collaborations and offers an unrivalled dataset for academic research. This data will then be combined with published work and that from the IODP drilling campaign to provide a unique opportunity from which to carry out glacial research, with the potential to change and test long-standing ideas. Core data from Antarctica can be used to develop, refine, and question finer-scale interpretations of the glacial stratigraphy in Greenland and Norway that have used lower resolution seismic and gamma-ray records. Conversely, the larger-scale interpretations from seismic and gamma ray records offshore Greenland and Norway can then be used to aid large-scale interpretation of the Ross Sea where high-resolution seismic data is lacking. This will allow data from different margins to be used to refine, validate, and calibrate records from other complementary margins.

The insights from this comparative study will allow for a regional, basin-wide, stratigraphical, and geomorphological record to be developed and to investigate how offshore glacial signatures vary. These records can also be used to evaluate and calibrate numerical models of past cryospheric change and will help to provide a better understanding of the impact of glaciations on shelf evolution in different settings with varied geological histories. This record can also be used to develop a model of high-latitude sequence stratigraphy, a topic which has received limited interest due to the complexities and relative inaccessibility of glaciated margins.

References

- Clark, C.D., 1993. Mega-scale glacial lineations and cross-cutting ice-flow landforms. *Earth Surface Processes and Landforms*, 18, 1-19.
- Huuse, M., Lykke-Andersen, H., 2000. Large-scale glaciotectionic thrust structures in the eastern Danish North Sea, In: Maltman, A.J., Hubbard, B., Hambrey, M.J. (Eds.), *Deformation of Glacial Materials*. The Geological Society of London, London, pp. 293-305.
- Huuse, M., Newton, A.M.W., 2015. Beyond the seafloor: a Plio-Pleistocene archive of glacial geomorphology from basin-wide 3D seismic reflection data on the mid-Norwegian shelf, *American Geophysical Union Fall Meeting*, San Francisco.
- Newton, A.M.W., Harding, R., Lamb, R.M., Huuse, M., Brocklehurst, S.H., submission pending. Evidence for repeated low latitude marine-terminating ice sheets in a 41 kyr Early Quaternary world.
- Newton, A.M.W., Huuse, M., Brocklehurst, S.H., in review. A Plio-Pleistocene archive of glacial landforms from the mid-Norwegian shelf.
- Newton, A.M.W., Huuse, M., Gannon, P., Brocklehurst, S.H., 2016a. The Stratigraphic and Glaciological Evolution of the Melville Bugt Trough Mouth Fan, Northwest Greenland. *American Geophysical Union Fall Meeting*, San Francisco.
- Newton, A.M.W., Huuse, M., Brocklehurst, S.H., 2016b. Buried iceberg scours reveal reduced North Atlantic Current during the stage 12 deglacial. *Nature Communications*. DOI: 10.1038/ncomms10927
- Stewart, M.A., Lonergan, L., 2011. Seven glacial cycles in the middle-late Pleistocene of northwest Europe: Geomorphic evidence from buried tunnel valleys. *Geology* 39, 283-286.
- Woodworth-Lynas, C.M.T., 1996. Ice scour as an indicator of glaciolacustrine environments, In: Menzies, J. (Ed.), *Past Glacial Environments: Sediments, Forms and Techniques*. Butterworth-Heinemann, Oxford.

Andrew Newton

B.Sc. M.Sc.

- I am a graduate from The Queen's University Belfast where I obtained a First class degree with honours (>4.0 GPA) in Geography.
- In 2012 I received a distinction (>4.0 GPA) in my MSc in Polar and Alpine Change at the University of Sheffield.
- I am currently a fully sponsored NERC-CASE PhD student in Basin Studies and Petroleum Geoscience at the University of Manchester's School of Earth, Atmospheric and Environmental Sciences. A full description of the PhD project is available below.
- Upon completion of my PhD in Spring 2017 I intend to continue my research with an interest in palaeo-glaciology and climate change.



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<https://uk.linkedin.com/pub/andrew-newton/64/118/47>

Education

University of Manchester, UK | Basin Studies and Petroleum Geoscience | [Ph.D.](#)

2013-Present (Expected completion Spring 2017)

[See project description below](#)

University Centre in Svalbard, Norway | Arctic Geology | [70%](#)

August 2012 and April 2015

University of Sheffield, UK | Polar and Alpine Change | [M.Sc. Distinction](#)

2011-2012

The Queen's University of Belfast, UK | Geography | [B.Sc. \(Hons\) First Class](#)

2008-2011

Awards & Achievements

- 2011 Estyn Evans Prize for best undergraduate dissertation.
- Runner-up for the 2011 Sarah M Holland award for best overall undergraduate degree mark.
- 2nd place in the student poster competition at the Postgraduate Research Conference in Manchester 2014.

Publications

- Newton, A. M. W.**, Huuse, M., and Brocklehurst, S. H. (2016), Buried iceberg scours reveal reduced North Atlantic Current during the stage 12 deglacial, *Nature Communications*.
- Newton, A. M. W.**, and Huuse, M. ([in review](#)), Relative chronologies and glacial geomorphology of the central Barents Sea: implications for the deglaciation of the Barents Sea Ice Sheet, *Quaternary Science Reviews*.
- Newton, A. M. W.**, and Huuse, M. ([in review](#)), A review with new insights into the Plio-Pleistocene environmental evolution of the mid-Norwegian shelf, *Marine Geology*.
- Newton, A. M. W.**, Gong, Y., Gannon, P., Clausen, O. L., Knutz, P. C., Huuse, M., and Brocklehurst, S. H. (submission pending) Glacial geomorphology of the Melville Bugt cross-shelf trough, *Geology*.
- Newton, A. M. W.**, Harding, R., Lamb, R. M., Huuse, M., and Brocklehurst, S. H. ([submission pending](#)), Evidence for repeated low latitude marine-terminating ice sheets in a 41 kyr Early Quaternary world, *Nature Geoscience*.
- Newton, A. M. W.**, Huuse, M., and Brocklehurst, S. H. ([submission pending](#)), Plio-Pleistocene margin architecture and glacial evolution of the mid-Norwegian shelf, *Quaternary Science Reviews*.
- Brown, C., **Newton, A. M. W.**, and Huuse, M. ([submission pending](#)) Iceberg scouring and palaeo-oceanography offshore the Falkland Islands, *Marine Geology*.
- Newton, A. M. W.**, Huuse, M., and Brocklehurst, S. H. ([in prep](#)), Late Cenozoic glacial history, margin architecture and evolution of the Northwest Greenland continental shelf, *Basin Research*.
- Newton, A. M. W.**, Huuse, M. and Brocklehurst, S. H. ([in prep](#)), Late Miocene to Pleistocene history of the Scoresby Sund trough mouth fan, *Marine Geology*.
- Newton, A. M. W.**, Huuse, M. and Brocklehurst, S. H. ([in prep](#)), The acoustic signature of glaciated margins, *Earth and Planetary Science Letters*.
- Newton, A. M. W.**, Huuse, M., and Brocklehurst, S. H. ([in prep](#)), Developing a high-latitude sequence stratigraphy model for glaciated margins, *Earth-Science Reviews*.

Conference Presentations

- Newton, A. M. W.**, Huuse, M., and Brocklehurst, S. H. (2016), A Plio-Pleistocene archive of glacial geomorphology on the mid-Norwegian shelf, William Smith Meeting, London

Conference Presentations continued

Brown, C., **Newton, A. M. W.**, and Huuse, M. (2016) Iceberg scouring and palaeo-oceanography offshore the Falkland Islands, William Smith Meeting, London.

Harding, R., **Newton, A. M. W.**, Huuse, M., and Gawthorpe, R. (2016), All change at the base Quaternary, William Smith Meeting, London.

Newton, A. M. W., Huuse, M., and Brocklehurst, S. H. (2015), A sluggish ocean conveyor in the Norwegian-Greenland Sea during the stage 12 deglaciation: geomorphological evidence from buried iceberg scours on the mid-Norwegian shelf, AGU Annual Fall Meeting, San Francisco.

Huuse, M., and **Newton, A. M. W.** (2015), Beyond the seafloor: a Plio-Pleistocene archive of glacial geomorphology from basin-wide 3D seismic reflection data on the mid-Norwegian shelf, AGU Annual Fall Meeting, San Francisco.

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Harding, R., **Newton, A. M. W.**, Huuse, M., and Gawthorpe, R. (2015), Early Quaternary geomorphology of the southern North Sea: insights from high resolution 3D MegaSurvey seismic analysis, QRA Annual Meeting, Edinburgh.

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Newton, A. M. W., and Huuse, M. (2014), Palaeo-oceanographic measurements from 400 ka old buried iceberg scours on the mid-Norwegian shelf, Postgraduate Research Conference, Manchester.

Newton, A. M. W., and Huuse, M. (2014), Using submarine landforms to investigate glacial history, chronology and evolution during the Late Cenozoic: A 3D case study of the mid-Norwegian shelf, EGU Annual Meeting, Vienna.

Expertise & Interests

<ul style="list-style-type: none">• Reconstructing Environments• Earth Science• Field and Research Techniques• Petroleum Geoscience• Marine Geology	<ul style="list-style-type: none">• Geographical Information Systems• Coastal Environments• Landforms and Landscapes• Tropical Environments• Sequence Stratigraphy	<ul style="list-style-type: none">• Polar and Alpine Environments• Climate Change• Geochemical Techniques• Glacier Dynamics• Basin Studies and Evolution
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Fieldwork

- East Greenland - August 2006
Geological and glaciological mapping of the Kalkdahl valley
- Svalbard - August 2012 and April 2015
Glacial, geomorphological and sea ice research looking at glacial dynamics, erosion and transport
- Huesca Fan - Spain - October 2013
Mapping and logging of fluvial sedimentary structures in an Oligocene-Miocene fluvial fan
- New Jersey - UK - July 2014 and June 2015
Acquisition of ultra-high resolution 3D seismic data across IODP Expedition 313 drill sites
- European Alps - France, Switzerland, and Italy - August 2014
Mapping of alpine landslides onto glaciers with photogrammetry around the Mont Blanc Massif.

Courses

- Modelling in the polar sciences with the UKPN - April 2012
- EAGE Geophysics course with Wintershall oil and gas - March 2014
- Sea level, ice sheets and isostasy course with Kurt Lambeck - April 2014
- Basin Mastery - Greenland and Labrador - Upcoming in January 2016

Employment History

Teaching Assistant | University of Manchester, UK | 2013 - Present

Bar staff | Horseshoe Bar, UK | 2008 - 2011

Attendant and outreach tutor | Marble Arch Caves Global Geopark, UK | 2007 - 2008

Supervisor | Castle Leisure Group, UK | 2005 - 2007

Interests

- Outside of academia I am an outdoors enthusiast and enjoy spending time travelling, hiking, climbing, and camping in areas of both natural beauty and geological interest.
- I play several sports and have played football, rugby, and tennis at various university and local levels.
- I regularly run endurance events such as marathons and other personal challenges to both test myself and raise money for charities including Prostate Cancer UK, The British Heart Foundation, The Chernobyl Children, and Bright Eyes Animal Sanctuary.

Title:

Glaciation of the Norwegian and Greenland Shelves: integrating geomorphological and stratigraphic information from 3D seismic, boreholes and land areas

Supervisors:

Professor. Mads Huuse (University of Manchester), Dr. Simon, H. Brocklehurst (University of Manchester), and Dr. Wim Kouwe (Cairn Energy).

Summary:

Our understanding of the late Pleistocene glaciations on high latitude margins, to a large extent relies on widely spaced boreholes linked with bathymetry, 2D seismic profiles and local 3D seismic surveys. However, to date only a relatively small part of the Norwegian Shelf and even less so of the West Greenland Shelf has been investigated with these data sets and most studies focus on the most recent glaciations, which are relatively well known

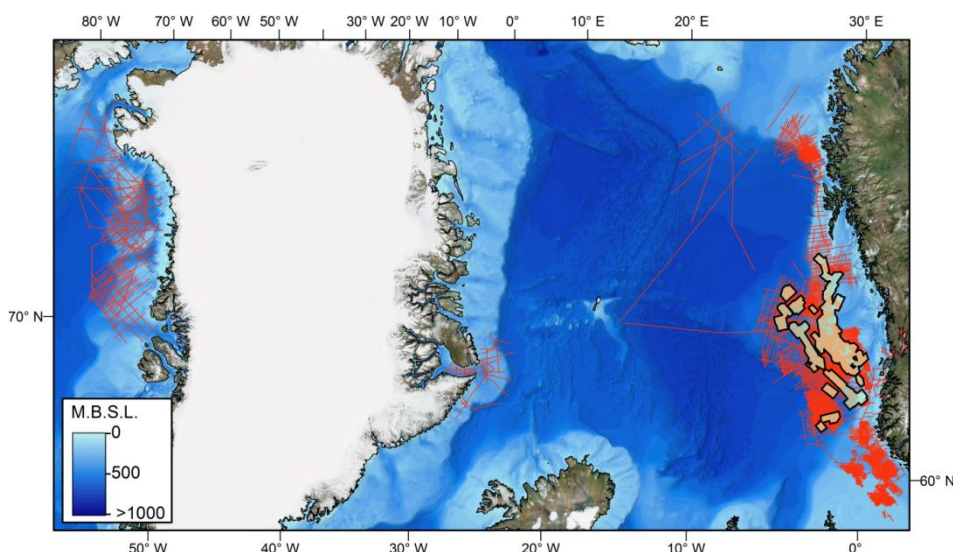


Figure 1: Red lines show the 2D seismic data and the solid polygons the 3D data used in this project.

The record of Northern Hemisphere shelf glaciation, as captured in records of ice-rafted debris offshore, spans at least the entire Pleistocene (since 2.58 Ma) and the knowledge of the early and middle Pleistocene glaciations is rather sparse due to over-prints from later glaciations in the onshore and offshore geomorphology. The shelf succession preserves a geomorphological record of multiple glaciations and by imaging using 3D seismic volumes acquired for oil exploration, one can reconstruct past landforms and thus unravel past shelf glaciations and their dynamics.

This project is using 2D and 3D seismic data (Fig. 1) to image glaciogenic structures such as mega-scale glacial lineations, tunnel valleys, iceberg scours, and glacial tectonics in addition to the overall structure and thickness of the glaciogenic sequences.

The insights afforded by a regional, basin-wide, glaciological record will enable us to ascertain the chronology and extent of shelf glaciations through the Pleistocene, unravel the exact origin of the glaciogenic structures recorded, and help calibrate models of onshore landscape evolution and more widely contribute to the global understanding of glaciations during the Pleistocene.

This project is being carried out in collaboration with Cairn Energy and includes a comparative study of Baffin Bay and the mid-Norwegian margin. The comparative study offers the opportunity to compare similar tectono-stratigraphic settings in widely separated areas and should allow more generic conclusions to be drawn regarding the manifestations of shelf edge glaciations in the stratigraphic record and to unravel controlling factors and impacts on underlying petroleum systems.

12th Aug 2016**Prof Mads Huuse**
Basin Studies and Petroleum Geoscience Group
Room 2.70 Williamson Building
Tel: +441612753811
Mob: +447759043007
mads.huuse@manchester.ac.uk*Re. statement in support of Andrew Newton
application for IODP cruise participation*

To whom it may concern

It is my pleasure to write this letter in support of Andrew Newton's application to sail on IODP expedition 374.

I have known Andrew since 2013 when he started his PhD with me at the University of Manchester, working on the Glaciation of the Norwegian and Greenland shelf and slope areas by integrating geomorphological and stratigraphic information from 2D and 3D seismic and boreholes with geomorphology from land and seabed. I have thoroughly enjoyed working with Andrew and watched him ascend along a very steep upward trajectory from a physical geography and glaciology background to a well-rounded and extremely talented earth scientist with an unusually well-developed flair for advanced 3D seismic interpretation and visualization. He has developed novel workflows to apply these techniques using advanced commercial workstation technology to individual and merged 3D seismic volumes covering several tens of thousands of square kilometres. His work is thus on the scale of entire margin segments which allows a holistic view of the evolution of margins from onset of glaciation in the late Pliocene/early Pleistocene to fully glaciated conditions during the early to mid Pleistocene. The industrial 3D seismic datasets that he is using for this research comprise extensive archives of margin evolution at a high spatial and temporal resolution and we have only just begun unlocking these treasure troves of palaeo-environmental information. In addition Andrew will be gaining valuable core description and sampling skills over the next few months as we will be studying some 50 m of shallow cores from West Greenland for sedimentology and palaeo-environmental information.

Beyond the technical aspects of his research, Andrew has demonstrated an unusual ability for a young researcher to intellectually progress several research strands at once, working in parallel on areas offshore West and East Greenland, offshore Western and Northern Norway and in the North Sea, the latter work integrating his work with that of two other PhD students. He has shown outstanding scholarship in each of these areas, rapidly analysing extensive bodies of literature in order to identify key outstanding questions of regional as well as global significance and progressing his findings to high-quality manuscripts aimed at high impact journals, including his first paper on the palaeoceanographic significance of buried iceberg scours published in Nature Communications this year.

Andrew's publication record is still in its infancy, but his publication plan is very ambitious, comprising 8 papers in journals including Nature Communications, Nature (hopefully), Quaternary Science Reviews, Geology, Marine Geology, etc, it is entirely plausible that he will achieve these plans within the next 18 months. I predict that Andrew Newton will rapidly become a leading authority on palaeo-environmental evolution of glaciated continental margins and particularly in the

field of seismic geomorphology and stratigraphy applied to the early and mid-Pleistocene evolution of the mid and high latitude margins whose palaeo-environmental records beyond the seabed are extremely poorly known at present.

In conclusion, Andrew is one of the most accomplished and talented PhD students I have worked with over the past 12 years during which I have supervised and co-supervised about 20 PhDs. He is a naturally gifted writer and is on course to gain a publication record that is second to none. He is also an extremely likeable person whom it is a joy to work with.

I therefore give Andrew Newton my unreserved and full support and I strongly recommend him for your consideration for selection as an expedition 374 participant.

I will of course be happy to elaborate on this if you require it.

Yours sincerely

A handwritten signature in black ink that reads "Mads Huuse". The script is cursive and fluid, with the first letters of each name being capitalized and prominent.

Dr Mads Huuse
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<http://uk.linkedin.com/in/madshuuse/>



APPLICATION TO PARTICIPATE IN AN IODP EXPEDITION

ESSAC Office ECORD Science Support & Advisory Committee

GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
24148 Kiel, Germany

Hanno Kinkel (ESSAC Science Coordinator):

Tel: +49 431 600 2418

Fax: +49 431 600 2922

Web Page: <http://www.essac.ecord.org> Email: essac@geomar.de

Please type information

Apply to Sail Application Form

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: Newton

First name: Kate

Current Position: PhD Student

Institution: University of Birmingham

Address: School of Geography Earth and Environmental Sciences, Aston Webb A Block,
University of Birmingham, Edgbaston

City, Postcode, Country: Birmingham, B15 2TT, UK

Tel. work: 07988337554

Tel. home: as above

Fax: n/a

Email: ken155@student.bham.ac.uk

Country of citizenship: UK

Place of birth/date of birth: Britain, 11/11/1992

Gender: Female

Education (highest degree, including year PhD was received / is expected): PhD Earth Sciences,
expected 2019

Are you currently a student? **YES/NO** Expected Graduation Date: 2019

2. EXPEDITION INFORMATION

FULL

Summary of proposed participation, including **(a)** area of scientific interest, **(b)** current research and **(c)** participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

- (a) Palaeoceanography and organic geochemistry
- (b) Antarctic climate-ocean-ice interactions and Miocene SSTs and CO₂
- (c) Biomarker proxies for SSTs, water masses, carbon cycle, terrestrial vegetation and climate from past warm climates (MMCO and MPWP)

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

My research has focussed predominantly on IODP material, notably from IODP 318 to Wilkes/Adélie Land under the supervision of Dr James Bendle, who sailed as lead organic geochemist. I have worked directly on the work-up, identification and compound-specific carbon and hydrogen isotope analysis of algal biomarkers (fatty acids and sterols). These have been applied to the reconstruction of glacial meltwater inputs and primary productivity in response to changes in climate throughout the Holocene, in addition to comparison with data obtained from other proxy records.

I have also been directly involved in analysis of samples from IODP 355: Arabian Monsoon, under the supervision of James Bendle who also sailed as a lead organic geochemist. I have particularly focussed on alkenone biomarkers to produce records of sea-surface temperatures, using the U^{k'}₃₇ proxy, and palaeo-pCO₂ records through compound-specific carbon isotope measurement of the di-unsaturated alkenone compound. I also plan on working on other ODP/IODP material from the mid-Miocene, including, Site U1337 (IODP 320/312, equatorial Pacific), ODP Site 999, (Leg 165, Caribbean Sea) and ODP Sites 752A, 1139A and 1168A (Indian Ocean) sites as part of my PhD research.

I was also involved in analysis and identification of marine biomarkers from DSDP 270 (Oligocene-Miocene, Ross Sea) and DF 79-38 (Cretaceous, George V-Adélie Land).

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

- 1) Before the expedition I would apply for a Moratorium award from UK-IODP, who provide up to £25,000 to PhD students for up to six months during the post-cruise moratorium period. As a NERC-funded student, this would allow my current studentship to be placed into an abeyance during the lifetime of the award and cover costs directly related to proposed work on IODP 374 material. Following this, I will have another fully-funded 13 months of my NERC PhD studentship which will allow me to continue work on IODP 374 projects forming part of my PhD thesis. There will subsequently be an additional six months until the end of my maximum period of registration, which I may use to continue this research and apply for additional funding to do so.
- 2) Post-cruise research will be undertaken at the Birmingham Molecular Climatology (BMC) Lab at the University of Birmingham under the supervision of Dr James Bendle. This lab is fully equipped to perform extraction and separation of organics into specified compound classes, in addition to gas chromatograph (GC) analysis of individual compounds through use of a GC-FID, GC-MS and GC-IRMS. These will enable identification and quantification of compounds as well as stable isotope (C and H) analysis of target compounds.

Additionally, I will have support from my CASE partnership with Isoprime, who are dedicated to bulk and compound-specific stable isotope ratio mass spectrometry (IRMS).

For any organic geochemical analyses not routinely performed at the BMC (i.e. measurement of TEX₈₆, MBT-CBT-MAT) funding will be sought to support analyses at one of NERC's national Mass-Spectrometry facilities, in particular the NERC-LSMSF, School of Chemistry, Bristol. The BMC lab has a good relationship with the NERC-LSMSF and has several recent grants awarded to run analyses in partnership.

Three scientific and/or personal references:

Dr. James Bendle. School of Geography, Earth and Environmental Sciences, Aston Webb A Block, University of Birmingham, Edgbaston, B15 2TT, UK. Email: J.bendle@bham.ac.uk
Telephone: +44 (0) 121 41 46156

Professor Ian Fairchild. School of Geography, Earth and Environmental Sciences, Aston Webb A Block, University of Birmingham, Edgbaston, B15 2TT, UK. Email: i.j.fairchild@bham.ac.uk
Telephone: +44 (0)121 414 4181

Dr Robert McKay. Antarctic Research Centre, Victoria University of Wellington, New Zealand. Telephone: +64 4 463 6836. Email: robert.mckay@vuw.ac.nz

3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist	x	Organic geochemistry
physical properties specialist	x	
sedimentologist	x	
structural geologist		
paleontologist		
paleomagnetist		
petrologist		
hydrogeologist		
Other		

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for%20Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants must inform their national office (if applicable) and national delegate and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.

Letter of interest for IODP 374: Ross Sea West Antarctic Ice Sheet History

Area of expertise

I am applying for sailing participation on board IODP 374 to the Ross Sea as an **organic geochemist**, sedimentologist or physical properties specialist. I am a doctoral researcher in palaeoceanography and organic geochemistry, and have experience in various **molecular proxies** which I believe I can contribute to this project, through both on-board and subsequent shore-based analyses. My broad experience as a palaeoclimatologist (having worked on speleothems before ocean sediments) and the skills acquired during my MSci (Hons) (1st class with prizes – see CV) also gives me the confidence to sail as a sedimentologist or physical properties scientist.

Current research and IODP experience

My current research is focused on climate-ocean-ice interactions within **Antarctic coastal zones**, as evidenced by my current work on **IODP 318** sediments from Adélie Land. This involves a multi-proxy approach, combining and synthesizing molecular and compound specific isotopic records (generated by myself and the Birmingham Molecular Climatology (BMC) lab, Birmingham, UK) with complimentary data-sets (e.g. sedimentology, bulk isotopes, diatoms) from IODP 318 and published regional records (marine sediments and ice-cores) to constrain the Holocene paleoclimate of a climatically sensitive region. I am also particularly interested in **Miocene climate** and carbon cycle dynamics, focusing on reconstructing CO₂ and sea surface temperatures (SSTs) during the mid-Miocene climate optimum (MMCO) and late Miocene cooling, currently through work on **IODP 355** Arabian Sea samples and planned PhD work on various Miocene ocean sediments. The MMCO is recognized as a significant time period within the Cenozoic with large changes in climate, ice sheets and sea level, of which the **Antarctic Ice Sheet** (AIS) is known to play a key role. At CO₂ levels perhaps comparable to those expected this century, the MMCO is considered a fundamental analog for future anthropogenic climate change.

Collaborative work on IODP cores has given me an appreciation of the diversity of currently available paleoclimatic tools. Moreover, I am gaining direct experience of on-going IODP based international collaborations, and how combining multiple approaches, from different laboratories, leads to more detailed and comprehensive paleoclimate reconstructions.

Reason for interest

The prospect of IODP 374 providing records of Neogene to Quaternary West Antarctic Ice Sheet (WAIS) evolution is exciting as it has the potential to address many outstanding questions about forcings and feedbacks involved in key climate transitions, particularly past warm periods such as the MMCO and mid-Pliocene warm period (MPWP). I am especially interested as it would tie in strongly with my current research on both Antarctic palaeoclimate, in an area directly affected by conditions within the Ross Sea, and Miocene climate and carbon cycle changes. Changes in the AIS^{1,2,3,4,5} plus Southern Ocean phytoplankton turnover^{1,6} are known to be significant during the MMCO and subsequent mid-Miocene climate transition (MMCT), yet disparities between current proxy data and model simulations mean that questions remain about internal feedbacks and ice sheet sensitivities^{7,8,9}. This IODP project has the unique opportunity to directly compare ice proximal sedimentary facies from WAIS and associated modelling studies⁵, with molecular and micropalaeontological proxies for SSTs, water mass changes and carbon cycle dynamics.

Ongoing collaborative work between the BMC lab (UK) and the Antarctic Research Centre (VUW, NZ), is analyzing biomarker distributions and preservation in an array of Antarctica sediments and depositional environments (Duncan PhD thesis). Initial biomarker results on legacy material demonstrates that ocean drill cores proximal to the Antarctic (e.g. DSDP 270) can yield remarkable insights into mid-Cenozoic to Neogene climate evolution. Specifically, compound specific stable isotope analysis (δD and $\delta^{13}C$) on late Oligocene to Miocene leaf waxes are viable and yield insights into the Antarctic vegetation record and critical terrestrial climatic boundary conditions and transitions. The work also demonstrates that archaeal lipid biomarkers can be used to derive sea surface temperatures (from marginal marine sites) using the TEX_{86} index. This builds on earlier work that focused on the early Cenozoic of the Antarctic (e.g. ^{10,11}).

Expedition participation plan

During the cruise, I would perform lipid extractions and initial gas chromatograph (GC) analyses of recovered sediments for identification and quantification of preserved biomarkers compounds. This will provide a base for post-cruise research, enabling the determination of which molecular proxies to be used. This will be in addition to assisting with core hydrocarbon measurements.

Ultimately, I propose to provide **multiple biomarker analyses**, as shown in Table 1, to help address three specific objectives of the project: (1) reconstruct atmospheric and oceanic temperatures to identify past polar amplification and assess its forcings/feedbacks; (2) assess the role of oceanic forcing on WAIS stability; (4) identify the sensitivity of WAIS to Earth's orbital configuration under a variety of climate boundary conditions.

Table 1: Potential biomarker proxies to be applied.

	Molecular Biomarker	Known or postulated source	Application
Marine	Sterols Fatty acids	Diatoms/ other marine algae	$\delta^{13}C$ → Carbon cycle changes δD → Hydrography, salinity
	Alkenones	Haptophyte algae	U'_{37} → sea surface temperatures $\delta^{13}C$ → pCO_2 δD → Hydrography, salinity
	Isoprenoidal GDGTs	Thaumarchaeota	TEX_{86} → Sea surface temperatures MI → Anaerobic oxidation of methane
	Long chain Diols	Eustigmatophytes/diatoms	LDI → Sea surface temperatures
Terrestrial	Branched GDGTs	Anaerobic soil and peat bacteria	BIT → Relative inputs of terrestrial material MBT → Terrestrial Temperature (MAT) CBT → pH
	Plant Waxes	Higher Land Plants	Land plant organic matter inputs. $\delta^{13}C$ → Changes in carbon cycle/ reservoirs δD → P/E, hydrography
	Hopanes	Soil bacteria	$\delta^{13}C$ → Changes in methanogen populations
	Hydroxy fatty acids	Gram-negative bacteria	RAN → MAAT RIAN → soil pH CDI → soil pH

The multi-proxy approach will utilise both marine biomarkers, produced directly within the water column, in addition to terrestrial biomarkers from land plants and soils, transported via aeolian, fluvial or glacial processes. This will enable a more complete picture of environmental conditions at key time intervals, through direct comparisons of the marine and terrestrial realm, in addition to datasets produced by other sailing and shore-based participants (e.g. sedimentological, micropalaeontological, numerical ice sheet and climate modellers). My main target will be **marine biomarkers** for compound-specific isotope analysis and SST reconstructions, with a focus on sediments from **past warm periods** (MMCO and MPWP). Where preserved, GDGTs and alkenones can be used for SST reconstructions following well-established techniques and calibrations^{12,13,14}, in addition to the more recently developed long-chain diol index¹⁵. δD analysis of algal biomarkers (e.g. sterols, diols, fatty-acids, alkenones) should enable reconstruction of water mass changes e.g. surface water freshening, while $\delta^{13}C$ can provide information on carbon cycle dynamics such as CO₂ drawdown through an enhanced biological pump. Land surface conditions can be obtained from a wide range of biomarkers found within both soils and plants, including the novel soil pH and MAAT hydroxy-fatty acid proxies¹⁶ currently being developed within the BMC lab.

I am aware that core recovery and preservation of biomarkers from IODP drilling is uncertain and may be variable, especially in such a challenging environment. However, the wide range of techniques and expertise available in the BMC lab allows multiple proxies to be applied, allowing **flexibility** in the specific proxies to be targeted, to be determined after onboard identification of preserved organics. In addition, the BMC lab is well-placed to study discontinuous glacial-marine strata - having been involved in a study with Bella Duncan and Rob McKay (Antarctic Research Centre; VUW, NZ), strategically-linked to Expedition 374. This examined biomarkers in **DSDP site 270**, which sampled stratigraphically older strata in the same basin (Eastern Basin) as the primary continental shelf. This provided insights into appropriate proxies to apply in Expedition 374, as well as extending the biomarker reconstruction we plan for IODP 374 back into the late Oligocene.

I aim to collaborate with sedimentologists, micropalaeontologists and other researchers involved in the expedition to provide multi-proxy records which will help answer the main research questions. Crucially, these biomarker proxies are required to reconstruct oceanic and atmospheric temperatures, key for meeting the expedition's first two objectives.

Post-cruise research

Most shore-based analysis of organic biomarkers will be undertaken at the BMC Lab, University of Birmingham, under the supervision of Dr James Bendle, forming part of my fully-funded PhD. This lab is fully equipped to perform extraction and separation of organics into specified compound classes, in addition to gas chromatograph (GC) analysis of individual compounds through use of a GC-FID, GC-MS and GC-IRMS. These will enable identification and quantification of biomarkers, and compound-specific stable isotope (C and H) analysis, thus enabling a wide range of palaeoclimate proxies to be exploited. For organic geochemical analyses not routinely performed at the BMC (i.e. GDGTs) funding will be sought to support analyses at one of NERC's national Mass-Spectrometry facilities, in particular the NERC-LSMSF, School of Chemistry, Bristol, which the BMC lab has a good relationship with having several recent grants awarded to run analyses in partnership.

My PhD also has the added benefit of a CASE partnership with Isoprime Ltd, who specialise in bulk and compound-specific stable isotope ratio mass spectrometry (IRMS), and have provided training

and additional funding for my PhD research. I will be able to make use of this partnership through collaborations on isotopic analyses, using the latest techniques and cutting edge IRMS capabilities.

References:

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Kate Newton

School of Geography, Earth and Environmental Sciences, University of Birmingham, Edgbaston, B15 2TT
Mobile: 07988337554 Email: ken155@student.bham.ac.uk

Education

2015 – present PhD in Earth Sciences, University of Birmingham (NERC funded; CENTA DTP)

Supervised by Dr James Bendle. Research in palaeoceanography and organic geochemistry, focusing on compound-specific isotope work and application to warm periods of the Cenozoic. Specifically, I am using alkenone biomarkers to reconstruct late Cenozoic and late Miocene sea-surface temperatures (the U^{K}_{37} proxy) and pCO_2 (the alkenone- pCO_2 proxy), using samples from IODP 355, Arabian Sea. This will be taken further and reconstruct pCO_2 and carbon cycle changes during the mid-Miocene (~17-13 Ma) using a range of marine sediment cores, including from IODP 320/321 (equatorial Pacific), ODP 165 Site 999 (Caribbean Sea) and Indian Ocean sites. I am also working to constrain Holocene variability in freshwater input and productivity from Adélie Land, East Antarctica using compound-specific carbon and hydrogen isotope analysis of algal biomarker (fatty acids and sterols) from IODP 318.

2011 – 2015 MSci (Hons) Geology and Geography, University of Birmingham, 1st Class (with 2 prizes).

Fourth year research project: *“Holocene climate variability off East Antarctica: biogenic, oceanic and glacial interactions”*. Supervised by Dr James Bendle and Dr Heiko Moossen. (Grade: 85%)

Third year research project: *“Rates of calcite precipitation from hyperalkaline waters, Derbyshire”*. Supervised by Professors Ian Fairchild and John Gunn. (Grade: 80%)

2009 – 2011 The Sixth Form College, Farnborough

A-levels: Geography – A, Maths – A, Dance – B

AS-levels: Further Maths – A, Tudor History – A, Critical Thinking – B

Employment

2013 – 2015 Research Assistant, University of Birmingham

Part-time employment in the School of Geography, Earth and Environmental Sciences, assisting Professor Ian Fairchild in various research projects. This involved a range of lab work, and occasional fieldwork, including preparation of rocks and speleothems for isotope analysis; fluorescence and TOC analysis of soil samples; and inventorying and organising rock collections.

2009 – 2011 Customer Sales Representative, Domino's Pizza

Two years part-time working as a customer sales representative involving answering phones and serving customers. This greatly increased my skills in working in a team and as an individual, often under stressful conditions, as well dealing with a variety of customers.

Demonstrating and Supervision

- Demonstration on recent research at Poole's Cavern, Buxton to a group of 45 PhD students at the International Speleothem Summer School (S4) August 2015.
- Demonstrating on University of Birmingham undergraduate geology courses:
 - o Field Skills I (Year 1): Wrekin Field Trip and notebook marking
 - o Resources of the Earth (Year 2): Remote sensing practical classes
 - o Sedimentology (Year 2): Carbonate thin sections practical classes
- Co-supervisor for MSci project entitled: *The tropical Pacific during the Miocene: investigating changes in El Niño and the carbon cycle*. 2016-2017

Placements and Work Experience

- Two week placement with PhD CASE partner Isoprime Ltd., Cheadle Hulme, Stockport, UK, June 2016
- Work experience in Department of Geological Sciences, University of Canterbury, New Zealand, September 2012

Training courses

- NERC CENTA training courses attended: Tenerife residential: Speed PhD, Mobile Data Collection with Open Data Kit, Public Engagement with Science; Professional Development and the RDF planner; Introduction to R for environmental scientists; Earth observation & global observing systems; Introduction to VBA programming; Introduction to multivariate analysis; Research Integrity; Numerical modelling for earth surface processes - hydrology/hydraulics; Environmental genomics as a tool in modern environmental science
- University of Birmingham Graduate School courses: Introduction to Teaching and Learning in Higher Education; Assessment and Feedback; Lab Based Demonstrating;

Awards

- Early Career Scientist Travel Award for EGU 2016.
- The Shotton Prize (for MSci degree): highest overall mark in all degree programmes in the department
- The Micropalaeontological Society Prize (for MSci degree): highest mark in a micropalaeontology module

Publications

Newton, K.E., Fairchild, I.J. and Gunn, J. (2015) Rates of calcite precipitation from hyperalkaline waters, Poole's Cavern, Derbyshire. *Cave and Karst Science*, 42, 116–124.

In Prep.:

Newton, K., Bendle, J., McKay, R., Albot, A., Moossen, H., Seki, O., Willmott, V., Schouten, S., Riesselman, C., and Dunbar, R. (In Prep.) Holocene Surface Water Freshening and ENSO Linkages off the Adélie Coast, East Antarctica.

Bratenkov, S., George, S., C., Bendle, J., Liddy, H., Clift, P. D., Pandey, D. K., Kulhanek, D. K., Andò, S., Tiwari, M., Khim, B. K., Griffith, E., Steinke, S., Suzuki, K., Lee, K., **Newton, K.**, Tripathi, S. and Expedition 355 Scientific Party (In Prep.) Multi-proxy geochemical analyses of Indus Submarine Fan sediments sampled by IODP Expedition 355: implications for sediment provenance and palaeoclimate reconstructions.

Presentations

Newton, K., Bendle, J., McKay, R., Albot, A., Moossen, H., Seki, O., Willmott, V., Schouten, S., Riesselman, C., and Dunbar, R. (2016) *Biomarker and isotope record of Holocene climate variability, Adélie Land, East Antarctica*. Oral presentation at British Organic Geochemistry Society 27th Meeting, 13-15 July 2016.

Newton, K., Bendle, J., McKay, R., Albot, A., Moossen, H., Seki, O., Willmott, V., Schouten, S., Riesselman, C., and Dunbar, R. (2016) *Glacial discharge, upwelling and productivity off the Adélie coast, Antarctica: results from a 171 m Holocene sediment core from IODP Expedition 318*. Oral presentation at EGU General Assembly, Vienna, Austria, 17-21 April 2016.

Bratenkov, S., George, S., C., Bendle, J., Liddy, H., Clift, P. D., Pandey, D. K., Kulhanek, D. K., Andò, S., Tiwari, M., Khim, B. K., Griffith, E., Steinke, S., Suzuki, K., Lee, K., **Newton, K.**, Tripathi, S. and Expedition 355 Scientific Party (2016) *Multi-proxy geochemical analyses of Indus Submarine Fan sediments sampled by IODP Expedition 355: implications for sediment provenance and palaeoclimate reconstructions*. Poster presentation at EGU General Assembly, Vienna, Austria, 17-21 April 2016.

Newton, K., Bendle, J., McKay, R., Albot, A., Moossen, H., Seki, O., Willmott, V., Schouten, S., Riesselman, C., and Dunbar, R. (2016) *Glacial discharge, upwelling and productivity off the Adélie coast, Antarctica: results from a 171 m Holocene sediment core from IODP Expedition 318*. Poster presentation at University of Birmingham GEES Doctoral Researcher conference, 12-13 April 2016.

Newton, K. E. (2014) *Rates of calcite precipitation from the hyperalkaline waters of Poole's Cavern, Derbyshire, UK*. Oral presentation at British Cave Research Association 25th Cave Science Symposium, Birmingham, 25 October 2014.

*Dr James Bendle,
Reader,
School of Geographical, Earth and Environmental Sciences,
University of Birmingham,
Edgbaston,
Birmingham,
B15 2TT
12th August 2016*

Letter of support for Kate Newton

To whom it may concern,

I have been the MSci and PhD supervisor of Kate Newton for the last 2 years and 10 months. Kate's research is in palaeoclimatology and organic geochemistry, with a focus on compound-specific isotope work and applications to warm periods and key thresholds in the Cenozoic.

The principal sample material for Kate's graduate work is derived from:

- IODP 318: Adélie Land, East Antarctica using compound-specific carbon and hydrogen isotope analysis of algal biomarkers.
- IODP 355: Arabian Sea, using alkenones and foraminiferal isotopes to reconstruct late Cenozoic and late Miocene sea-surface temperatures and $p\text{CO}_2$.
- A range of marine sediment cores, including from IODP 320/321 (equatorial Pacific), ODP 165 Site 999 (Caribbean Sea) and Indian Ocean sites to study the Miocene carbon cycle.

Fit of IODP 374 objectives with Kate's PhD research:

Samples from 374 would be highly complimentary to Kate's research and she is very motivated to work on the material and to collaborate with the 374 science party. Her broad experience and training qualify her to sail not only as an organic geochemistry, but also as a sedimentologist or even as a physical properties scientist. IODP 374 is of special interest to Kate because it brings together two areas of interest for her current PhD: the ice-ocean-atmospheric interactions at the continental margin of the Antarctic and past warm period in the Cenozoic, especially the MMCO and mid-Pliocene warm period (MPWP).

More broadly, the work would be synthesised with ongoing collaborative efforts between Birmingham and the Antarctic Research Centre, Victoria University of Wellington (NZ). I am currently the co-supervisor (with Dr Rob McKay) of VUW student Bella Duncan. Bella is analyzing biomarker distributions and preservation in an array of Antarctica sediments and depositional environments. Bella's results demonstrate that ocean drill cores proximal to the Antarctic (e.g. DSDP 270) can yield remarkable insights into middle Cenozoic – Neogene climate evolution, based on biomarkers.

Post-cruise support and academic research environment:

Kate's post-cruise work would be funded by NERC. All UK IODP sailing participants now receive up to £25,000 for up to six months during the post-cruise moratorium period. As a NERC-funded student, this would allow Kate's current studentship to be placed into an abeyance for 6 months and the award would cover costs directly related to proposed work on IODP 374 material.

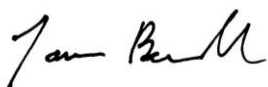
Following this Kate would continue to work on IODP 374 material and would incorporate the results into her PhD thesis and peer reviewed outputs.

Post-cruise research will be undertaken at the Birmingham Molecular Climatology (BMC) Lab at the University of Birmingham under my supervision. This lab is fully equipped to perform extraction and separation of organics into specified compound classes, in addition to GC-FID, GC-MS and GC-IRMS analyses. Additional analyses (e.g. LC-MS) are performed through NERC facilities.

More generally Kate's post-cruise research will take place within **an environment that facilitates cutting-edge palaeoclimatic research**. The Geosystems Research Group (GRG) within the School of GEES, University of Birmingham is internationally known within the areas of palaeobiology, palaeoclimate reconstruction and marine geophysics. A distinct feature of GRG is inter-disciplinary working, especially in the field of marine geology. Kate's research benefits from **interaction and supervision from co-located leaders in palaeoclimatology**, including in foraminiferal-based proxies (Dr Kirsty Edgar), coccolithophore paleobiology and alkenone-based $p\text{CO}_2$ estimation (Dr Tom Dunkley Jones), carbonate isotopes (Dr Ian Boomer), the relationship between solid earth processes and climate change (Dr Stephen Jones), palynology (Dr Guy Harrington – Petrostrat Senior Stratigrapher and adjunct academic). Furthermore the GRG is increasing the critical mass of palaeoclimatologists at Birmingham even further, with a new paleoclimate lectureship/ reader appointment in autumn 2016 (with a likely focus on palaeohydrology).

Kate has considerable experience of organic geochemistry and paleoclimatology in general (she has also worked and published on speleothems) and works well in interdisciplinary team situations. She would offer a number of strengths as an IODP sailing participant. I am always impressed by how capable and motivated Kate is and by her capacity to organise and carry out meticulous laboratory work. She is remarkably mature, hard working individual with excellent time-management skills. Finally she is also very much a team player, with a friendly, broad-minded and sympathetic personality. I am certain that Kate would be a positive addition to any research expedition. Thus I wholeheartedly support her application. The themes of her PhD research, and her interest in Cenozoic paleoclimatology, in general, fit very well with the research objectives of IODP Leg 374.

Yours Faithfully



Dr James Bendle
BSc, MSc, PhD
Reader

School of Geographical, Earth and Environmental Sciences,
University of Birmingham,
Edgbaston,
Birmingham,
B15 2TT



APPLICATION TO PARTICIPATE IN AN IODP EXPEDITION

ESSAC Office ECORD Science Support & Advisory Committee

GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
24148 Kiel, Germany

Hanno Kinkel (ESSAC Science Coordinator):

Tel: +49 431 600 2418

Fax: +49 431 600 2922

Web Page: <http://www.essac.ecord.org> Email: essac@geomar.de

Please type information

Apply to Sail Application Form

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: Olivo

First name: Elisabetta

Current Position: PhD student

Institution: OGS (National Institute of Oceanography and Experimental Geophysics) - University of Siena

Address: via del Donatello, 14

City, Postcode, Country: 34128, Trieste (Italy)

Tel. work: +390402140395

Tel. home: +393474231518

Fax:

Email: eolivo@inogs.it

Country of citizenship: Italy

Place of birth/date of birth: Trieste / 06-05-1988

Gender: Female

Education (highest degree, including year PhD was received / is expected):

November 2015 / November 2018 – ongoing PhD in Polar Science and Technology

March 2012 / March 2014 - Master's Degree in Geoscience

October 2007 / March 2012 – Bachelor's Degree in Geological Science

Are you currently a student? YES Expected Graduation Date: December 2018

2. EXPEDITION INFORMATION

Summary of proposed participation, including area of scientific interest, current research and participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

I'm a PhD student in Polar Science and Technology at University of Siena (in collaboration with OGS - National Institute of Oceanography and Experimental Geophysics). My research deals the analysis of the depositional processes on the continental slope of Ross Sea (Antarctica) during the Cenozoic in relation with the ice sheet dynamics and bottom currents. I graduated in Geoscience with a thesis in seismic reflection interpretation with a seismostratigraphic analysis for the reconstruction of depositional processes on a similar area of my PhD research.

I'll take part in the ANTSSS EU/FP7 Eurofleets 2 cruise, planned for early 2017, that will collect IODP prop. 751 missing seismic site survey data. The Eurofleets 2 cruise aims to provide new insights on Antarctic ice sheet stability related to bottom current influence, from continental slope process investigation.

Based on the 751 proposal, and on the webinar that I attended last week, I am confident I could have the right skills to contribute actively in this expedition. My personal contribution would be as a geophysicist checking if the target depth is reached at each site by plotting the synthetic seismograms obtained from the downhole logs on the seismic profiles. I could also help the sedimentology team with knowledge from some courses that I took during my Master degree (Sedimentology and Facies Analysis).

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

The seismic data that I re-processed during the last months for my PhD work have been used also as site survey for proposal IODP 751-full and they have been included in the EPSP report submitted on May 2016 and presented at the EPSP Panel Meeting on July 2016.

I also took part at the workshop "Antarctica's Cenozoic ice and climate history: New Science and new challenges of drilling in Antarctic waters" (9 – 11 May 2016, College Station, Texas) with the Magellan Plus and PAIS programs grant.

I will attend the ECORD Summer School in Bremen (5-16 September 2016) on "Submarine Geohazards: Mapping, Monitoring, and Modelling" (I also have been selected to obtain an ECORD scholarship).

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

At the moment, the Italian funding mechanism work with the signing of agreements with the institutions based on the public selection made by ECORD, and the favorable opinion of the Committee and following approval by the funds manager. In this first year the Committee supported the funding application for cruise and post cruise activity. There aren't clear funding scheme right now, but the Committee will try to guarantee the cruise support.

Three scientific and/or personal references

3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist		
physical properties specialist		
sedimentologist	X	Core describer, facies analyst
structural geologist		
paleontologist		
paleomagnetist		
petrologist		
hydrogeologist		
Other	X	Geophysicist (synthetic seismograms)

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for_Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants *must inform their national office* (if applicable) *and national delegate* and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

LETTER OF INTEREST

Trieste, 14th August 2016

To whom it may concern,

I'm Elisabetta Olivo.

a PhD student in Polar Science and Technology at University of Siena (in collaboration with OGS - National Institute of Oceanography and Experimental Geophysics). My research deals the analysis of the depositional processes on the continental slope of Ross Sea (Antarctica) during the Cenozoic in relation with the ice sheet dynamics and sub bottom currents.

This is an educational path that I started years ago from my Master's Degree in Geoscience with a thesis in seismic reflection interpretation with a seismostratigraphic analysis for the reconstruction of depositional processes on a similar area of my PhD research. During my Master's and Bachelor's degree I could attend some interesting courses in Sedimentology and Facies Analysis.

After my Master's Degree I obtained a post graduate internship grant at OGS during which I worked on misfits of seismic data in the SDLS (Antarctic Seismic Data Library System); I also helped to create a new project with all the SDLS data (with Kingdom Suite Software) and I attended an ARC GIS course. Throughout my MSc internship, thesis and a post Msc internship at OGS, I've learned theoretical, informatics and applied knowledge about the marine geophysical surveys. I also learned to use software like Kingdom Suite, Focus, SeiSee, SwanPro, to process and interpret seismic sections.

Last year I also participated to the CUMEC 3 campaign with R.V. OGS Explora (study object: canyon dynamics on Malta Escarpment, PI: A. Camerlenghi).

During this first year of PhD I re-processed several seismic sections from Italian, USA, German campaigns, in the Ross Sea, in order to identify and map sedimentary bodies and erosional features, used to infer active or old sedimentary processes along the slope.

The re-processed seismic data have been used also as site survey for proposal IODP 751-full and they have been included in the EPSP report submitted on May 2016 and presented at the EPSP Panel Meeting on July 2016.

I'll take part in the ANTSSS EU/FP7 Eurofleets 2 cruise, planned for early 2017, that will collect IODP prop. 751 missing seismic site survey data. The Eurofleets 2 cruise aims to provide new insights on Antarctic ice sheet stability related to bottom current influence, from continental slope process investigation. I'll use also the new seismic data for my PhD thesis.

During my research I'll focus in particular on the slope processes and I will increase my knowledge in slides and failure processes attending the ECORD Summer School in Bremen (5-16 September) on "*Submarine Geohazards: Mapping, Monitoring, and Modelling*" (I also have been selected to obtain an ECORD scholarship)

Currently, I'm focusing on recent slope processes re-processing some Italian and German seismic section. I will present my results as a poster in the 34th SCAR Biennial Meetings - Open Science Conference in Kuala Lumpur, (August 22-26, 2016) with title "*Depositional processes on the eastern Ross Sea slope and rise: Slides, mounds, presence of fluids.*"

During these first two years of my PhD I'm also get involved with the MAE-GSLAISS project (Italy – USA) "Global Sea Level Rise & Antarctic Ice Sheet Stability predictions: guessing future by learning from past", wich aims are: producing Ross Sea paleobathymetry at 30, 14 and 4 Ma, mapping glacial wedges deposited on the 30, 14 and 4 Ma sea floor and produce paleo ice sheet and circulation models to predict future

scenarios. In this project junior researchers and me will spend few weeks at Univ. of Santa Barbara, Louisiana, Illinois and Massachusetts, to implement our modelling.

I'm very interested in the topic proposed for this expedition and I also believe this project has a lot to offer to my knowledge, in particular to improve my knowlegde about the polar sedimentary facies. In 2018 I will be on my last year of PhD, so I think it could be an incredible experience to enhance my PhD activity plan. I thinks also that interactive with scientists with different skills from me would be a great opportunity, and it would be of course very useful for my future academic career.

Based on the 751 proposal, and on the webinar that I attended last week, I am confident I could have the right skills to contribute actively in this expedition. I'm actually a geophysicist, so my personal contribution would be checking if the target depth is reached at each site by plotting the synthetic seismograms obtained from the downhole logs on the seismic profiles in my Kingdom Project. I could also help the sedimentology team with knowlegde from some courses that I took during my Master's and Bachelor's degree.

I'm a flexible, adaptable person, and I can work alone or as part of a group. I have an enterprising spirit, I am willing to learn and not afraid of hard work.

I hope you will share my same optimism and I hope to have the opportunity to take part of all of this incredible project.

Thank you for your time and consideration.

Sincerely,

Elisabetta Olivo

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

CURRICULUM VITAE and PUBLICATIONS - ELISABETTA OLIVO

Affiliation:

OGS (National Institute of Oceanography and Experimental Geophysics)
Borgo Grotta Gigante, 42/c, 34010 Sgonico, Trieste

Università di Siena, Dept. of Physical Sciences, Earth and Environment
via Banchi di Sotto, 55, 53100 Siena

Personal Details:

First name: Elisabetta
Surname: Olivo
Male/Female: Female
Year of birth: 1988
Address: Via del Donatello, 14
City, Postcode, Country: 34128, Trieste, Italia
Email: eolivo@inogs.it

Education: (higher education, including year PhD received/expected):

November 2015 / November 2018 – ongoing PhD in Polar Science and Tecnology
March 2012 / March 2014 - Master's Degree in Geoscience
October 2007 / March 2012 – Bachelor's Degree in Geological Science

Current academic status: PhD student

Area of scientific interest (including current research project):

Seismic stratigraphy of polar margin, fluids and depositional processes in slope sediments, Eastern Ross Sea (Antarctica)

Professional Experience:

Oceanographic Campaign

3rd / 11th March 2015 - Partecipation at CUMECS 3 campaign on R.V. OGS Explora.
Chief scientist: A. Camerlenghi (OGS), Party Chief: L. Facchin (OGS).
Main Responsibilities: Acquisition of CHIRP sub-bottom profiles, conversion to SEG-Y format, geophysical data archiving and onboard preliminary interpretations.

Trainings

March 2015 / September 2015 - Post MSc Internship (Post-Graduate Educational Training at OGS)
Main Responsibilities: Contribution to the review of the seismic Antarctic database SDLS (Seismic Data Library) by correction of navigation and segy files (SeiSee) and creation of the Antarctica project (Kingdom) with loading data in SDLS.

September 2013 / January 2014 – MSc internship (Student Training as part of MSc thesis at OGS)

Main Responsibilities: Loading, correction, processing and interpretation of seismic data. Management of software such as Kingdom Suite, Focus, SeiSee.

Training Courses

- 27st/ 28nd April 2016 - “*Glaciology: past, present and future*”, R.Colucci (CNR-ISMAR), A.Camerlenghi, M.Rebesco, R.Lucchi (OGS), F.Colleonib(Euro-Mediterranean Center on Climate Change) at OGS (Trieste)
- 11th/ 13th November 2015 - “*Downhole measurements training course*”, at OGS (Trieste)
- 25th/ 29th March 2015 - “*ECDL GIS*” with final exams and certification, Univ. of Trieste, Dept. of Geoscience
- 25th/27th November 2013 - “*Short course on Hydrocarbon Geology*”, W. Paltnieri (ENI) at OGS (Trieste)

Conferences and Seminars

- 9th/11th May 2016 - Workshop “*Antarctica’s Cenozoic ice and climate history: New Science and new challenges of drilling in Antarctic waters*”, College Station (Texas, USA)
- 17th/ 19th November 2015 - 34th GNGTS (National Group of Geophysics of Solid Earth), Trieste
- 13th/16th October 2015 - International Congress GeoSub – Underwater Geology (Trieste)
- 20th/21st October 2015 - “*Conferenza nazionale programmatica sulla ricerca in Antartide*”, Accademia Nazionale dei Lincei (Roma)
- 8th July 2015 - “*Topographically-driven meteoric groundwater – An important geomorphic agent*”, Aaron Micaleff (University of Malta) at OGS (Trieste)
- 23rd/ 25th February 2015 - Turbintermars 2015 “*International conference on turbulence and interactions in marine systems*”, organized by PhD programme ESFM School, Trieste
- 12nd February 2015 - Workshop “*Processi deposizionali e lungo la colonna d’acqua nel Mare di Ross (Antartide)*”, with A. Bergamasco (ISMAR), L. De Santis (OGS), L. Petronio (OGS) at OGS (Trieste)
- 19th/ 21st November 2013 - 32nd GNGTS (National Group of Geophysics of Solid Earth), Trieste
- 14th/17th November 2011 - 30th GNGTS, (National Group of Geophysics of Solid Earth), Trieste

Personal skills and competences:

Language skills

Mother tongue: Italian

Other Languages:

	<i>Understanding</i>		<i>Speaking</i>		<i>Writing</i>
	<i>Listening</i>	<i>Reading</i>	<i>Spoken Interaction</i>	<i>Spoken Production</i>	
English	B2	B2	B2	B1	B1
Deutsch	A1	A2	A2	A1	A1

Relational and Organisational skills

Ability to work both individually and as part of a group acquired through university projects and through post graduate internship.

Ability to be flexible and open to multicultural diversity acquired by participation in an international theater group.

Strong determination and self-motivation.

Good planning skills with great attention to detail and ability to understand priorities, resulting from years of repetition and homework help offered to children and teenagers.

Good skills in managing groups, database management, project implementation, preparation and exhibition of presentations acquired through university and post-university projects (internships).

Technical and Computer skills

- Operating systems Windows and Linux.
- MS Office (Word, Excel, Power Point).
- GIS software.
- Kingdom Suite software (IHS), Seisee (DMNG), Petrosys.
- CAD, SwanPro, SwanConv.
- Photo editing (GIMP).

Publications:

Depositional processes on the eastern Ross Sea slope and rise: Slides, mounds, presence of fluids., (Poster) **Elisabetta Olivo**, Laura De Santis, Nigel Wardell, Riccardo Geletti, Dario Civile, Gualtiero Boehm, Stuart Henrys, Lorenzo Petronio, 34th SCAR Biennial Meetings - Open Science Conference, Kuala Lumpur, August 22-26, 2016.

The Hillary Canyon and the Iselin Bank (Eastern Ross Sea, Antarctica): Alongslope and Downslope Route For Ross Sea Bottom Water, Laura De Santis, Lorenzo Petronio, Riccardo Geletti, Diego Cotterle, Nigel Wardell, Gualtiero Boehm, **Elisabetta Olivo**, Ester Colizza, Andrea Bergamasco, Jenny Black, Stuart Henrys, Rob MacKay, AGU Fall Meeting, San Francisco, December 14-18, 2015.

West Antarctic Ice Sheet Evolution: insight from the Eastern Ross Sea Continental Slope, 20th International Symposium on Polar Sciences (ISPS), Laura De Santis, **Elisabetta Olivo**, Nigel Wardell, Riccardo Geletti, Ester Colizza, Gualtiero Boehm, Korea Polar Research Institute, Incheon, Republic of Korea, May 27-29, 2014

References:

Angelo Camerlenghi

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Laura De Santis

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Istituto Nazionale di Oceanografia e di Geofisica Sperimentale – OGS

Borgo Grotta Gigante 42/c – 34010 Sgonico – TRIESTE – Italy

C.F. 00055590327

fax + 040-327307

12 August 2016

Letter of support for Elisabetta Olivo for applying to sail on IODP Expedition 374

I have been working with Elisabetta since 2013. I was co-supervisor for her Master thesis project at Univ. of Trieste and I gave her a 6 months contract at OGS after she graduated for working on formatting some old multichannel seismic data collected around the Antarctic margin, for the Seismic Data Library and for the IODP proposal 751 seismic data base. I'm currently supervising her PhD research project in Polar Science to present, aimed at the investigation of the depositional processes affecting the eastern Ross Sea continental slope and Cenozoic WAIS dynamics.

The seismic data re-processed by Elisabetta for her PhD work and used as site survey for proposal IODP 751-full, have been included into the EPSP report submitted last May and presented at the EPSP panel meeting on July11-12.

The aims of the IODP expedition 374 fits well into Elisabetta's PhD thesis subject. Elisabetta is using existing and will also use new reflection seismic data, that will be collected from the Ross Sea slope in 2017, in the frame of the EUROFLEETS-2 (PI. Paolo Stocchi, NIOZ) and PNRA WHISPERS (West Antarctic Ice Sheet History from Slope Processes – Eastern Ross Sea, PI: L. De Santis) projects. Elisabetta will be onboard during the 2017 cruise in the Ross Sea and will process and interpret the new seismic data for her thesis. She will produce paleobathymetric maps of the Ross Sea continental margin and publish original work on a detailed acoustic facies analysis of slope processes to understand the relationship between ice sheet dynamic and bottom current. Being member of the shipboard party of IODP Exp. 374 will offer Elisabetta the opportunity to: 1) improve her knowledge about polar sedimentary facies, now based only on their acoustic properties and geometry and 2) make a wonderful experience by interacting with other international scientists of different skill, 3) contribute with her knowledge to check if the target depth is reached at each site by plotting the synthetic seismograms obtained from the downhole logs on the seismic profiles in her Ross Sea kingdom project. She can also be employed in the sedimentology team since she took sedimentology and facies analysis courses during her Master degree. All this will be very useful for her current PhD project but also for her future academic career

Elisabetta is very much motivated and she is hard working on her PhD project. She has flexible personality and good social attitude to work in team. She easily understands scientific concepts and learns how to use of different digital tools/software. She has a scientific attitude, enthusiasm and can potentially give an original contribute to the Expedition and to future polar science

Dr. Laura De Santis

Senior scientists

Istituto Nazionale di Oceanografia e di Geofisica Sperimentale OGS

www.ogs.trieste.it

Borgo Grotta Gigante 42/c, 34010 Sgonico

Trieste, Italy



APPLICATION TO PARTICIPATE IN AN IODP EXPEDITION

ESSAC Office ECORD Science Support & Advisory Committee

GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
24148 Kiel, Germany

Hanno Kinkel (ESSAC Science Coordinator):

Tel: +49 431 600 2418

Fax: +49 431 600 2922

Web Page: <http://www.essac.ecord.org> Email: essac@geomar.de

Please type information

Apply to Sail Application Form

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: Perotti

First name: Matteo

Current Position: PhD Student

Institution: University of Siena, Department of Physical Sciences, Earth and Environment

Address: Via Laterino 8

City, Postcode, Country: Siena, 53100, Italy

Tel. work:

Tel. home: +39 3291610470

Fax:

Email: perottimatteo@gmail.com

Country of citizenship: Italy

Place of birth/date of birth: Genova (Italy)/05-03-1985

Gender: Male

Education (highest degree, including year PhD was received / is expected): Master Degree, PhD expected on 2018

Are you currently a student? YES/**NO** Expected Graduation Date:

2. EXPEDITION INFORMATION

Summary of proposed participation, including area of scientific interest, current research and participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

Full participation. The main goal of this application is defining sediment provenance by a multi-analytical approach. In particular, petrologic (on-board activity), thermo- and geo-chronologic techniques (on-shore activities) will be carried out on samples from the drilled cores.

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

No

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

Funding available:

- Department of Physical Sciences, Earth and Environment of University of Siena
- National antarctic Museum – Geology Section of the University of Siena.
- Italian National Antarctic Program (PNRA-MIUR): IODP projects have been identified as high priority projects to be financial supported in PNRA 2014-2016 strategic plan.

Scientific team

M.Perotti (P.I., on board activities and post-cruise responsible)
F.Talarico, G. Cornamusini, S.Sandroni (Petrologic analysis, University of Siena, Italy),
M.Zattin, B. Andreucci (thermo-geo-chronology analysis, University of Padova, Italy)
M. Petrelli (LA-ICP-MS chemical analysis, University of Perugia, Italy)

Facilities

Department of Physical Sciences, Earth and Environment, University of Siena,
(Petrographic Lab, SEM-EDS)
Department of Geosciences, University of Padova, (Thermochronology and geochronology Lab)
Department of Physics and Geology, University of Perugia (LA-ICP-MS lab)

Three scientific and/or personal references

Professor F.M. Talarico, Department of Physical Sciences, Earth and Environment of University of Siena (Italy), Tel. +39 0577 233812, franco.talarico@unisi.it

Professor G. Cornamusini, Department of Physical Sciences, Earth and Environment of University of Siena (Italy), Tel. +39 0577 233930, gianluca.cornamusini@unisi.it

Professor M. Zattin, Department of Geosciences, University of Padova (Italy), Tel. +39 049 827 9186, massimiliano.zattin@unipd.it

3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist		
physical properties specialist		
sedimentologist		
structural geologist		
paleontologist		
paleomagnetist		
petrologist	x	Clast logging
hydrogeologist		
Other		

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for%20Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants *must inform their national office* (if applicable) *and national delegate* and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.

Letter of interest for the full participation at IODP Expedition Number 374

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

About my current research and expertise

I am a Phd Student geologist from University of Siena (Italy) and I am carrying out a 3-years project relating provenance of the LGM and post-LGM sediments in the Ross Embayment, Antarctica. In particular, I am applying a petrographical approach to several sea floor piston cores located all along the Ross Embayment, in front of the major Ice Streams from West Antarctica; collection of data has been carried out with description of distribution and composition of granule to cobbles sized clasts found in the entire length of the sampled cores, applying a methodical counting of each lithology present (clast logging). Detailed petrographical analysis has been carried out to a representative selection of counted clasts from subglacial and glaciomarine facies, in order to identify and compare possible source areas of sediments, and, ultimately, provide information about LGM ice-flow patterns. In addition, in collaboration with the Geosciences Department of University of Padova (Italy), geochronological and thermochronological analysis have been completed to some sand-rich fraction from the same cores, in order to apply a multi-techniques study.

Moreover, I have participated as field geologist in two Italian expeditions to Antarctica (PNRA XXXth and XXXIst expeditions), being involved as member of AZ2.08 project (titled "Climatic and tectonic forcing on the sediments dispersion processes in West Antarctic Rift System of South Victoria Land: a "source-to-sink" and "multi-proxy" provenance study"). The investigated areas were the Dry Valleys, Skelton/Mulock glaciers region and the Allan Hills, all located in South Victoria Land.

Expedition participation plan

The primary research goal of my requested participation to IODP 374 expedition affects provenance studies of sediments.

Petrological investigations on the granule-to-cobble sized clasts and coarse sand fraction have been widely used as a successful provenance tool in several cases in Ross Sea Embayment research projects: AND1B and AND2A cores (Talarico and Sandroni, 2011; Talarico et al., 2012), CIROS-1 and CIROS-2 cores (Sandroni and Talarico, 2004), CRP-2/2A cores (Talarico et al., 2000). In previous projects, this analytical technique has demonstrated potentiality in revealing direct provenance from source region during glacial maxima and minima, and in providing information about down-core and time-shifting variations which can be ascribed to ice-volume changes and paleoclimate evolution through time.

Detrital thermochronological analysis such as Apatite Fission Track has been applied in ANDRILL AND-2A drill core to unravel tectonic history of large areas of Transantarctic Mountains and Victoria Land Basin, taking into account also provenance patterns through time (Zattin et al., 2012, 2010).

In addition, geochronology techniques such as U-Pb ages on detrital grains (i.e. zircon and apatite) have demonstrated reliability in provenance studies carried out on LGM sediments from Ross Sea Embayment (Licht et al., 2014).

Taking into account this well known spectra of methods, our proposal is to apply a multi-analytical approach towards the cores which will be drilled during IODP 374 expedition (Ross Sea West Antarctic Ice Sheet History). In fact, as previously demonstrated by several authors, petrological and geothermochronological analysis are a powerful tool in sediment provenance studies, providing not only indirect ice-flow patterns and their evolution in time (i.e. changes in thermal regime of ice sheets), but

also useful information about geologic evolution of source regions, in particular those without significant rock exposures such as West Antarctica.

Thus, this approach could easily support sedimentary facies analysis in order to achieve the objective 1, 2 and 4 of the original proposal (1. Evaluate the contribution of West Antarctica to far-field ice volume and sea level estimate; 2. Reconstruct ice proximal atmospheric and oceanic temperatures to identify past polar amplification and assess its forcings/feedbacks. 4. Identify the sensitivity of WAIS to Earth's orbital configuration under a variety of climate boundary conditions.), in particular for proposed continental shelf sites EBOCS-01 to -04, which are supposed to recover complete sequences of glacial cycles. In fact, provenance of sediments is of great utility in determining ice regime of West or East antarctic ice sheets (ice caps vs ice sheet expansion and retreat) and this kind of approach allows for evidencing paleo-ice flows cyclicity in time, and ultimately, providing constraints of WAIS stability through time.

On board activities: petrographic logging of composition and distribution of granules to cobbles sized clasts from the working half cut of the drilled cores will be carried out, following the procedure explained in Talarico et al., 2012. In particular, clasts will be subdivided in lithological groups and their occurrence through the cores will be mapped for each 10 cm intervals. Logging will be done on the entire length of the split cores, so it will be possible a down-core and time-shift mapping of lithological variability, which could provide useful information in support of the other sedimentological and bio- tephro- and magneto-chronology techniques. Some representative clasts will be sampled from the working half core in order to be analyzed on board with a petrographic optical microscopy. First data about lithological distribution, occurrence, and composition of clasts will be available on board during the expedition.

Post-cruise research: samples of sand-rich sediments located at representative stratigraphic intervals of the drilled cores will be analyzed during post-cruise research by means of geo-chronological and thermochronological analysis; in particular, Apatite Fission Track analysis will be carried out following the procedure already applied for ANDRILL site (Zattin et al., 2010). Moreover, geochronological U-Pb ages on detrital apatite and zircon will be obtained following the procedure illustrated in Licht et al., 2014 and Zattin et al., 2012.

In addition, geochemical analysis of single apatite and zircon grains will be performed by LA-ICP-MS in order to better characterize the origin of detrital grains in terms of source rocks and thus identify the possible source area of sediments.

Petrographical analysis will be completed with more detailed microscopic analysis on medium sand fractions by point counting techniques.

Facilities available in order to obtain these types of data are the Department of Physical Sciences, Earth and Environment of University of Siena (Optical and Electronic Microscopy analysis), the Department of Geosciences of University of Padova (thermochronology and geochronology lab), the Department of Physics and Geology of University of Perugia (LA-ICP-MS lab analysis).

Financial Support

The necessary funding to cover all the costs (PI's salary, analytical investigations, travels, accommodations, etc.) is already available in the Department of Physical Sciences, Earth and Environment of University of Siena and in the National antarctic Museum – Geology Section of the University of Siena. Additional funding is expected in the frame of the National antarctic Program (PNRA-MIUR) since IODP 374 and other approved IODP projects in the Antarctic region have been

identified as priority projects to be implemented and supported by PNRA in the PNRA Strategic 2014-2016 plan (http://www.csna.it/Documenti/PNRA_Programma_triennale_2014_2016.pdf).

REFERENCES

- Licht, K.J., Hennessy, A.J., Welke, B.M., 2014. The U-Pb detrital zircon signature of West Antarctic ice stream tills in the Ross embayment, with implications for Last Glacial Maximum ice flow reconstructions. *Antarct. Sci.* 26, 687–697. doi:10.1017/S0954102014000315
- Sandroni, S., Talarico, F.M., 2004. Petrography and provenance of basement clasts in CIROS-1 core, McMurdo Sound, Antarctica. *Terra Antarctica* 11, 93–114.
- Talarico, F., Sandroni, S., Fielding, C.R., Atkins, C., 2000. Variability, petrography and provenance of basement clasts in core from CRP-2/2A, Victoria Land Basin, Antarctica.
- Talarico, F.M., McKay, R.M., Powell, R.D., Sandroni, S., Naish, T., 2012. Late Cenozoic oscillations of Antarctic ice sheets revealed by provenance of basement clasts and grain detrital modes in ANDRILL core AND-1B. *Glob. Planet. Change* 96–97, 23–40. doi:10.1016/j.gloplacha.2009.12.002
- Talarico, F.M., Sandroni, S., 2011. Early Miocene basement clasts in ANDRILL AND-2A core and their implications for paleoenvironmental changes in the McMurdo Sound region (western Ross Sea, Antarctica). *Glob. Planet. Change* 78, 23–35. doi:10.1016/j.gloplacha.2011.05.002
- Zattin, M., Andreucci, B., Thomson, S.N., Reiners, P.W., Talarico, F.M., 2012. New constraints on the provenance of the ANDRILL AND-2A succession (western Ross Sea, Antarctica) from apatite triple dating. *Geochem. Geophys. Geosystems* 13, Q10016. doi:10.1029/2012GC004357
- Zattin, M., Talarico, F.M., Sandroni, S., 2010. Integrated provenance and detrital thermochronology studies on the ANDRILL AND-2A drill core: Late Oligocene–Early Miocene exhumation of the Transantarctic Mountains (southern Victoria Land, Antarctica). *Terra Nova* 22, 361–368. doi:10.1111/j.1365-3121.2010.00958.x

Matteo Perotti

MSc Applied Geosciences,
BSc Geology, BSc Archaeology



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Date of Birth: 05/03/1985	e-mail: perottimatteo@gmail.com
Address: Via della Mercanzia, 80, 53100 Siena, Italy	skype: matteopero

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Profile

I am a Phd student geologist and petrographer from University of Siena (Italy). During my previous career I was involved in different research project relating both academia and industry consultancies in the field of applied petrography. My Phd project regards provenance studies of sediments collected from Last Glacial Maximum glacial tills in Ross Embayment, Antarctica. Recently I was involved in PNRA/2013 project Az2.08 titled "Climate and tectonic forcings on sediment dispersal in the West Antarctic Rift System of South Victoria Land: a source-to-sink, multi-proxy provenance study" (P.I. Professor F.M. Talarico); As member of this scientific project I took part to the XXXth and XXXIst Italian Expedition in Antarctica, working as field geologist in Southern and Northern Victoria Land areas.

- *Main skills*: petrography
- *Techniques*: Optical Microscopy, SEM-EDS

Experience

Field geologist, project 2013/PNRA Az2.08

Austral summers 2014/2015 and 2015/2016: XXXth and XXXIst Italian Expedition in Antarctica. Study areas: Northern and Southern Victoria Land. Geological survey, Rock sampling, Mapping.

Postgraduate scholarship, Department of Physical Sciences, Earth and Environment, University of Siena

2013-2014. Geo-petrographic analysis and modelling of limestone features for calcium and magnesium lime industrial production. Geological survey, Rock sampling, Data acquisition and management (XRF; XRD; Optical Microscopy; SEM-EDS; Geotechnical Tests)

Research Scholarship, Department of Physical Sciences, Earth and Environment, University of Siena

2009. Archaeometric research study of Roman Age copper alloy items: Sampling, chemical and mineralogical analysis, data management.

Education

PhD Student 2014-Present

Doctoral programme: ENVIRONMENTAL, GEOLOGICAL AND POLAR SCIENCES AND TECHNOLOGIES

Department of Physical Sciences, Earth and Environment, University of Siena (Italy). Title of project: " The Antarctic Ice Sheets dynamics during and after the Last Glacial Maximum revealed by provenance of clasts and sand fraction in Ross embayment glacial tills"

Master's degree in Applied Geosciences 2010-2013 (110/110 with honors)
Department of Physical Sciences, Earth and Environment, University of Siena (Italy)

Bachelor's degree in Geological Sciences 2008-2010 (110/110 with honors)
Department of Physical Sciences, Earth and Environment, University of Siena (Italy)

Bachelor's degree in Archaeological Sciences 2004-2007 (110/110 with honors)
Faculty of Letters and Philosophy, University of Siena (Italy)

Courses and seminars

"Sedimentary provenance and analysis", short course to be held on 20th-23rd September 2016, Department of Sedimentology and Environmental Geology, University of Gottingen, Germany.

ERASMUS Intensive Program "*Materials and patrimony: stone, glass, ceramics and concrete, durability and conservation*". University Marne la Vallée PARIS-EST, 12-23 January, 2009.

Professional Qualification

Vocational training Certificate as "Technician specialised in the techniques of archaeological research (RT20051199)", European qualification level (85/368/CEE), Regione Toscana (Italy), 2008

Skills and expertise

Petrography, Petrology, Sampling, Geological Survey, Chemical and mineralogical data acquisition (Optical Microscopy, XRF, SEM-EDS, XRD).

Publications

M.Perotti, B.Andreucci, F.M. Talarico, M. Zattin, Detrital Thermochronology, Geochronology and Petrography of the LGM Eastern Ross Sea (Antarctica), with Implications for Tectonic Evolution of Marie Byrd Land, submitted abstract to AGU FALL Meeting, San Francisco, 2016

G. Cornamusini, M. Perotti, S. Sandroni, F.M. Talarico, The Permian–Triassic continental succession at Allan Hills recording a fluvial reworked fossil forest (Southern Victoria Land, Transantarctic Mountains, Antarctica), 31st IAS meeting of Sedimentology Krakow, Poster session, 2015.

Other Skills and Activities

- Languages: **Italian** (native), **English** (FCE - Cambridge ESOL), **French** (basic)
- Competent in all Windows applications, particularly Office Package.
- Good knowledge of Geographic Information Systems software (particularly ESRI ArcGis)
- Basic knowledge of Computer Aided Design software and drafting (particularly Autodesk AutoCAD)
- Full clean driving license

Prot. n. A/345

Siena, 08/08/16

Dear Dr. Robert McKay
Dear Dr. Laura De Santis
Dear Dr. Denise Kulhaneck

I know Matteo Perotti since 2014 when he started a post-graduate course at the Department of Physical, Earth and Environmental sciences (University of Siena), and I could appreciate very much his strong good attitude to perform high quality research work already during his thesis project in the field of petrology and applied petrography where I acted as tutor.

Matteo acted as an important contributor of ideas and provided essential inputs for the good preparation of two Antarctic Research proposals (PNRA2009 and PNRA2013) which were then approved.

Since then, Matteo was continuously involved in petrography lab work on several cores he sampled at Florida State University - Antarctic Core Facility where he was able to demonstrate his excellent attitude to apply the laboratory techniques relevant for logging and the study (with a number of techniques including optical microscopy and SEM-EDS) of glacial sediments.

Because of his skills, determination and motivation, I was happy to involve him in two PNRA-Italian Antarctic Program projects in austral seasons 2004/15 and 2015/16. During the most recent period he continued to collect a large amount of petrographical, LA-ICP-MS, zircon and apatite U-Pb age data AFT data, which provide a detailed characterization of key intervals of the Last Glacial Maximum and post LGM sedimentary record, and play a key role in identifying important provenance changes during the Pleistocene and Holocene glacial evolution in the Ross Sea area. Matteo is currently at the end of the 2nd year of a 3 year long PhD project focused on provenance investigations of gravel and sand fractions in glacial tills during the Last Glacial Maximum ice advance/retreat processes in the Ross Embayment, Antarctica.

In conclusion, I am delighted to recommend Matteo as a young researcher of outstanding ability and who will greatly benefit from the opportunity to be included in the IODP EXP 347 Ross Sea WAIS.

Best regards





APPLICATION TO PARTICIPATE IN AN IODP EXPEDITION

ESSAC Office ECORD Science Support & Advisory Committee

GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
24148 Kiel, Germany

Hanno Kinkel (ESSAC Science Coordinator):

Tel: +49 431 600 2418

Fax: +49 431 600 2922

Web Page: <http://www.essac.ecord.org> Email: essac@geomar.de

Please type information

Apply to Sail Application Form

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: SALABARNADA ROSET

First name: ARIADNA

Current Position: PhD Student

Institution: Instituto Andaluz de Ciencias de la Tierra, IACT-CSIC

Address: Avenida de las Palmeras, 4

City, Postcode, Country: Armilla, 18100, Spain

Tel. work: (34) 958 230000 (ext. 190132)

Tel. home: (34) 660585931

Fax:

Email: a.salabarnada@csic.es

ariad.sr@gmail.com

Country of citizenship: SPAIN

Place of birth/date of birth: Barcelona, February 14 1984

Gender: Female

Education (highest degree, including year PhD was received / is expected): PhD / fall 2017

Are you currently a student? YES Expected Graduation Date: fall 2017

2. EXPEDITION INFORMATION

Summary of proposed participation, including area of scientific interest, current research and participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

My main scientific interests are related to the study of Antarctic Ice sheet and Southern Ocean palaeoceanographic evolution using sedimentological, physical properties, and geochemical data. My current research studies the link between bottom current sedimentation during the late Oligocene and the Antarctic ice sheet and paleoceanographic configuration in front of the East Antarctic Wilkes Land Margin (Core U1356 IODP Exp. 318).

General objectives:

- 1) Increase our understanding on the imprint that different water masses (the Antarctic Bottom Water, Circumpolar Deep Water, and Antarctic Slope Water) leave on the sediment record of the continental rise site RSCR-02B during warmer-than-present climates.
- 2) Link glacial and oceanic processes recorded in the Ross Sea influenced by the West Antarctic Ice Sheet (WAIS) to those in the Wilkes Land influenced by the East Antarctic Ice Sheet (EAIS). Does oceanographic changes occurring in the Ross Sea are also recorded in sediments from the east Antarctic margin? How are they similar or differ? In addition, AABW plays a critic role in the Global Thermohaline Circulation (THC) but little is know how it operates during warmer-than-present climates. With this proposal we intend provide more hints on how in operates during key-time periods.

This will be achieved by means of:

- 1) Characterization of downslope and along-slope current depositional processes.
- 2) Correlation of Expedition 374 findings with Sites U1361 (EAIS) DSDP Sites 269 and 274 to link glacial and oceanic processes recorded in the Ross Sea (WAIS) to those in the Wilkes Land (EAIS).

Targeting time-interval: middle-late Miocene (~13-10 Ma).

Research plan proposed will help fulfill the objective nº 3 in proposal 751 from the Exp. 374.

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

PhD thesis working with IODP exp. 318, cores U1356, U1357, U1361.

Internships and sample request in the three IODP core repositories in:

Marum (Germany) → Core description, CT-scans

Kochi (Japan) → XRF Geochemical mapping, CT-scans

TAMU (USA)→ Core description, Digital images, core sampling.

I have been involved in three marine geology research cruises. I gained experience with CTD- water sampling (RV García del Cid), refraction and wide-angle reflection seismic line acquisition and bathymetry (RV Sarmineto de Gamboa), and gravity cores and box cores retrieval, pore water sampling (RV Marion Dufresne).

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

I intend to graduate during the fall of 2017. After PhD completion, I will continue having support and affiliation with my actual research institute IACT and my mentor Prof. Carlota Escutia. A 2-year Post-Doctoral position is planned in order to cover post-cruise science analysis and travel costs. Also, additional grants for funding proposed research analysis would be considered (for eg. EU Funding schemes, post-doctoral fellowships abroad, and SCAR Fellowships).

Three scientific and/or personal references

1.- Hans C. Nelson

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3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist		
physical properties specialist	X	Geotek multi-sensor core logger, Digital images, CT-scan
sedimentologist	X	Contourites, turbidites, mass transport deposits. Deep-sea sediments. Smear slides
structural geologist		
paleontologist		
paleomagnetist		
petrologist		
hydrogeologist		
Other		

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for%20Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants *must inform their national office* (if applicable) *and national delegate* and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.

Letter of Interest for IODP Expedition 374

Ross Sea West Antarctic Ice Sheet History

My name is Ariadna Salabarnada and I am in the last year of my PhD research at the Instituto Andaluz de Ciencias de la Tierra (IACT – CSIC) and Granada University in Spain, under the supervision of Professor Carlota Escutia Dotti.

For the past three years I have been working on the glacial and paleoceanographic evolution of the Eastern Antarctic Wilkes Land margin using sediments recovered during IODP Expedition 318. It would be for me a great opportunity to learn first hand and from a team of experts about the evolution of the West Antarctic Ice Sheet (WAIS) that would provide me with a more Antarctic-wide knowledge about ice-ocean interactions. For this, I would like to be considered as a candidate for the IODP exp. 374 in the Ross Sea. Based on my expertise, I am applying to work as a sedimentologist and physical properties specialist.

Research Interests, Experience, and Expertise

My main scientific interests are related to the study of Antarctic Ice sheet and Southern Ocean palaeoceanographic evolution. I have focussed on three different time-windows: the late Oligocene warmth, the Oligocene-Miocene Transition, and the Holocene deglaciation using cores U1356 and U1357 collected by the IODP Expedition 318 in front of East Antarctic Wilkes Land Margin. For my thesis, I have focused on: 1) deep-water Antarctic sedimentation (i.e., turbidites, Mass Transport Deposits (MTDs), contourite and hemipelagic deposits) as indicators of glacial and paleoceanographic changes; and 2) Holocene laminated and debris-laden deposits from the continental shelf to characterize the Holocene deglaciation.

For my work I have used and integrated different sedimentological, physical properties and geochemical methods. I have conducted detailed facies analysis based on visual descriptions of the lithology, microfossil abundance sediment structures and textures, bioturbation, high-resolution digital imaging. Facies interpretation has been aided with smear slides, SEM, CT-scan imaging and grain-size analyses. I have both, used shipboard data and collected new physical properties data from cores using a Geotek Multisensory Core Logger with Magnetic Susceptibility, Gamma-Ray density, P-Wave velocity, and resistivity sensors. I have used geochemical XRF Core Scanner, data and collected discrete XRF, XRD data; Finally, I have also conducted Spectral analysis (Analyseries, Astrochron) and multichannel seismic reflection profiles interpretation using Kingdom Suite Software.

For instrumentation that can be of relevance for an IODP expedition I have training in the use of Geotek multi-sensor core logger, XRF core scanner, and CT-scanner data acquiring and post-processing. Many of this work and analyses have been conducted in the IODP core repositories (MARUM, TAMU and Kochi) and laboratories from my own institution and JAMSTEC through different stays/collaborations. I also obtained a grant to participate in the ECORD Summer School held in MARUM, Bremen “Deep-Sea sediments: from stratigraphy to age models” that provided me with a holistic introduction to what means a IODP expedition, which techniques and methodologies are used on board, and “life on board” hints.

In addition to the main focus of my research, my PhD work also involves collaborations with other scientists working on data from IODP Expedition 318 (i.e., Eocene-Oligocene Transition, Oligocene, and Pliocene warmth) and other projects being now developed using DSDP data from site 269 (in a latitudinal transect to Site U1356) and site 274 (in a latitudinal transect with sites proposed for Expedition 374). I have participated in three scientific oceanographic cruises where I gained experience with CTD-water sampling (RV García del Cid), refraction and wide-angle reflection seismic line acquisition and bathymetry (RV Sarmineto de Gamboa), and gravity cores and box cores retrieval with pore water sampling (RV Marion Dufresne).

Research Goals in Expedition 374

- General objective

Increase our understanding on the imprint that different water masses (the Antarctic Bottom Water, Circumpolar Deep Water, and Antarctic Slope Water) leave on the sediment record to be recovered at the continental rise site RSCR-02B during warmer-than-present climates. The target time interval spans the middle-late Miocene (~13-10 Ma). This goal aims to contribute to Objective 3 of Expedition 374.

A second goal is to link glacial and oceanic processes recorded in the Ross Sea influenced by the West Antarctic Ice Sheet (WAIS) to those in the Wilkes Land influenced by the East Antarctic Ice Sheet (EAIS). Does oceanographic changes occurring in the Ross Sea are also recorded in sediments from the east Antarctic margin? How are they similar or differ? In addition, AABW plays a critical role in the Global Thermohaline Circulation (THC) but little is known how it operates during warmer-than-present climates. With this proposal we intend provide more hints on how it operates during key-time periods.

- Specific objectives

1) Characterization of downslope and along-slope current depositional processes

Based on the oceanographic setting displayed in Fig 7 of the proposal, Site RSCR-02B should record the shift between sedimentation under the influence of the AABW or CDW. We hypothesize this shift should be recorded either by down-slope dominated vs. along-slope dominated processes in the sedimentary record, or by an interplay between different contourite deposits (such it is the case for the Oligocene section at Site U1356). For this, we propose to conduct high-resolution facies analysis of middle-late Miocene succession in order to characterize intervals with dominant processes (e.g., contourites, turbidites, Mass Transport Deposits, modified turbidites, etc.). In addition, we propose to conduct geochemical/mineralogical characterization of the facies to provide with further insights into the different composition of the sediments (e.g., productivity, heavy mineral concentration, etc.) as well as redox conditions of the bottom water masses, which can help in differentiating sediment sources and water masses. Depending on recovery, cyclicity and spectral analysis can be applied in the studied sedimentary section to determine the interactions of bottom currents and climate orbital forcings.

2) Correlation of Expedition 374 findings with Sites U1361 (EAIS) DSDP Sites 269 and 274 to link glacial and oceanic processes recorded in the Ross Sea (WAIS) to those in the Wilkes Land (EAIS).

During this time-window (13-10 Ma) there is a large expansion of the ice sheets onto the Ross Sea continental shelf (Mckay et al., 2009) and also two grounding events were described by Bart et al., (2003). But Wilkes Land sediments show especially interesting intervals where nannofossil oozes are preserved (Escutia et al., 2011). In addition, during the selected time-interval the initiation of strong contour currents were described in Site 274 (Frakes, 1975) that continued until early Pliocene at least. Correlations between these sites can give information about similar/different mid to late Miocene paleoceanographic configuration in these margins that can be linked to their glacial evolution.

Correlation between sites will be achieved using the normal chron C5n.2n (o) (11.04 Ma GTS 2004), which will serve as a tie point for a high-resolution study of this time interval. Our research group has ongoing studies in sediment cores from Leg. 28 269 off the Wilkes Land, and 274 off the Ross Sea. These studies include the construction of new age model for the sites. In addition, we have collected high-resolution digital images, XRF scanner data and Magnetic Susceptibility data.

Methodology: High-resolution facies description and analysis and physical (Magnetic susceptibility, Grain density), geochemical properties (XRF core scanner, discrete XRF, XRD), and spectral analysis (Astrochron software). If the retrieved core presents sediment structures CT-scanning can allow to infer current directions and clast counting without destroying sediments. . CT-Scans allow a 3D high-resolution image of the core and, in addition, can be used as high-resolution proxies for clast counting or for characterizing sediment structures in order to obtain for eg. current direction, clast orientation, etc.

Sampling plan/interval of interest

We intend to sample continental slope/rise sites RSCR-02 (or alternates that recover desired time-window) for facies characterization throughout the middle Miocene (13-10 Ma). Sampling intervals will be facies dependent (or alternatively every 20 cm from the interval 13-10 Ma). Post-cruise, we will acquire XRF scanning and CT-scans if possible/needed.

We know that there are more people/groups interested in this interval but we are happy to collaborate or join resources with other groups.

Depending on the materials recovered during the expedition, the same research plan can be applied to different time-intervals.

Collaborations

I am open to establish collaborations aimed at the study of bottom current sedimentation in Antarctica. As my specialty is based on sedimentology and physical properties other disciplines will be needed in order to undertake a more wide range research.

Collaborations with Carlota Escutia and Dimitrios Evangelinos (PhD thesis looking at DSDP Site 269 and 274) are ongoing for all the objectives as part of my research group.

Geochemistry studies will be held in collaboration of Francisco Jimenez-Espejo.

Sedimentology and cyclostratigraphy in collaboration with Rob MacKay.

Future funding scheme

I intend to graduate during the fall of 2017. After PhD completion, I will continue having support and affiliation with my actual research institute IACT and my mentor Carlota Escutia. A 2-year Post-Doctoral position is planned in order to cover post-cruise science analysis and travel costs. Also, additional grants for funding proposed research analysis would be considered (for eg. EU Funding schemes, post-doctoral fellowships abroad, and SCAR Fellowships).

References

- Escutia, C., Brinkhuis, H., Klaus, A., 2011. IODP Expedition 318: From Greenhouse to Icehouse at the Wilkes Land Antarctic Margin. *Sci. Drill.* 15–23.
- Frakes, L. A., 1975. Paleoclimatic significance of some sedimentary components at Site 274. In Hayes, D. E., Frakes, L. A., et al., *Init. Repts. DSDP, 28: Washington (U.S. Govt. Printing Office)*, 785-787.
- McKay, R., Browne, G., Carter, L., Cowan, E., Dunbar, G., Krissek, L., Naish, T., Powell, R., Reed, J., Talarico, F., Wilch, T., 2009. The stratigraphic signature of the late Cenozoic Antarctic Ice Sheets in the Ross Embayment. *Geol. Soc. Am. Bull.* 121, 1537–1561.

PhD Student
Affiliation: IACT-CSIC
Dept. Marine Geosciences and Global Change
Instituto Andaluz de Ciencias de la Tierra – Universidad de Granada
Avda. de las Palmeras, 4. CP: 18100, Armilla, Spain.

Nationality: Spanish, *Date of Birth:* February 14, 1984

EDUCATION

2013 - present: Current academic status: Doctoral Student, expected in fall 2017.

Ph.D. thesis: "Cenozoic East Antarctic Glacial Evolution from Sediments Collected by Ocean Drilling in the Wilkes Land Margin (CAGES)"
Supervisor: Prof. Dr. Carlota Escutia Dotti

2012-2013: Pre-Doc Fellowship UCM-REPSOL at Repsol Technology Centre (CTR).
Commissioning and development of analytical techniques of mineralogy, petrology and geochemistry studies of upstream rock-fluid interaction.

2010-2012: M.Sc. in Global Change
Spanish Research Council (CSIC)-Universidad Internacional Menéndez Pelayo (UIMP)

Diploma thesis (M.Sc.): Recent depositional evolution of a high altitude, alpine lake: Marboré Lake (Ordesa-Monte Perdido National Park, Spanish Pyrenees). Supervisor: Prof. Dr. Blas Valero Garcés.

February 2010: Bachelor degree in Geology, University of Barcelona (UB), Spain.

INTERSHIPS

2013 (August): 7-day stay at the IODP in the Gulf Coast Core Repository in College Station Texas A&M (USA). Re-describing and sampling sediment cores from Expedition 318 Site U1356.

2013 (6-9 May): 4-day stay at the IODP Bremen Core Repository (Germany). CT-scan acquisition of the deglaciation section from IODP Expedition 318 Site 1357.

2014 (October-December): 3 month stay in the Antarctic Research Center, University of Victoria in Wellington (NZ). Work with Rob MacKay and Tim Naish on data from Sites U1356 and U1361.

2015 (July-October): 3 month stay in JAMSTEC (Japan) and the IODP Kochi Core Repository. Geochemical data interpretation-IODP Site 1356. Analytical work: CT-scans and Geochemical mapping of the Oligocene-Miocene transition sediments.

2016: 10-day stay in the IODP in the Gulf Coast Core Repository in College Station Texas A&M. Re-describing and sampling sediment cores from DSDP Leg 28 and 29 (Sites 269, 274 and 278) and ODP Leg 113 (Site 696). Focusing on Eocene-Oligocene and Oligocene-Miocene Transitions.

SCIENTIFIC EXPEDITIONS

June 2013 RV Marion Dufresne, MD194 "EuroFLEETS GATEWAY" Ghent University (Belgium).
PI: Dr. David Van Rooij. 11 days duration

May 2010 RV García del Cid, "COSTEM" Institut de Ciències del Mar (ICM) Barcelona (Spain).
PI: Dr. Pere Puig. 6 days duration

April 2010 RV Sarmiento de Gamboa, "MEDOC" Institut de Ciències del Mar (ICM) Barcelona (Spain).
PI: Dr. César R. Ranero. 20 days duration

PROFESSIONAL EXPERIENCE

2009 – 2010 SOTASÒL-AT Serveis de geologia s.l.p.
Geotechnical studies, geological cartography for the Geological Survey of Catalonia, Spain.

2008 – 2009 Geological Survey from Catalonia, IGC
Natural Hazards area. Avalanche cartography, nivometeorological studies.

January 2009 Assistant in field campaign for magnetotelluric study in the Spanish Pyrenees.
University of Barcelona

RELATED COURSES

- May 2016 "Avizo Training" software for post-processing of CT-Scans. By FEI VSG Company. (<http://www.vsg3d.com/>).
- May 2015 "Shortcourse on XRD methods for study of clays & clay minerals" taught by Ray E. Ferrell Jr. (Louisiana State University Professor Emeritus).
- May 2015 Theoretical-practical course on ICP-MS, ICTJA-CSIC, in Barcelona, Spain.
- April 2014 "Messinian Salinity Crisis: Budgets, Balances, and Diagenesis", IACT-CSIC, Spain. Taught by: Prof. Emeritus Dr. Gert J. De Lange.
- Sep. 2013 ECORD Summer School. MARUM, Bremen, Germany. "Deep-Sea Sediments: From Stratigraphy to Age Models"

AWARDS

2016: Outstanding Student Poster (OSPP) Award for poster presentation in the International Conference EGU, Viena, for: Obliquity paced contourite cyclicity in Antarctic sediments from the Wilkes Land (Site U1356) during Late Oligocene. Ariadna Salabarnada et al.

GRANTS

2013 (9-20 September): ECORD Scholarship to participate in the ECORD Summer School "Deep-Sea Sediments: From Stratigraphy to Age Models" (ECORD awardee).

2014 (August): PAIS travel funding to attend the ISAES XII in Goa (India).

2104 (October-December): Ministry of Science and Competitively awardee for a 3-month stay in the Antarctic Research Centre-Victoria Univ. of Wellington (NZ).

2015 (13-17 July 2015): Participation in the PAIS activities during the ISAES XII in Goa (India): PRAMSO and Downhill meeting.

2015 (July-October): Ministry of Science and Competitively awardee for a 3-month stay in JAMSTEC (Japan).

2016: PAIS travel funding to attend IODP "Antarctica's Cenozoic ice and climate history: New Science and new challenges of drilling in Antarctic waters" Workshop.

PUBLICATIONS

Salabarnada, A., Escutia, C., Nelson, C.H., Roehl, U., Jimenez-Espejo, F.J., Evangelinos, D., Ikehara, M., McKay, R., and Lopez-Quiros, A. (in preparation). Obliquity paced contourite cyclicity in Antarctic sediments from the Wilkes Land (Site U1356) during Late Oligocene. In prep. to be submitted in *Climate of the Past*.

Valero-Garcés, B.L., Oliva-Urcia, B., Moreno Caballud, A., Rico Herrero, M.T., Mata-Campo, P., Salazar-Rincón, A., Rieradevall, M., García-Ruiz, J.M., Chueca Cía, J., González-Sampériz, P., Pérez Sanz, A., **Salabarnada, A.**, Pardo, A., Sancho, C., Barreiro-Lostres, F., Bartolomé, M., Garcia-Prieto, E., Gil-Romera, G., López Merino, L., Sevilla-Callejo, M., Tarrats, P., (2014). Dinámica glacial, clima y vegetación en el Parque Nacional de Ordesa y Monte Perdido durante el Holoceno. Organismo Autónomo Parques Nacionales.

PUBLICATIONS AT SCIENTIFIC MEETINGS

Salabarnada, A., Escutia, C., Nelson, C.H., Roehl, U., Jiménez-Espejo, F., Evangelinos, D., Ikehara, M., McKay, R., López-Quirós, A. Late Oligocene contourite sedimentation in the Antarctic Wilkes Land margin: IODP Site U1356. IX Congreso Geológico de España, 2016.

Salabarnada, A., Escutia, C., Nelson, C.H., Roehl, U., Jimenez-Espejo, F.J., Evangelinos, D., Ikehara, M., McKay, R., and Lopez-Quiros, A. (2016). Obliquity paced contourite cyclicity in Antarctic sediments from the Wilkes Land (Site U1356) during Late Oligocene. *Geophysical Research Abstracts* Vol. 18, EGU2016-14854, 2016. EGU General Assembly 2016 (Vienna).

Evangelinos, D., Escutia, C., López-Quirós, A., **Salabarnada, A.**, Nelson, C.H. Sedimentological evidences of enhanced bottom-currents developed across the Tasman Gateway from the Late Eocene to Oligocene-Miocene Transition. XXXIV SCAR Meetings and Open Science Conference 2016.

Lobo, F.J., López-Quirós, A., García, M., Pérez, L.F., Hernández-Molina, F.J., Escutia, C., Evangelinos, D., **Salabarnada, A.**, Rodríguez-Fernández, J., Maldonado, A., Bohoyo, F. Morphology and recent sub- surface stratigraphy of Dove Basin, Scotia Sea: Physiographic constrains on bottom current deposition. 35th International Geological Congress 2016.

López-Quirós, A., Lobo, F.J., Escutia, C., Evangelinos, D., **Salabarnada, A.**, García, M., Rodríguez- Fernández, J., Maldonado, A., Bohoyo, F., Hernández-Molina, F.J., Pérez, L.F. Late Quaternary sedimentation patterns in Ona Basin, southern Scotia Sea, Antarctica: Preliminary results. XXXIV SCAR Meetings and Open Science Conference 2016.

Salabarnada, A., Escutia, C., Nelson, C.H., Damuth, J.E., and Jiménez-Espejo F.J. (2015). East Antarctic Ice Sheet Dynamics during the Oligocene-miocene Transition: Insights from IODP Site 1356 Drilling off the Wilkes Land Margin. XII International Symposium on Antarctic Earth Sciences (Goa, India). Abstracts Vol S15-477.

Escutia, C., Jiménez-Espejo F.J., **Salabarnada, A.**, Gutierrez-Pastor, J., Roehl, U., Dunbar, R. (2015). Early Holocene Deglaciation Record from the East Antarctic ADELIE Land Margin: IODP Site U1357. XII International Symposium on Antarctic Earth Sciences (Goa, India). Abstracts Vol S15-478.

Jiménez-Espejo F.J., Etourneau, J., Dunbar, R., Escutia, C., **Salabarnada, A.**, Yamane, M., Ohkouchi, N., Crosta, X., Yokohama, Y., Gutierrez-Pastor, J. (2015). The early middle Holocene of Adélie land (East Antarctic margin): a high resolution record from IODP site U1357. XII International Symposium on Antarctic Earth Sciences (Goa, India) Abstracts Vol S15-476.

Jimenez-Espejo, F.J., **Salabarnada, A.**, and Gutiérrez-Pastor, J. (2015). Record of the early Holocene deglaciation from the East Antarctic Adélie Land margin: IODP Site U1357 XIX INQUA Congress (Nagoya, Japan) Abstracts Vol T02852(02288), P14.

Salabarnada A., Escutia C., Nelson H., Damuth J., Jimenez-Espejo F.J. (2015). The Oligocene-Miocene transition at the East Antarctic Wilkes Land margin: IODP Site 1356. European Geophysical Union (EGU) General Assembly 2015 (Vienna), Geophysical Research Abstracts, Vol. 17, EGU2015-15698-1, 2015

Escutia, C., Jimenez-Espejo, F.J., **Salabarnada, A.**, and Gutiérrez-Pastor, J. (2015). Record of the early Holocene deglaciation from the East Antarctic Adélie Land margin: IODP Site U1357. European Geophysical Union (EGU) General Assembly 2015 (Vienna), Geophysical Research Abstracts, Vol. 17, EGU2015-15692, 2015

Salabarnada, A., Escutia, C., Nelson H.C., Damuth, L., and Brinkhuis, H. (2014). Varying depositional environments across the Oligocene-Miocene boundary and their relevance for East Antarctic ice sheet history: IODP Site U1356, Wilkes Land margin. European Geophysical Union (EGU) 2014 (Vienna), Geophysical Research Abstracts, Vol. 16, EGU2014-13705, 2014.

OUTREACH

November 2015 Science week in Andalusia (Spain): “Antarctica and the oceanic basins around it”, IACT-CSIC.
October 2015 PIISA – Introduction of science and research to High-School students in Andalusia, Spain.

SOFTWARE

Kingdom, Avizo Fire (CT-Scans)
R for Astrochron, Analyseries
ArcGis, Microstation, CAD
Profex XRD processing software
Microsoft Office, Adobe Pack (Illustrator, Photoshop)

LANGUAGES

Spanish: Native
Catalan: Native
English: Very good oral, written and communication skills.
Italian: Good oral and communications skills.



Dr. Carlota Escutia
Instituto Andaluz de Ciencias de la
Tierra, CSIC-Univ. de Granada
Avda. de las Palmeras 4
1800 Armilla (Granada)
Spain
Phone: +34 690614300
15 August 2016

To whom it may concern,

I am writing to support Ariadna Salabarnada's application to be a shipboard scientist for Expedition 374 in the Ross Sea Margin.

Ariadna is one of the top PhD students that I have had the pleasure of working with. I am very impressed with her background knowledge, her understanding of key concepts, her ability in the laboratory and in working with large data sets and I am confident that she will be a successful scientist in the future. During her PhD Ariadna has acquired a strong background in sedimentological, physical properties and geochemical signatures of deep-water sediments in the Antarctic margin and Southern Ocean. She is now preparing the scientific manuscripts where she integrates these data sets to obtain paleoenvironmental records that can be linked with paleoclimate, ice sheet and paleoceanographic changes during the Oligocene and early Miocene.

Most of her work has been conducted in large multidisciplinary and international teams. Ariadna is hard worker and she can be relied upon to complete a job she has committed herself to. Regarding her work habits, she is organized and thorough with her work and pays attention to detail. She works well both, independently and in collaboration with other colleagues. She has an open-personality and excellent oral language and communication skills, which make her able to work and interact with a large number of persons from many countries, disciplines and levels of expertise. In addition, she has a kind demeanour and a good sense of humour that is very pleasant and efficient when working in large research teams and collaborations. All of these qualities are very relevant for conducting successful independent and teamwork during two-month length expeditions.

Ariadna is expected to finish her PhD in the fall of 2017. If she participates in Expedition 374, we can secure funding to provide her with a two-year postdoctoral fellowship at the Instituto Andaluz de Ciencias de la Tierra (IACT), one of the Institutes of the Spanish Research Council at the University of Granada. We can also guarantee funding for full support for post-cruise laboratory and analytical work on samples collected during the Expedition.



In summary, I highly support Ariadna's application and I truly hope she will be able to participate in Expedition 374. I am confident she can be an asset to the science party and at the same time the opportunity of participating in an IODP Expedition would benefit her with a unique scientific experience that will allow her to grow scientifically and personally.

A handwritten signature in blue ink, which appears to read 'Carlota Escutia', is positioned below the main text. The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Dr. Carlota Escutia



APPLICATION TO PARTICIPATE IN AN IODP EXPEDITION

ESSAC Office ECORD Science Support & Advisory Committee

GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
24148 Kiel, Germany

Hanno Kinkel (ESSAC Science Coordinator):

Tel: +49 431 600 2418

Fax: +49 431 600 2922

Web Page: <http://www.essac.ecord.org> Email: essac@geomar.de

Please type information

Apply to Sail Application Form

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: **Simões Pereira**

First name: **Patric**

Current Position: **Postgraduate (PhD) student**

Institution: **Department of Earth Science and Engineering, Imperial College London**

Address: **Royal School of Mines, Prince Consort Road**

City, Postcode, Country: **London SW7 2BP, United Kingdom**

Tel. work: /

Tel. home: **(+44) 0745 9838 680**

Fax: /

Email: **p.simo-es-pereira14@imperial.ac.uk**

Country of citizenship: **Luxembourg**

Place of birth/date of birth: **Esch-sur-Alzette (Luxembourg), 31st of August 1990**

Gender: **Male**

Education (highest degree, including year PhD was received / is expected):

**2018 (expected) Ph.D. in Isotope Geochemistry and Paleoclimatology
Imperial College London, United Kingdom**

**2014 MSc. In Environmental Geoscience and Engineering
School and Observatory of Earth Sciences, Strasbourg, France**

Are you currently a student? **YES** Expected Graduation Date: **30th September 2018**

2. EXPEDITION INFORMATION

Summary of proposed participation, including area of scientific interest, current research and participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

Isotope geochemistry and paleoclimatology, reconstruct ice margins using isotope provenance & sea-surface temperature using Mg/Ca ratios, inorganic geochemical analysis to conduct post-cruise provenance and sea-surface temperature reconstructions

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

No prior involvement with DSDP/ODP/IODP.

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

1) Given the parallel scientific goals between my PhD project and IODP Expedition 374, research during the 12-month moratorium on the samples will be funded through my PhD scholarship.

2) I will be able to use the MAss Spectrometry and Isotope Geochemistry at Imperial College (MAGIC) laboratories and available technical support for my post-cruise research.

Three scientific and/or personal references

Tina van de Flierdt

Reader in Isotope Geochemistry
Royal School of Mines
South Kensington Campus
SW7 2AZ, London, United Kingdom

Claus-Dieter Hillenbrand

Marine Geologist
Paleo-Environments, Ice Sheets and Climate Change team
British Antarctic Survey, High Cross Madingley Road
CB3 0ET Cambridge, United Kingdom

Julie Prytulak

Lecturer in Geology
Royal School of Mines
South Kensington Campus
SW7 2AZ, London, United Kingdom

3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist	X	Radiogenic Isotope geochemistry
physical properties specialist	X	No experience, but probably able to quickly learn the skills required
sedimentologist		
structural geologist		
paleontologist		
paleomagnetist		
Petrologist		
Hydrogeologist		
Other		

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for_Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants *must inform their national office* (if applicable) *and national delegate* and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.

SIMÕES PEREIRA Patric

Department of Earth Science and Engineering,
Imperial College London, SW7 2BP London, UK

ECORD Science Support & Advisory Committee

Jan Behrmann and Hanno Kinkel
GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3, 24148 Kiel, Germany

Letter of Interest to sail in the *International Ocean Discovery Program Expedition 374*

Dear *ECORD Science Support Advisory Committee*,

The decision taken by the IODP Science Evaluation Panel to focus on Antarctic research comes at a time where it has become essential to improve our understanding on the vulnerability of polar ice sheets to future climate changes. Hereby I am sending you a Letter of Interest to join the collective effort to unravel the past history of the West Antarctic Ice Sheet (WAIS) by participating in IODP Expedition 374 (referred in this letter as *Exp. 374*).

One of the scientific objectives of *Exp. 374* is to provide a more precise and reliable depiction of the evolution of the WAIS during the Neogene and Quaternary from the Ross Sea, and evaluate different climatic/oceanic forcings and feedbacks. Driven by the same motivation, I am currently doing a PhD in isotope geochemistry at Imperial College London, United Kingdom, with the purpose to better constrain the dynamic behaviour of the WAIS by analysing Pleistocene sediment sequences from the Amundsen Sea.

The approach chosen for reconstructing past WAIS (in-)stabilities during glacial and interglacial periods is to use the geochemical provenance of the terrigenous components of marine sediments. In detail, I obtain strontium (Sr), neodymium (Nd), hafnium (Hf) and lead (Pb) isotope analysis and major and trace element patterns on the fine-grained detritus and argon ages ($^{40}\text{Ar}/^{39}\text{Ar}$) on ice-rafted hornblende and biotite grains. In a first step for my PhD, I characterized the provenance of modern (i.e. late Holocene) seafloor surface sediments from the West Antarctic continental shelves (Bellingshausen Sea to Sulzberger Bay in the Ross Sea) in order to determine their overall geochemical variability and describe their respective source areas. In a second step, I decipher the continental provenance signature on two marine sediment (piston-)cores from the continental slope and rise in the Amundsen Sea holding a continuous record of at least the last 800'000 years. This work is underway and will provide insights into the location of the ice margin in this vulnerable area of the WAIS during past warm (and cold) times.

To learn about a potential driver for ice sheet retreat in the Amundsen Sea sector of the WAIS, I plan to conduct Mg/Ca analysis on planktonic and benthic foraminifera on the same core material in 2017 to reconstruct surface and deep ocean temperatures during the Late Pleistocene.

As for my future plans, I am lucky to be able to participate in a forthcoming RV *Polarstern* expedition PS104 to the Amundsen Sea in February 2017 (chief scientist: Karsten Gohl, Alfred Wegener Institute, Bremerhaven). This expedition aims to apply for the first time the seafloor drilling device MeBo to high latitude shelf environments, with the goal to facilitate *in situ* drilling of up to 80 m long cores in order to collect precious shelf material, which is often difficult to obtain using the JOIDES Resolution. This opportunity will make me gain tremendous experience and knowledge in terms of working on a research vessel alongside experienced sedimentologists.

My current research focuses on the WAIS evolution from an Amundsen Sea point of view. Integrating these findings with data from a drill core in the Ross Sea would provide a unique opportunity to decipher large scale changes affecting the WAIS during the late Pleistocene. A direct comparison is possible as similar methods are applied to resolve some of the objectives of *Exp. 374* (i.e. Objective 1, 2 and 3 in [751 Full2](#)). Hence, my primary research interest to participate in *Exp. 374* lies in this inter-shelf comparison and possible correlation between the Amundsen Sea sector and the Ross Sea sector of the WAIS.

Drill Site EBOCS-04B could potentially yield a continuous sediment sequence spanning the Plio-Pleistocene. Using radiogenic isotope provenance tracers in this core could reveal changes in the glacial behaviour of the WAIS, from localised ice caps (on Marie Byrd Land and/or Victoria Land) to ice sheet expansion. The relatively distal drill sites RSCR-01B and -02B on the continental rise are ideally situated to potentially contain carbonaceous organisms, which could be used for surface and deep seawater temperature reconstructions using techniques such as Mg/Ca. Such temperature proxies in turn can help to test the hypothesis that the upwelling of relatively warm Circumpolar Deep Water is a driver for WAIS instabilities.

The expedition is scheduled at the beginning of 2018, and my PhD funding continues until October of the same year. I am expecting to finish the above described work on my PhD cores from the Amundsen Sea before the expedition, to be able to fully focus on working on material from *Exp. 374* after coming back from sea. My goal would be to analyse Plio-Pleistocene marine sediments for their continental provenance (primarily Nd- and Sr- isotope analyses). Such provenance studies require a relatively small amount of sample volume (~3cc). Initial samples could be taken home from shipboard samples utilised for inorganic geochemistry work, complemented by more detailed sampling at the end of the cruise to capture Plio-Pleistocene climate cycles. The funds needed for this work could be taken from my main PhD funding, as the goals are aligned.

I am a dedicated scientist with the aim to pursue my career in an academic environment to conduct research in paleoclimatology, and will therefore also apply for various internal and external funding opportunities to carry out additional research on this project beyond my PhD funding (i.e. postdoc projects/fellowships).

Drilling in the Ross Sea is an ambitious project to expanding our understanding on the evolution of WAIS and the forcings acting upon it. I am happy to be already able to contribute to this knowledge with my current research project, and I am destined to dedicate part of my future scientific career to this field.

Sincerely yours,

Patric Simões Pereira



London, 15th August 2016

Patric SIMÕES PEREIRA

Postgraduate (Ph.D.) researcher in
Isotope Geochemistry and Paleoclimatology
Phone: (+44) 074 5983 8680
Email: p.simoes-pereira14@imperial.ac.uk



Department of Earth Science and Engineering
Royal School of Mines, Imperial College London
SW7 2AZ United Kingdom

Summary of Research Project

The aim of my current research is to investigate the stability of the West Antarctic Ice Sheet under warmer-than-present conditions by studying the geochemical provenance of marine sediments back in time.

Educational background

- | | |
|-------------|--|
| 2014 - 2017 | Ph.D. in Isotope Geochemistry and Paleoclimatology
Imperial College London, UK
Thesis: <i>In Search of the Last Collapse of the West Antarctic Ice Sheet</i>
Advisors: Dr Tina van de Flierdt and Dr Claus-Dieter Hillenbrand |
| 2012 - 2014 | MSc. in Environmental Geoscience and Engineering
School and Observatory of Earth Sciences, France, and University of Ottawa, Canada
Thesis: <i>U-series disequilibria studies in marl soils of the Terres Noires, ORE Draix, France</i>
Advisors: Prof François Chabaux and Dr Eric Pelt |
| 2009-2012 | BSc. in Earth and Environmental Science
School and Observatory of Earth Sciences, France |

Research Experience and Fieldwork

- | | |
|-----------------|--|
| Jan – May 2013 | Research Assistant at the University of Ottawa, Canada <ul style="list-style-type: none"><i>Elemental (NO₂, NH₄) and isotopic (¹⁵N and ¹³C) analyses of agricultural soils</i> |
| June- July 2012 | Internship at the Laboratory of Hydrology and Geochemistry of Strasbourg, France <ul style="list-style-type: none"><i>Isotopic analysis (U, Sr, B) in river waters and limestones</i> |
| June- Aug 2011 | Professional internship at Eurasol SA, Luxembourg <ul style="list-style-type: none"><i>Soil coring/drilling and evaluation of soil stability using pressiometric analysis</i> |
| Fieldtrips | Coastal sedimentology in Normandie/Brittany, France
Basin and Range of eastern California, USA
Pre-Alpine region of Digne-les-Bains, France
Volcanic province of the Massif Central, France ... |

Conferences, Meetings and Courses Attended

- | | |
|---------------------------|--|
| August 2016
(expected) | International Conference on Paleoceanography, Utrecht, Netherlands (Poster presentation)
Insights into West Antarctic Ice Sheet (in-)stability during the late Pleistocene |
| June 2016 | Goldschmidt Conference 2016, Yokohama, Japan (Oral Presentation)
Fingerprinting the provenance of marine sediments off West Antarctica |
| March 2016 | Geochemistry Group Research in Progress, Leeds, UK (Oral presentation)
Fingerprinting the provenance of marine sediments off West Antarctica |
| Nov 2015 | British Antarctic Survey Student Symposium, Cambridge, UK (Poster presentation)
In Search of the Last Collapse of the West Antarctic Ice Sheet: Insights into Glacial Erosion and Transport Using a Multi-Proxy Provenance Toolbox |

Nov 2014	Planning workshop for Polarstern expedition and MeBo drilling in the Amundsen Sea Embayment, Antarctica. Alfred-Wegener-Institut Helmholtz-Zentrum fuer Polar- und Meeresforschung, Bremerhaven, Germany (cruise reported to 2017)
Oct 2014	NERC-funded Short Course – Multidisciplinary Fieldwork Training in a Geoscience Environment, Geochemical Mapping (Leadhills, UK)
Aug 2013	DAAD-funded International Summer Ecological School, Shepsi (Russian Federation) organized by the Tyumen State University

Teaching and Outreach Experience

2014 – Present	Postgraduate demonstrator at Imperial College: <ul style="list-style-type: none"> • Paleoceanography • Climate • Ice & Fire
May 2015	Imperial Fringe Festival workshop on <i>Plastic in the Ocean</i> for a public audience
July 2014	<i>Build your Aquifer</i> workshop for primary school children at the Mineral & Gem Festival in Sainte-Marie-aux-Mines, France
2012	Supervision during fieldtrip in sedimentology to Digne-les-Bains, France

Technical Skills

Analytical skills:	Multi-Collector Inductively Coupled Plasma Mass Spectrometry Thermal Ionization Mass Spectrometry Ion-exchange chromatography (U,Th,Ra,Sr,Nd)	
Software skills:	Proficient:	ArcGIS, Illustrator, Matlab, C
	Basics:	PHREEQC, R
Language:	Mother Tongue:	Portuguese
	Fluent:	French, English and Luxembourgish
	Excellent command:	German
Management:	Organiser of the seminar series 2015-16 for the Grantham Institute for Climate Change, Imperial College	

Funds Granted

Travel grants by the Geochemistry Group of the Geological Society to present my work at the Goldschmidt conference in 2016 (£200)
Travel grants by the *School and Observatory of Earth Sciences* for studying a year abroad (350Eur)
Travel grants by the *University of Strasbourg* for studying a year abroad (750Eur)

Professional Membership

European Association of Geochemistry & The Geological Society

Interests

Alongside of being passionate about science, I am also a devoted rock climber who is thrilled by the opportunity to test the edges of my skills on unlike challenges. When possible, I like spending my time outdoors (mountain climbing, occasional alpinism, long trek ...), but do regular running, swimming, and occasional Salsa dancing, during my spare moments.



13 August 2016

IODP Expedition 374 application of Mr Patric Simões Pereira

To Whom it May Concern,

I am the principal PhD advisor for Mr Patric Simões Pereira, who is applying to participate in IODP Expedition 374 to the Ross Sea.

Patric is a second year PhD student in the Department of Earth Science and Engineering at Imperial College London, co-supervised by myself and Claus-Dieter Hillenbrand (British Antarctic Survey, Cambridge, UK).

His project is to decipher the stability of the West Antarctic Ice Sheet (WAIS) over the past 800,000 years. The approach we chose is to study well-dated marine sediment cores that contain a record of sediment provenance that can be unravelled based on radiogenic isotope geochemistry. As a first step towards this goal Patric compiled unique provenance maps of the West Antarctic continent and existing bedrock geochemistry data. In a second step he performed an extensive survey of well dated late Holocene core top sediments all around the shelves and slopes of West Antarctica, including transects of proximal to distal sites in the Bellingshausen and Amundsen Sea. His results show spectacular provenance signals for individual areas and even ice streams, lending a lot of promise to the upcoming downcore work (Simoes Pereira et al., 2016, Goldschmidt abstract). The third and fourth part of Patric's PhD will be to produce provenance and temperature records from two piston cores offshore the Amundsen Sea for the past 800,000 years. These cores were recovered during BAS/AWI expeditions in the past. They are well characterised, but have never been worked on for provenance (and temperature) reconstructions. We expect truly novel insight into WAIS dynamics on glacial-interglacial times from these cores reaching back to MIS 19.

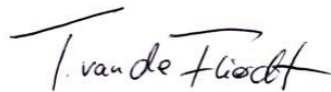
Patric came to Imperial with formidable skills in isotope geochemistry and geology, benefiting from work experiences in a range of universities and laboratories. He is an extremely quick and eager learner and has built on his initial skill set in the past two years. He is now absolutely independent and competent in sediment processing, ion chromatography and mass spectrometry for the elements strontium and neodymium, with

lead and hafnium procedures at his fingertips as well. He also carried out major and trace element analysis in collaboration with Sam Hammond at the Open University (Milton Keynes, UK), and collaborates with Sidney Hemming (Columbia University, New York, USA) on obtaining $^{40}\text{Ar}/^{39}\text{Ar}$ ages on individual biotite and hornblende grains. Patric is a joy to work with and extremely collegial. I can see that he will do very well in a ship environment, even though he has not sailed before.

If selected, I would be happy for him to take on the provenance work on Expedition 374. I would of course support him towards this goal. His PhD funding comes from the Kristian Gerhard Jebsen Foundation, and is fully guaranteed for four years, including laboratory consumables (until October 2018). I am confident that Patric can finish the work on his planned PhD chapters by January 2018 so that he would have ~ 7 months after the cruise to work full time on creating results for IODP Expedition 374. He will have my full support and the facilities to do so, and I have no doubt that he will be able to deliver a large amount of fantastic provenance work within this time frame. He is also destined to stay in academia and will most certainly look for postdoc/fellowship positions to continue his Antarctic provenance work.

Please let me know should you have any further questions.

Best regards,
Tina van de Flierdt

A handwritten signature in black ink, reading "T. van de Flierdt". The signature is written in a cursive style with a large, sweeping initial 'T'.



APPLICATION TO PARTICIPATE IN AN IODP EXPEDITION

ESSAC Office ECORD Science Support & Advisory Committee

GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
24148 Kiel, Germany

Hanno Kinkel (ESSAC Science Coordinator):

Tel: +49 431 600 2418

Fax: +49 431 600 2922

Web Page: <http://www.essac.ecord.org> Email: essac@geomar.de

Please type information

Apply to Sail Application Form

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: van der Weijst

First name: Carolien

Current Position: PhD student (first year)

Institution: Faculty of Geosciences, Utrecht University

Address: Heidelberglaan 2

City, Postcode, Country: 3684CS Utrecht, The Netherlands

Tel. work: +31 30 253 2630

Tel. home: +31 6 14132006

Fax: -

Email: C.M.H.vanderweijst@uu.nl

Country of citizenship: The Netherlands

Place of birth/date of birth: 29.03.1990, Bladel (The Netherlands)

Gender: Female

Education (highest degree, including year PhD was received / is expected):

2013-2015	MSc Earth, life and climate (biogeology) at Utrecht University <i>cum laude</i> (GPA 4.0)
2015-2019	PhD in marine palynology and palaeoceanography, Utrecht University Project title: <i>The signature of Mid-Pliocene warmth in the ocean</i>

Are you currently a student? **YES/NO** Expected Graduation Date: 15-9-2019

2. EXPEDITION INFORMATION

Summary of proposed participation, including area of scientific interest, current research and participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

Pliocene (MIS-M2 and Mid-Piacenzian Warm Period) biostratigraphy and marine ecology (dinocysts), high-resolution temperature and sea ice variability (organic geochemistry), in relation to orbital forcing and relative sea level change.

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

I am working on ODP Leg 159, site 959C; IODP Leg 318, sites 1359 and 1361 (pilot); IODP leg 175, sites 1081 and 1082 (pilot).

High-resolution sampling of ODP 959 was performed d a 4-day visit at the core repository in Bremen.

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

My PhD project funding (WP4-GEO-AS-PHD10) is granted to the Department of Earth Sciences at Utrecht University by the Netherlands Earth System Science Centre (NESSC), which is directly funded by the Dutch Ministry of Science and Education. Following IODP Expedition 363, I am warranted approximately three years of financial support and laboratory access at the Department of Earth Sciences at Utrecht University. Additionally, I will have access to organic geochemistry laboratory of the Royal Netherlands Institute for Sea Research (NIOZ) for specialized measurements that cannot be performed at Utrecht University. My advisors and several other staff members are experienced IODP scientists and very much willing to contribute to the success of the expedition in any way they can.

Three scientific and/or personal references

Prof. dr. Appy Sluijs

Heidelberglaan 2
3584 CS UTRECHT
The Netherlands
Phone number +31 30 253 2638
Email: A.Sluijs@uu.nl

Dr. Francesca Sangiorgi

Heidelberglaan 2
3584 CS UTRECHT
The Netherlands
Phone number +31 30 253 2419
Email: F.Sangiorgi@uu.nl

Dr. ir. Francien Peterse

Heidelberglaan 2
3584 CS UTRECHT
The Netherlands
Phone number +31 30 253 5068
Email: F.Peterse@uu.nl

3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist		
physical properties specialist		
sedimentologist	x	Descriptive sedimentology
structural geologist		
paleontologist	x	Palynology: Mesozoic pollen and dinocysts and Cenozoic dinocyst ecology and stratigraphy
paleomagnetist		
petrologist		
hydrogeologist		
Other		

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for%20Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants *must inform their national office* (if applicable) *and national delegate* and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.



Universiteit Utrecht

IODP Expedition 374 Shipboard
Scientific Party selection committee

**Faculty of Geosciences
Department of Earth Sciences
Marine Palynology and Paleoceanography**

Address
Heidelberglaan 2
3584 CS UTRECHT
Room 5.05
The Netherlands

Phone +31 302532630
Email C.M.H.vanderWeijst@uu.nl
Date 15-8-2016
Subject Application IODP Expedition 374:
Ross Sea West Antarctic Ice Sheet History

Dear Sir/Madam,

Please allow me to motivate my application for IODP Expedition 374 as a shipboard palynologist or sedimentologist. I am currently at the end of the first year of my PhD project entitled '*The signature of Mid-Pliocene warmth in the ocean*' at the Marine Palynology and Paleoceanography group at Utrecht University. Under the supervision of dr. Francesca Sangiorgi, prof. dr. Appy Sluijs and dr. Francien Peterse, I aim to creatively apply a multi-proxy approach to quantify environmental change in detail and to identify mechanistic drivers of regional climate change. My goal is to improve understanding of physical, biological and chemical oceanographic processes in areas where data-model comparison shows large discrepancies, such as the tropics, the Arctic and Antarctic.

I am currently working on the late Pliocene ODP Site 959 in the Eastern Equatorial Atlantic. Together with a master student, who I am co-supervising with prof. dr. Lucas Lourens and prof. dr. Appy Sluijs, we are improving the former biostratigraphic age model with benthic isotope stratigraphy. In contrast to previous hypotheses outlined in the Initial Reports, we find the late Pliocene at ODP Site 959 to be both continuous and extensive enough to be studied on a precession-scale resolution. I am exploring the potential of using the biomarker temperature proxy TEX₈₆ in an area where the traditional calibrations are unsatisfactory. This is achieved by combining different temperature proxies (TEX₈₆, U^K₃₇ and Mg/Ca of planktonic foraminifera), stable oxygen isotopes of planktonic foraminifera, dinocysts assemblages and a physical modelling study of a second master student that I will co-supervise, together with dr. Anna von der Heydt at the Institute for Marine and Atmospheric Research (IMAU) in Utrecht. I expect this assessment to not only greatly improve our knowledge of Pliocene oceanography in the Atlantic tropics, but also to fundamentally improve our understanding of the TEX₈₆ proxy and its applicability in other areas where traditional calibrations seem insufficient, but where alternative temperature proxies (U^K₃₇ and Mg/Ca), are inapplicable; e.g., the Antarctic.

After I finish my work on ODP Site 959, I plan to redirect my attention towards the other end of the thermal gradient; the cold seas of the Arctic and Antarctic. Research targets in these areas are to substantially improve temperature estimates using unexplored biomarker proxies and/or new calibrations, to quantify temperature variability on astronomical time scales, to quantify sea ice variability using biomarker proxies and dinocysts assemblages and to qualitatively assess near-field sea level change in regions that are sensitive to ice sheet dynamics, such as the Ross Sea. These parameters are of tremendous importance to ice sheet modellers, including my colleague, PhD student Tijn Berends and his supervisor, dr. Roderik van der Wal at the Physics Department at Utrecht University. Our PhD projects



are funded by the Dutch Ministry of Science and Education through the Netherlands Earth System Science Centre (www.NESSC.nl). One of the goals of NESSC is to quantify past climate sensitivity, for which it is crucial to transcend discipline boundaries. Hence, collaboration within this research centre is highly encouraged, and moreover, travelling grants are offered to visit collaborators abroad. Collaboration with ice sheet modellers in Utrecht and perhaps abroad will maximize the scientific output of my analytical efforts.

Obviously, joining the Shipboard Science Party of IODP expedition 374 would be invaluable to my PhD project as well as my NESSC colleague's, and so would be the opportunity to work as a post-cruise researcher during the moratorium. Within this year, I would be most eager to make a proximal-distal transect of sea-ice biomarkers (highly branched isoprenoids produced by diatoms, see e.g. Massé et al. 2011 in *Antarctic Science*), assess late Pliocene sea surface temperatures with the TEX₈₆ proxy and sea level fluctuation with the related BIT-index, and explore the potential of quantitative palynological analyses for the reconstruction of sea ice, sea level and marine ecology. Concerning palynology, it has to be stressed that until date, no Antarctic sediments of Pliocene age have been recovered that are suitable for environmental reconstruction by quantitative analysis of dinocysts. Palynology has been useful though to quantify reworking and determine the age of reworked material. Finding diverse dinocysts assemblages would be a prime discovery that would be in excellent hands in our specialized laboratory in Utrecht.

Both as a shipboard scientist and as a post-cruise researcher, I have a lot to offer. First, I would like to point out my specialties: Marine palynology and organic geochemistry. I have plenty of theoretical knowledge in both fields, as well as an extensive practical track record. I am very comfortable in the laboratory and often I find myself able to think of creative solutions to unexpected problems, which will allow me to perform well under harsh conditions. Second, I would like to stress my broad academic background. Originally being a biologist, I have explored many fields within biogeology and paleoclimatology, including sedimentology. Although I'm less experienced in sedimentology than palynology and organic geochemistry, I am catching up by teaching sedimentology practicals in an undergraduate sedimentology course. Joining Expedition 374 as a sedimentologist would allow me to further explore the practical side of a field I'd wish to be more experienced in. Being familiar with many aspects of paleoclimatology and having learned various analytical techniques, I expect myself to be a quick learner in sedimentological analyses. In addition to my scientific skills, I am a certified first-aider, trained by the Orange Cross Organisation in treating various injuries and giving CPR.

In my spare time, I greatly enjoy taking long-distance mountain hikes, preferably in higher and more inhospitable terrain. I hope to experience Antarctica in a similar way; working hard under harsh conditions, but being able to go somewhere where few have gone before and to enjoy nature in its purest form. It would be a dream come true to visit the Ross Sea as a scientist. With this positive and persevering spirit, I hope to be a welcome addition to the team from a social perspective as well. I look forward to work in the dynamic shipboard environment, to get acquainted with other scientists that are passionate about the Antarctic region and to set up new collaborations in the post-cruise phase of the expedition.

Finally, I would like to stress my intentions of actively participating in public outreach through the NESSC outreach programme before, during and after the cruise: www.tippingpointahead.nl. The NESSC has budget and work force to realize professional movies, interviews, (video) blogs, etc., aimed at educating a high-school audience.

My PhD supervisors and the managing director of the Department of Earth Sciences strongly support my application and warrant commitment and funding availability to post-cruise research activities and journal publications. In two complementary letters, included in my application, they motivate their support.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Carolien van der Weijst'.

Carolien van der Weijst

Carolien M.H. van der Weijst



Date of birth
29.03.1990

Work address
Faculty of Geosciences
Heidelberglaan 2
3584 CS Utrecht,
The Netherlands

Phone number
+31 614 132 006

E-mail address
c.m.h.vanderweijst@uu.nl

Education

09.2015 – PhD candidate at Utrecht University. Department of Earth Sciences

Project title: *The signature of Mid-Pliocene warmth in the ocean*
(Co-) promotors: Prof. dr. Appy Sluijs, dr. Francesca Sangiorgi, dr. Francien Peterse
Funding: Netherlands Earth System Science Centre (NESSC)

09.2015 Advanced Course in Organic-Walled Dinoflagellate Cysts, Heidelberg

07.2015 Urbino Summer School in Paleoclimatology

2013-2015 Master: Earth, Life and Climate at Utrecht University, *cum laude* (GPA 4.0)

Projects and (field) courses with a focus on biogeosciences and climate reconstruction.

MSc thesis: *Controls on vegetation dynamics in the wake of the end-Triassic mass extinction event*

Supervisors: Dr. Bas van de Schootbrugge (Utrecht University) and prof. dr. A. Sluijs (Utrecht University)

MSc internship: *Trace elements and stable oxygen isotopes from an Indonesian marine lake: Validation of the Na/Ca salinity proxy and environmental history reconstruction*

Supervisors: Dr. Willem Renema (Naturalis Biodiversity Centre), dr. Lisa Becking (Naturalis Biodiversity Centre/University of California, Berkeley), dr. Lennart de Nooijer (NIOZ), prof. dr Gert-Jan Reichart (Utrecht University/NIOZ)

2009-2013 Bachelor: Biology with a minor in biogeology at Utrecht University

BSc thesis: *Multi-proxy pilot study of Environmental changes across the Cretaceous-Paleogene boundary at Seymour Island, Antarctica*

Supervisors: Dr. Johan Vellekoop (Utrecht University) and prof. dr. Appy Sluijs (Utrecht University)

Training

06.2016 **First aid training (including CPR)**

Work experience

2014-2015 **Research assistant at the Laboratory of Palaeobotany & Palynology Foundation**
Compilation and recalibration of organic-walled dinocyst biostratigraphic events.

Teaching

2013-2014 **Teaching assistant at the Department of Biology, Utrecht University**
Bachelor's courses: Marine Sciences I, Marine Sciences II and Marine Sciences III.

09.2015 – **Teaching assistant at the Department of Earth Sciences, Utrecht University**
Bachelor's courses: Evolution & Ecology and Sedimentology.
Master's course: Organic Geochemistry.

11.2015 – **(Co-) supervisor of one bachelor's and two master's student research projects**

Boards & committees

2012-2013 **Member of the theatre committee of The Utrecht Biologists Association**

2016 **Member of the organization committee of the Utrecht Earth Sciences Department Day**

2015 – **Member of the NESSCwork board**
Newsletter editing and organization of excursions for the PhD/PD network of the Netherlands Earth System Science Centre

2015 – **Member of the Palaeobotanical & Palynological Society Utrecht (PPGU) Board**

Conference talks and workshops

11.2013 **Speaker at the Association of universities in the Netherlands (VSNU) Student Research Conference at the Amsterdam University College**
Title of talk: Reconstructing the Antarctic marine environment at the time of the Cretaceous-Paleogene mass extinction event

04.2016 **Workshop co-leader on 7th National Science Communication Student Conference in Utrecht**
Title of workshop: Creative Scientific Solutions in Climate Communication

Publications

Van de Schootbrugge, B., S. Richoz, J. Pross, F. W. Luppold, S. Hunze, T. Wonik, J. Blau, C. Meister, **C. M. H. van der Weijst**, G. Suan, A. Fraguas, J. Feibig, J. O. Herrle, T. Rutz, J. Guex, C. T. S. Little, P. B. Wignall, W. Putmann, and W. Oschmann. Submitted to Newsletter on Stratigraphy: The Schandelah Scientific Drilling Project: A new reference core from northern Germany for understanding repeated Early Jurassic ocean anoxia.

Van der Weijst, C. M. H., L. J. De Nooijer, W. Renema, and G. J. Reichart. Trace elements and stable oxygen isotopes from Lake Kakaban, Indonesia: Validation of the Na/Ca salinity proxy and environmental history reconstruction. In prep.

Van der Weijst, C. M. H., F. Hilgen, J. H. A. van Konijnenburg-van Cittert, A. Sluijs, and B. van de Schootbrugge. Controls on vegetation dynamics in the wake of the end-Triassic mass extinction event. In prep.

Abstracts

Lindström, S., H. Sanei, B. van de Schootbrugge, G. K. Pedersen, K. Dybkjær, **C. M. H. van der Weijst** and K. H. Hansen. 2015: Evidence of volcanic induced environmental stress during the end-Triassic event. Poster presented at the European Geosciences Union General Assembly, Vienna, Austria.

Sluijs A., M.J. Cramwinckel, J. Frieling, I.J. Kocken, T.J.T. Veenstra, **C.M.H. van der Weijst**, R. van der Ploeg, C. Agnini, P.K. Bijl, S.M. Bohaty, M. Huber, F. Sangiorgi, S. Schouten, J.S. Sinninghe Damste and F. Peterse. 2016: Cenozoic temperature and oceanographic evolution of the tropical Atlantic Ocean. Keynote lecture at the Congress of the Italian Geological Society, Naples, Italy.

Van der Weijst, C. M. H. 2013: Reconstructing the Antarctic marine environment at the time of the Cretaceous-Paleogene mass extinction event. Proceedings of the VSNU Student Research Conference 1.

Van der Weijst, C. M. H., F. Sangiorgi, F. Peterse and A. Sluijs. 2016: Pliocene ocean thermal gradients: From documenting patterns to understanding processes. Poster presented at the Dutch Earth Sciences Congress (NAC), Veldhoven, The Netherlands.

Van der Weijst, C. M. H., J. H.A. Van Konijnenburg-Van Cittert, F. J. Hilgen, A. Sluijs and B. van de Schootbrugge. 2016: Eccentricity-forced vegetation changes following the end-Triassic mass extinction. Poster presented at the Dutch Earth Sciences Congress (NAC), Veldhoven, The Netherlands.

Van der Weijst, C. M. H., W. Renema, L. J. de Nooijer, L. E. Becking and G.-J. Reichart. 2016: Deconvolving calcitic $\delta^{18}\text{O}$ using Mg/Ca temperature and Na/Ca salinity estimates and first application in El Niño reconstructions of the Holocene in Indonesia. Poster presented at the Dutch Earth Sciences Congress (NAC), Veldhoven, The Netherlands.

Van der Weijst, C. M. H., J. Winkelhorst, F. Sangiorgi, F. Peterse, L. Lourens and A. Sluijs. 2016: Tracing Late Pliocene Eastern Equatorial Atlantic ocean temperatures and water-column structure using dinoflagellates, and (in)organic geochemical proxies. Poster will be presented at the International Conference on Paleoceanography, Utrecht, The Netherlands.



Laboratory of Palaeobotany and Palynology
Budapestlaan 4
3584CD, Utrecht

IODP Expedition 374 Shipboard
Scientific Party selection committee

Correspondentie

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Page

Page 1 of 3

Date

August 15th, 2016

Subject

Letter of Recommendation: Carolien van der Weijst, MSc.

Dear Sir or Madam.

Please allow me to emphatically motivate my recommendation of Carolien van der Weijst for participating on IODP Expedition 374. I am convinced that her multi-disciplinary background, problem-solving capacity, aptness at learning new theory and methods, hard-working mentality, sociable personality and ability to cooperate within a team will be of great value to the success of the expedition, both shipboard and post-cruise.

We became acquainted in 2012 when she came to work on a bachelor's research project at the Laboratory of Palaeobotany and Palynology. She expressed her interest in the interaction of the biosphere and global climate, particularly in harsh environments such as the Antarctic. To meet these interests, she enrolled in a project on the marine palynology and organic geochemistry of the Cretaceous-Paleogene boundary on Seymour Island, Antarctica, which I supervised with a PhD student in our group, Johan Vellekoop. Carolien proved to be a bright, independent, hard-working student with excellent analytical insight and writing skills, with great scientific ideas. She was the best of her cohort and was graded an 8.8/10 (8 out of 10 equals GPA: 4). Her qualities were seen by the Association of Universities in the Netherlands (VSNU), by whom she was invited as a speaker at the annual VSNU Student Research Conference.

After finishing her bachelor's project, Carolien extended her bachelor's programme in order to complete a minor in biogeology and attend a three-week fieldwork course to the Tremp Basin in Spain, where I was again one of her supervisors. During this intensive field course, she gained valuable experience in descriptive sedimentology and carbonate paleontology.

Carolien continued her studies with a master in Earth, Life and Climate at the Faculty of Geosciences, which she accomplished *cum laude* (GPA 4.0) at the top of the cohort (<10%). The courses she followed, covered a broad spectrum of expertise, including microbial biogeochemistry, (in-) organic geochemistry, paleoceanography, cyclostratigraphy and sea-going fieldwork. With this broad theoretical and practical background in paleoclimate science, she joined our group again for a major master's project, this time on the recovery phase of the Triassic-Jurassic mass extinction. This project was supervised by dr. Bas van de Schootbrugge and myself. She took a lot of initiative and made clever decisions in the process of data acquisition. She complemented palynology (mostly pollen) with $\delta^{13}\text{C}$ and magnetic susceptibility records on which she performed spectral analysis. This led to surprising, new insights on the expression of orbital cycles on the supercontinent Pangea under elevated $p\text{CO}_2$. Her project was graded an 8.5/10. An



adaptation of her thesis on the influence of astronomical cycles and monsoon circulation on major vegetation shifts in the late Rhaetian and Hettangian will be submitted for publication.

She further broadened her expertise during a combined three-month internship at Naturalis Biodiversity Centre and the Royal Netherlands Institute for Sea Research. With dr. Willem Renema, prof. dr. Gert-Jan Reichart and dr. Lennart de Nooijer, she worked on Holocene sediments from marine lakes in Indonesia. Using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) on benthic foraminifera picked from core top samples, she was able to calibrate Na/Ca ratios of *Ammonia tepida* to lake water salinity. This calibration was used to reconstruct paleosalinity of Lake Kakaban, Indonesia. In combination with Mg/Ca-based temperature reconstructions and $\delta^{18}\text{O}$ measurements, she was able to assess the influence of the Western Pacific Warm Pool on Lake Kakaban hydrology. This internship was graded with an 8/10 and a publication will follow from it.

During her master's programme, she was hired as a teaching assistant by myself and several of my colleagues for three interdisciplinary bachelor courses of marine sciences. She was also employed by dr. Peter Bijl as a research assistant at the LPP foundation. Her work as a research assistant involved calibrating and compiling records of dinocyst stratigraphy for a large web-based dinocysts reference platform. Both as a teaching and research assistant, she has showed a great sense of responsibility, initiative and ability to adapt to unexpected circumstances.

In 2015, with dr. Francesca Sangiorgi, dr. Francien Peterse, I assigned Carolien fully-funded four-year PhD project out of 120 international applicants. Her project is entitled: *The signature of Mid-Pliocene warmth in the ocean*. Within this project, she aims to make detailed environmental reconstructions of regions at warm and cool ends of the latitudinal thermal gradient. She performs quantitative analysis of dinocyst assemblages, which she complements (depending on the region) with organic geochemical proxies (TEX_{86} and U^{k}_{37} for temperature and highly branched isoprenoids for sea ice) and inorganic geochemical proxies (carbonate stable isotopes and Mg/Ca for age control and proxy cross-calibration). Currently, she is working on a high-resolution environmental reconstruction of MIS-M2 and the Mid Pliocene Warm Period at equatorial site ODP 959 in the Eastern Atlantic. Notably, she is assessing the potential of using TEX_{86} data which significantly underestimates sea surface temperature and would usually be ignored by the community. Hopefully, this will add to the understanding of the underlying mechanisms controlling this proxy, and can be translated into increased applicability of TEX_{86} at sites outside the tropics as well, including the Antarctic region.

Site selection and initiation of international collaborations in the Arctic and Antarctic regions is still ongoing. The sites that will be drilled during Expedition 374 are expected to be extremely valuable to Carolien's research targets in the Antarctic region. Moreover, reconstructions of sea surface temperature, sea ice and relative sea level, will be of direct use to a PhD student at the Physics Department in Utrecht, whose ice-sheet modelling project we hope to tightly link to Carolien's proxy research.

Carolien is also actively involved in teaching a bachelors courses in sedimentology and paleontology and from next year, she will be involved in a master's course in organic geochemistry. Also, she is currently co-supervising one bachelor student's and two master student's projects, which she herself (co-)designed and set up collaborations for.



Over the years, Carolien gathered knowledge of palynological preparation techniques, Mesozoic and Cenozoic dinocyst morphology, stratigraphy and ecology, in addition to Mesozoic pollen morphology and stratigraphy. She is acquainted with various chemical analytical techniques, including biomarker sample preparation and chromatography techniques. She has some experience with descriptive sedimentology, but is prepared to learn more if she were to join Expedition 374 as a shipboard sedimentologist.

Carolien can be very independent as a researcher, but is also an excellent team player. She is a board member of the Palaeobotanical & Palynological Society Utrecht (PPGU) and of the NESSCwork. The PPGU is a society that nowadays primarily aims to reinforce social contacts within the two separate research groups that once formed the Laboratory of Palaeobotany and Palynology. The NESSCwork is an active social network of PhD students and Post-Docs of the Netherlands Earth System Science Centre. With these boards, she organizes social events, technical workshops and composes newsletters.

Collectively, even though Carolien may have relatively little experience as a sea-going paleoceanographer, I am convinced that her multi-disciplinary training combined with a truly unique dose of talent will make her a great asset to the shipboard scientific party of Expedition 374. Moreover, since her PhD project will focus on multiple of the targets of the cruise, she will be able to generate lots of valuable data post-cruise. Therefore, I fully recommend Carolien to sail on IODP Expedition 374.

Sincerely yours,

Prof. dr. Appy Sluijs



P.O. Box 80.115
3508 TA Utrecht
The Netherlands

Faculty of Geosciences

Department of Earth Sciences

ECORD Science Support and Advisory Committee

Telephone
+ 31 30 253 5098
Fax

E-mail
J.W.deBlok@uu.nl

Date
August 12, 2016

Subject
Letter of support Carolien van der Weijst,
IODP 374

Your reference

Our reference
16.08003u

With this letter, the Department of Earth Sciences strongly supports the application of Ms. C.M.H. (Carolien) van der Weijst (date of birth March 29, 1990) to join the IODP 374 expedition (Ross Sea West Antarctic Ice Sheet History) on board the *Joides Resolution* as part of her PhD study.

I confirm that Ms. van der Weijst has enrolled in the PhD programme of Utrecht University in September 2015, with the intend to defend her PhD thesis in the 3rd or 4th quarter of 2019.

Ms. Van der Weijst has sufficient post-cruise science support available through funds and facilities at our department. The main source of funding will be the project WP4-GEO-AS-PHD10 that has been granted to our department by the Netherlands Earth System Science Centre (NESSC).

Yours Sincerely,

Drs. Jan-Willem de Blok
Managing director of the Department of Earth Sciences





APPLICATION TO PARTICIPATE IN AN IODP EXPEDITION

ESSAC Office ECORD Science Support & Advisory Committee

GEOMAR | Helmholtz Centre for Ocean Research Kiel
Wischhofstrasse 1-3
24148 Kiel, Germany

Hanno Kinkel (ESSAC Science Coordinator):

Tel: +49 431 600 2418

Fax: +49 431 600 2922

Web Page: <http://www.essac.ecord.org> Email: essac@geomar.de

Please type information

Apply to Sail Application Form

Expedition Number 374: Ross Sea West Antarctic Ice Sheet History

1. PERSONAL INFORMATION

Family name: Zindorf

First name: Mark

Current Position: PhD Student

Institution: Newcastle University

Address: School of Civil Engineering and Geoscience, Newcastle University,
Drummond Building

City, Postcode, Country: NE1 7RU, Newcastle upon Tyne, United Kingdom

Tel. work: -

Tel. home: 0044 776 395 3475

Fax: -

Email: m.zindorf1@ncl.ac.uk

Country of citizenship: Germany

Place of birth/date of birth: 23/07/1987, Koblenz am Rhein

Gender: Male

Education (highest degree, including year PhD was received / is expected):
MSc, PhD expected in September 2017

Are you currently a student? YES Expected Graduation Date: September 2017

2. EXPEDITION INFORMATION

Full participation

Summary of proposed participation, including area of scientific interest, current research and participation plan (maximum 250 characters with space – more detail should be included in the Letter of Interest):

Geochemically analyse sediments and pore waters for paleoclimate proxies, nutrients and products of microbially induced redox reactions. Distinguish primary signals from diagenetic ones, relate non-steady state diagenesis to climatic changes.

Prior involvement with DSDP/ODP/IODP and nature of involvement (expedition number, shipboard/shore-based participation, co-chief, etc):

PhD project on samples from IODP Expedition 341 – Gulf of Alaska (member of shore-based scientific party)
Expedition 341 2nd Postcruise meeting participation
ECORD Training course “Virtual Drillship” at MARUM/Bremen
Participation in two UK-IODP Conferences (London 2014, Newcastle 2015)
ECORD Research Grant for outstanding young scientists

Post-cruise science support to achieve the proposed scientific objectives 1) future funding scheme and 2) support from host institution (e.g. staff, facilities)

- 1) Shore-based sediment and pore water analysis and subsequent publication as postdoc; UK-IODP Moratorium Award covering £50k (US\$ ~65k) for post-cruise scientific work (covering monthly allowance, consumables, analyses etc.) at 80% FEC.
- 2) Access to technical support and analytical facilities at University of Leeds.

Three scientific and/or personal references

Prof Dr Sean S. Gulick
Institute for Geophysics
Jackson School of Geosciences
University of Texas at Austin
10100 Burnet Road, Building 196-ROC
Austin TX 78758-4445
USA
E-Mail: sean@ig.utexas.edu

Prof Dr Harald Strauss
Institut für Geologie und Paläontologie
Lehrstuhl für Historische und Regionale Geologie
Universität Münster
Corrensstraße 24
D-48149 Münster
E- Mail: hstrauss@uni-muenster.de

Prof Dr John M. Jaeger
Department of Geological Sciences
University of Florida
241 Williamson Hall
Gainesville FL 32611-2120
USA
E-mail: jmjaeger@ufl.edu

3. SCIENTIFIC EXPERTISE

For Scientist Jobs Descriptions visit: http://iodp.tamu.edu/participants/scientist_jobs.html

Please indicate your area(s) of expertise (maximum 3)

Discipline	Mark with X	Speciality
microbiologist		
organic and inorganic geochemist/biogeochemist	X	Inorganic geochemistry/biogeochemistry of pore waters and sediments (CNS analysis, bulk geochemistry, Fe-S speciation, S isotopes, cations/anions), reactive transport modelling
physical properties specialist		
sedimentologist	(x)	
structural geologist		
paleontologist		
paleomagnetist		
petrologist		
hydrogeologist		
Other		

4. ADDITIONAL DOCUMENTS

Please, provide the following documents:

- Letter of interest, including details about area of scientific interest, current research, expedition participation plan and post-cruise research
- CV and Publication list
- Letter of recommendation (for PhD students)
- See also: http://www.essac.ecord.org/flyer/Guidelines_for_Applying_to_sail.pdf

Please, send your application form as a *MS Word document* and the additional documents in *PDF format* (preferably as one file) by email to Jan Behrmann and Hanno Kinkel at the ESSAC office: essac@geomar.de.

In addition to the ESSAC application, all applicants *must inform their national office* (if applicable) *and national delegate* and send a copy of the application documents. ECORD does not provide funds for participation; the national offices or national delegates can provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.essac.ecord.org/index.php?mod=about&page=ESSAC> for a list of the national contact persons.

Mark Zindorf
Newcastle University
School of Civil Engineering and Geosciences
Drummond Building
NE1 7RU
Newcastle upon Tyne
United Kingdom

12/08/2016

ESSAC Office
GEOMAR Helmholtz Centre for Ocean Research Kiel
Ostufer Wischhofstrasse 1-3
24148 Kiel
Germany

Application to participate in IODP Expedition 374 - Ross Sea West Antarctic Ice Sheet History

Dear IODP Expedition 374 Staffing Committee,

Hereby I would like to apply as shipboard inorganic geochemist/biogeochemist to sail on IODP Expedition 374 – “Ross Sea West Antarctic Ice Sheet History” onboard the *JOIDES Resolution*.

I am a PhD Student in the field of Marine Geochemistry with a strong interest in sediment and pore water geochemistry. My main focus is on global carbon and nutrient cycling and its change with global climate as well as post-depositional processes in marine sediments by microbially catalysed redox reactions (early diagenesis) and the resulting alteration of pore water and sediment composition.

I am particularly interested in participating in IODP Expedition 374 because it matches my own research interests, and my expertise in inorganic sedimentary geochemistry will be very helpful to address the scientific objectives of the cruise. Currently I am reconstructing paleoclimate, carbon and nutrient cycling, non-steady state diagenesis, and water column oxygenation on Mid-Miocene to recent sediment samples from IODP Expedition 341 to the Gulf of Alaska. All these scientific issues overlap with the objectives of IODP Expedition 374. Furthermore, the drill targets of IODP Expedition 374 are similar in age to the records I am currently studying, and ice-proximal depositional settings are similar to the ones found in Gulf of Alaska during glacial times.

Therefore, my main interests in participating in Expedition 371 are:

- Studying the general composition of sediments and pore waters especially with respect to organic material, nutrients, paleoclimate and paleoredox proxies. These can yield information on general paleoproductivity in relation to climate changes and nutrient inflow. Bulk geochemistry can further be used to assess sedimentary provenance.
- Iron and phosphorus species hold information on paleoproductivity and diagenetic transformation of detritus. Iron minerals can be used to assess the influence of iron fertilisation by ice-rafting of dust. Phosphate minerals can be used to understand changes in paleoproductivity.

- The analysis of pore waters and authigenic minerals provides insights into diagenetic overprint, which is triggered by primary deposition of organic matter and electron acceptors for its decomposition. It is of crucial importance to distinguish diagenetic from primary signals in order to avoid wrong interpretations of, e.g., barite accumulations (which can be biogenic or authigenic), or magnetic susceptibility (which can decrease through diagenetic reduction of iron(oxyhydr)oxides). Reconstructing the diagenetic evolution of a sediment succession can yield further valuable information about changes in the depositional history.
- Reactive transport modelling can be used to reconstruct the diagenetic evolution and to time key events in depositional history, and therefore to refine accumulation rates of organic carbon and general sedimentation rates.
- At the most proximal sites on the shelf sedimentary pore waters can be mixed with freshwater from the land. The diagenetic implications of such brackish pore waters are not well investigated yet. Possibly recent changes in pore-water composition due to modern thawing of Antarctic ice and freshwater release to the sediments can be traced.

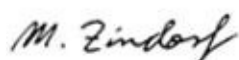
Through my PhD project, I am familiar with global carbon and nutrient cyclicity and post-depositional changes in the sediments and paleoclimate over the last ~16 Ma. For my MSc project I worked on the more recent (late Pleistocene to Holocene) paleoclimate of southern Patagonia. Therefore I am familiar with the paleoclimatologic and oceanographic settings in the southern hemisphere. I have used a range of analytical and theoretical approaches including bulk geochemical analysis with XRF, Fe and S speciation, S isotope analysis (^{32}S , ^{33}S , ^{34}S and ^{36}S), and reactive transport modelling. Instrumentation and methodology available for shore-based research include ICP-MS and ICP-OES for pore water samples; wavelength-dispersive XRF for bulk inorganic geochemistry; Leco and Elementar Analyser for TC, TOC, TS, TN; sequential P, Fe and S extraction protocols for authigenic minerals; Mößbauer Spectroscopy for Fe(II)/Fe(III) ratios; S isotopic techniques; and reactive transport models.

Besides my work on IODP samples from Expedition 341, I participated in the IODP training course "Virtual Drillship" in 2016. Here I learned the general core flow and the application of basic laboratory techniques which would be used onboard an IODP drillship. I presented my work at two national IODP conferences (London 2014, Newcastle 2015) and as member of the shore-based science party participated in the IODP Expedition 341 2nd Postcruise Meeting. My work has been awarded with the ECORD Research Grant for outstanding young scientists which I used to build a collaboration with the University of Münster. Also I am involved in the very lively UK-IODP community and have been nominated as an IODP student representative for my university.

Postcruise work can partly be covered by £ 50,000 (~65,450 US\$) postcruise funding (Moratorium Awards) provided by UK-IODP for Postdocs. This will provide me with sufficient funding for at least 6 months at the University of Leeds. Furthermore I have been granted full access to laboratories at Leeds University. I expect to use initial data and results from Expedition 374 to apply for further Postdoc funding.

I would be very pleased if my participation in IODP Expedition 374 would be possible.

With best regards,



Mark Zindorf

Mark Zindorf

Personal details:

Name, First name:	Zindorf, Mark
Address:	50 Brentwood Avenue NE2 3DH Newcastle upon Tyne United Kingdom
Mobile Phone:	0044 776 395 3475
E-mail:	m.zindorf1@ncl.ac.uk; mark@zindorf.de
Date of birth:	23/07/1987
Place of birth:	Koblenz am Rhein
Nationality:	German

Education:

Since Sept 2014:	Newcastle University, United Kingdom PhD Student Project title: "Reconstructing carbon and nutrient cycling in the Northeast Pacific Ocean over the past 15 million years"
Oct. 2010 - Sept. 2013:	University of Trier, Germany Master of Science "Environmental Assessment and Management" Focus "Environmental Monitoring and Pollution Assessment" Title of the Master's thesis: "Paleoreconstruction of coastline evolvement and climate at the southernmost South American Pacific coast"
Oct. 2007 - Sept. 2010:	University of Trier, Germany Bachelor of Science "Umwelt-Geowissenschaften" Title of the Bachelor's thesis: "Tonmineralogie als Anzeiger für Änderungen im Paläoklima Südpatagoniens während der letzten 60 000 Jahre" ("Clay mineralogy as proxy for changes in paleoclimate of southern Patagonia over the last 60 000 years")
1998 - Apr. 2007:	Gymnasium auf der Karthause Graduation: Abitur
1994-1998:	Grundschule Buchholz

Additional scientific experience:

- Sept. – Oct. 2012:** Expedition to Magallanes region/Chilean Patagonia with R/V Gran Campo II
- Mar. - Apr. 2011,
and Sept. 2011:** Voluntary internship
Engineering office Wasser und Boden GmbH
Groundwater extraction, landfill covering
- Aug. - Oct. 2009:** Internship
Bundesanstalt für Gewässerkunde, Referat M3 "Grundwasser, Geologie, Gewässermorphologie"
Evaluation of sediment movement in rivers, testing of scientific software, development of a method to determine grain size of sediments using photos
- Teaching experience:** Tutor/Demonstrator in: Petroleum system modelling; fieldtrip "Petroleum geology of the Wessex Basin"; geological mapping; analytical chemistry laboratory exercise

Achievements:

- June 2015:** awarded grant: ECORD Research Grant for outstanding young scientists

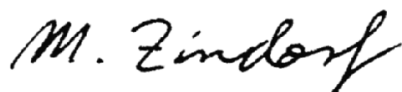
Additional skills:

Language: German (native), English (fluent), French (good skills), Latin (Latinum certificate), Norwegian (Bokmål, learner)

Member of the European Association of Geochemistry, European Geoscience Union, Deutsche Geologische Gesellschaft - Geologische Vereinigung e.V., Deutsche Mineralogische Gesellschaft, Challenger Society, Mineralogical Society

Personal interests: rock climbing, scuba diving

Newcastle upon Tyne, 12th August 2016



Publications

Conference Abstracts:

M. Zindorf, C. März, T. Wagner, C. v.d. Land, S. P. S. Gulick, J. Benowitz, H. Strauss, S. Arndt, 2016. Reconstructing the diagenetic evolution of marine sediments influenced by a tectonically induced deep aquifer (IODP Expedition 341, Site U1417). *Challenger Society 2016 Conference*, Liverpool, UK.

M. Zindorf, C. März, T. Wagner, H. Strauss, S. P. S. Gulick, J. M. Jaeger, L. J. LeVay, 2016. Deep aquifer as driver for mineral authigenesis in Gulf of Alaska sediments (IODP Expedition 341, Site U1417). *EGU General Assembly*, Vienna, Austria.

M. Zindorf, C. März, T. Wagner, H. Strauss, S. P. S. Gulick, J. M. Jaeger, L. J. LeVay, 2016. Mineral authigenesis in deep-sea sediments driven by deep aquifer (IODP Expedition 341, Site U1417). *GGRiP Conference*, Leeds, UK

M. Zindorf, C. März, T. Wagner, H. Strauss, S. P. S. Gulick, J. M. Jaeger, L. J. LeVay and the Expedition 341 Scientific Party, 2015. Early diagenesis in Gulf of Alaska sediments (IODP U1417). *IODP Expedition 341 2nd Post-Cruise Meeting*, Friday Harbor, WA, USA.

M. Zindorf, C. März, T. Wagner, S. P. S. Gulick, J. M. Jaeger, L. J. LeVay and the Expedition 341 Scientific Party, 2015. Reconstructing early diagenesis on marine sediments from the Gulf of Alaska (IODP Expedition 341). *UK-IODP Conference 2015*, Newcastle upon Tyne, UK.

M. Zindorf, C. März, T. Wagner, S. P. S. Gulick, J. M. Jaeger, L. J. LeVay and the Expedition 341 Scientific Party, 2014. Reconstructing Paleoenvironments and Diagenesis in the Gulf of Alaska (IODP Site U 1417). *UK-IODP Conference 2014*, London, UK.



Letter of Support Mark Zindorf - Shipboard Scientists IODP Expedition 374

Dear IODP Expedition 374 Staffing Committee,

I am writing you to support the application of Mark Zindorf as a member of the Shipboard Scientific Party onboard the *JOIDES Resolution* during IODP Expedition 374 (Ross Sea West Antarctic Ice Sheet History), scheduled for January-March 2018. Mark is currently in the second year of his PhD at Newcastle University, and as his first supervisor, I am genuinely very impressed with his progress. I am convinced that his scientific skills and interests as well as his personality would make him a very valuable member of the Scientific Party (as an Inorganic Geochemist/Biogeochemist). Mark is extremely inquisitive, very reliable and self-motivated, has great lab skills, a keen interest in interdisciplinary research, and is a true team player.

Besides his skills in a shore-based lab, Mark has gained significant sea-going experience in the fjords of Chile during his graduation project at the University of Trier. In addition, he has significant exposure to IODP as his PhD project is based on material from IODP Expedition 341. Mark has joined the Second Post-Cruise Meeting in 2015, is a full member of the shorebased scientific party, and his first IODP-related manuscript is currently in review with *Geochimica et Cosmochimica Acta*. The manuscript highlights the close links between paleoenvironmental conditions, tectonics, sediment geochemistry and diagenetic processes in a high-latitude, ice-proximal depositional setting – and is therefore of relevance to the central questions to be answered during Expedition 374.

Mark's participation will be financially supported by UK-IODP. A Moratorium Award (£50,000 for Postdocs) and the coverage of participation in sampling party and postcruise meetings will enable him to undertake the research required to fulfil his data generation and publication obligations. While Expedition 374 will take place after Mark's expected PhD thesis submission date at Newcastle University, I can guarantee full access to laboratory facilities at the University of Leeds to conduct the planned shore-based research.

From my own experience, I know that joining an IODP expedition is a great pathway to a successful scientific career, and I am sure it would strongly support Mark's existing trajectory to becoming a highly valuable member of the IODP and wider science community. I therefore support Mark's application for this expedition without reservation, and I think he would be an extremely valuable member of the Scientific Party.

With best regards,
Dr Christian März