Reports of MagellanPlus Workshops

:: Integrated Southern Ocean Latitudinal Transects (ISOLAT) - 23rd - 25th September 2013, Cambridge (UK)

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Quantifying oceanic variability at timescales of oceanic, atmospheric, and cryospheric processes are fundamental objectives of both IODP and the international IMAGES programmes. In this context the Southern Ocean plays a leading role in that it is involved, through its influence on global ocean circulation and carbon cycle, with the development and maintenance of the Earth's climate system.

Decadal to millennial ocean and climate variability is documented in a wealth of proxy records from throughout the global ocean and continental archives. There is broad consensus that such abrupt climatic swings in the North Atlantic region were caused by sudden changes in marine heat and salt transports to the northern North Atlantic. The amount of poleward heat transport in surface ocean currents is defined by the strength of the ocean's thermohaline circulation (THC), the so-called oceanic conveyor, with deep convection in the northern North Atlantic being a plausible control on the THC and marine heat transport. Abrupt transitions between differing THC appear to be most clearly associated with rapid (10-20 year), major perturbations in the climate system documented for the last glacial-interglacial cycle from marine,ice-core and lake records in the North Atlantic region - known as Dansgaard-Oeschger events. However, understanding the trigger mechanism(s) for these rapid mode switches in the past and the interhemispheric connectivity of their climate impacts remains a key area of research. While freshwater perturbations of the North Atlantic surface-ocean density structure play a major role in many models to explain such rapid THC changes, the role of the Southern Ocean in driving such patterns is increasingly becoming apparent. Model simulations suggest that the transition between the North Atlantic circulation modes may instead be a function of density perturbations in the southern hemisphere oceans. High-resolution marine and ice-core palaeoclimatic records from the southern hemisphere indeed indicate a high degree of variability in surface and deep-ocean as well as atmospheric patterns, thereby confirming the potential for an enhanced control of the southern hemisphere oceans on global ocean THC, and the Atlantic meridional overturning circulation in particular.

A natural place to investigate Southern Ocean variability is the circum-Antarctic ocean regimes of the southernmost subtropical, subantarctic and polar zones. The ocean circulation around Antarctica is primarily characterized by the vast Antarctic Circumpolar Current (ACC) surface current and the interactions between North Atlantic Deep Water (NADW) and Circumpolar Deep Water (CDW). The incorporation of NADW into the CDW varies through time as a function of past states of global climate and determines the volume transport in the ACC from the Atlantic to the Indian and Pacific Oceans. The surface section of the ACC likewise distributes water between the ocean basins and notably its transports through Drake Passage in conjunction with the water flow around the tip of Africa, in the southernmost subtropical zone, form the surface return flow to the Atlantic basin of the global THC. The fast-flowing deep reaching ACC in places promotes the deposition of contourite sediment drifts, offering the potential for recovering long, continuous, rapid deposition rate sediment sequences.

The three-day ISOLAT workshop brought together 33 members *(below)* of the palaeo-data and climate modelling communities from 11 countries to define scientific questions and targets to investigate sub-centennial to millennial variability of the ACC, including surface transports and deep water flow, in order to

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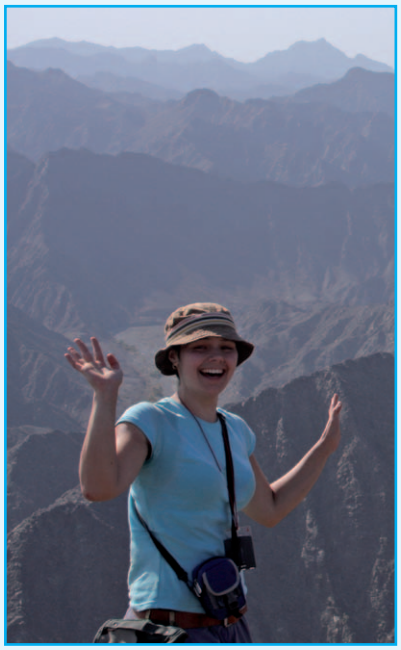
France

France has enthusiastically entered into the 2013-2023 phase of IODP. At the dawn of this new era, the good resolutions include the will to increase the involvement of French scientists by supporting them after an expedition. In order to reach this objective, IODP-France has secured a budget of about 300,000 euros per year specifically dedicated to post-cruise funding and to sea-going post-doc salaries for seagoing young scientists. Applications will be evaluated by a recently created committee composed of experts in the various fields of the IODP Science Plan.

The IODP-France website has been re-designed by Bénédicte Abily, Anne-Marie Cousin and Bérengère Doerler. It now has two main entry points, one for the scientists, and the other for a larger public audience, including teachers and journalists interested in scientific drilling.



Bénédicte Abily during a fieldtrip in Oman (photo Georges Ceuleneer).

Bénédicte Abily *(left)*, IODP-France Scientific Co-ordinator, left the office in Toulouse in January 2014. During her three years, Bénédicte has done a fantastic job! Among many others tasks, she daily collected information to feed the databases and, in particular, mostly wrote a long report about French participation in the IODP from 2003 to 2013, which contributed to the decision of our funding agency to renew French participation in the International Ocean Discovery Program.Bénédicte is now a Post-doc Fellow at Macquarie University (Sydney, Australia).

Georges Ceuleneer, ESSAC Delegate and President of IODP-France, and Michel Diament, ECORD Council Delegate.
http://www.iodp-france.org/

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assess the role of the Southern Ocean in rapid climate changes, both in terms of its THC and biogeochemical inventories. Overview presentations and discussions addressed the following subjects: dynamics of the Southern Ocean, the Southern Ocean role in modulating climate, biogeochemistry, stratification and the control of atmospheric CO_2, interhemispheric climate linkages, frontal systems: variability, processes and impacts, regionalisation of Holocene climate change and knowledge from existing sediment records in the Southern Ocean.

The workshop was also primarily intended to provide a planning opportunity that would lead to the development and submission of integrated proposal(s) for the acquisition of long (30-50 m) sediment cores from latitudinal transects crossing the Southern Ocean frontal systems and the ACC. This saw 24 short-presentations highlighting potentially suitable long-coring targets and ensured extensive discussions of future scientific coring strategies and plans.

Our objectives were reached, and discussions emphasized the strong need for multidisciplinary investigations utilising a long-coring, transect approach designed to allow the study of ACC variability across a range of latitudes in conjunction with meridional shifts of the major surface ocean-fronts. The targeting of sites distributed with water depth will ensure the opportunity to reconstruct the vertical water mass architecture of the ACC. Smaller working groups were created at the ISOLAT meeting and each has begun the process of developing detailed plans for long-coring transects in a number of key areas. These will be integrated into a Multi-Phase Drilling Project in the coming months.

This workshop, jointly funded by the MagellanPlus Workshops Series Programme and the International Marine Process Reconstruction Study (IMPRESS/IMAGES II) programme, was intended to take advantage of new changes that will allow ECORD to support long-coring as a mission-specific option within the framework of the International Ocean Discovery Program (IODP). The ISOLAT Workshop was hosted by the University of Cambridge, (Magdalene College) and is an outgrowth of earlier discussion and preliminary planning originating from within the IMAGES 'Southern Ocean Working Group'.

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http://www.ecord.org/magellanplus.html