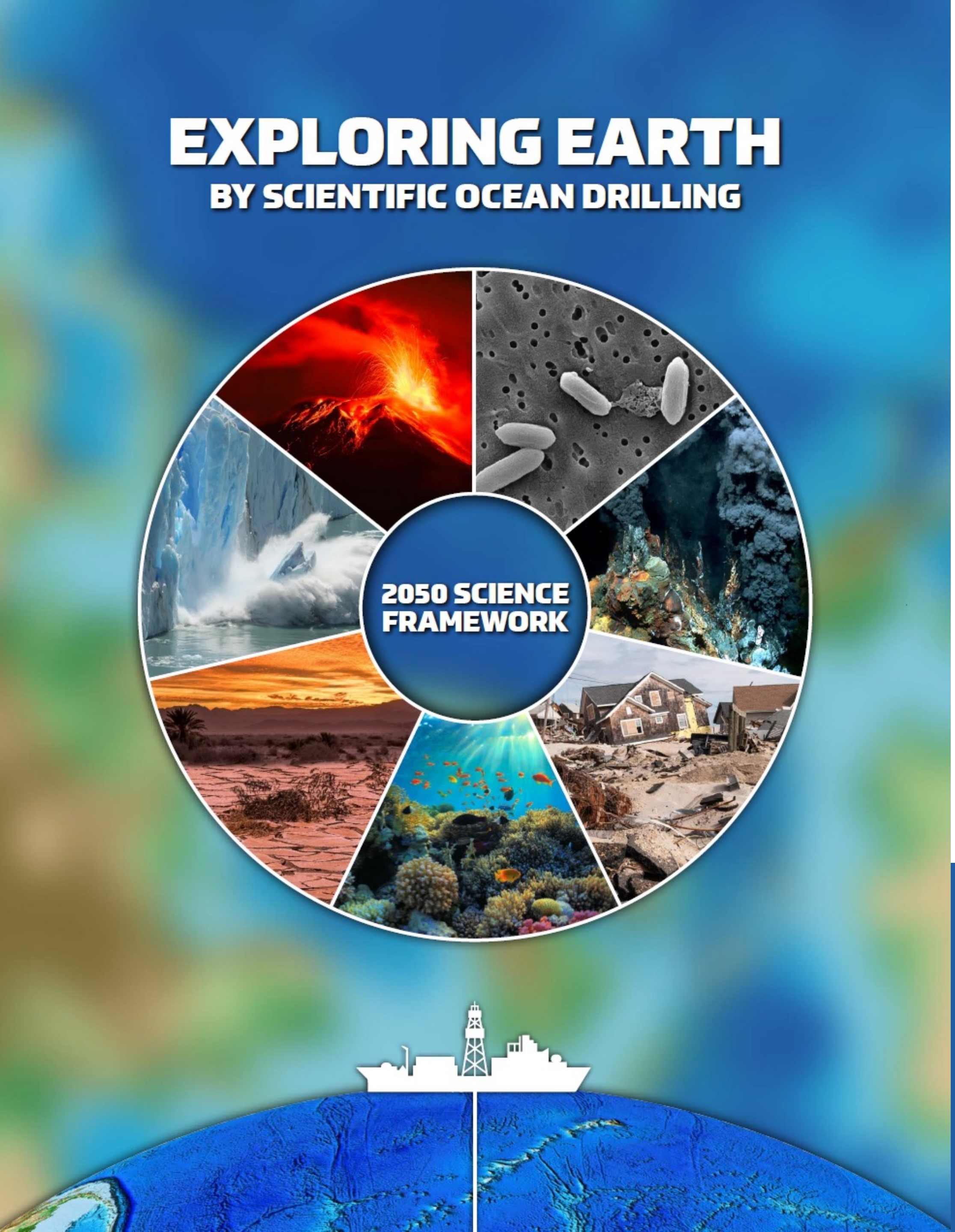


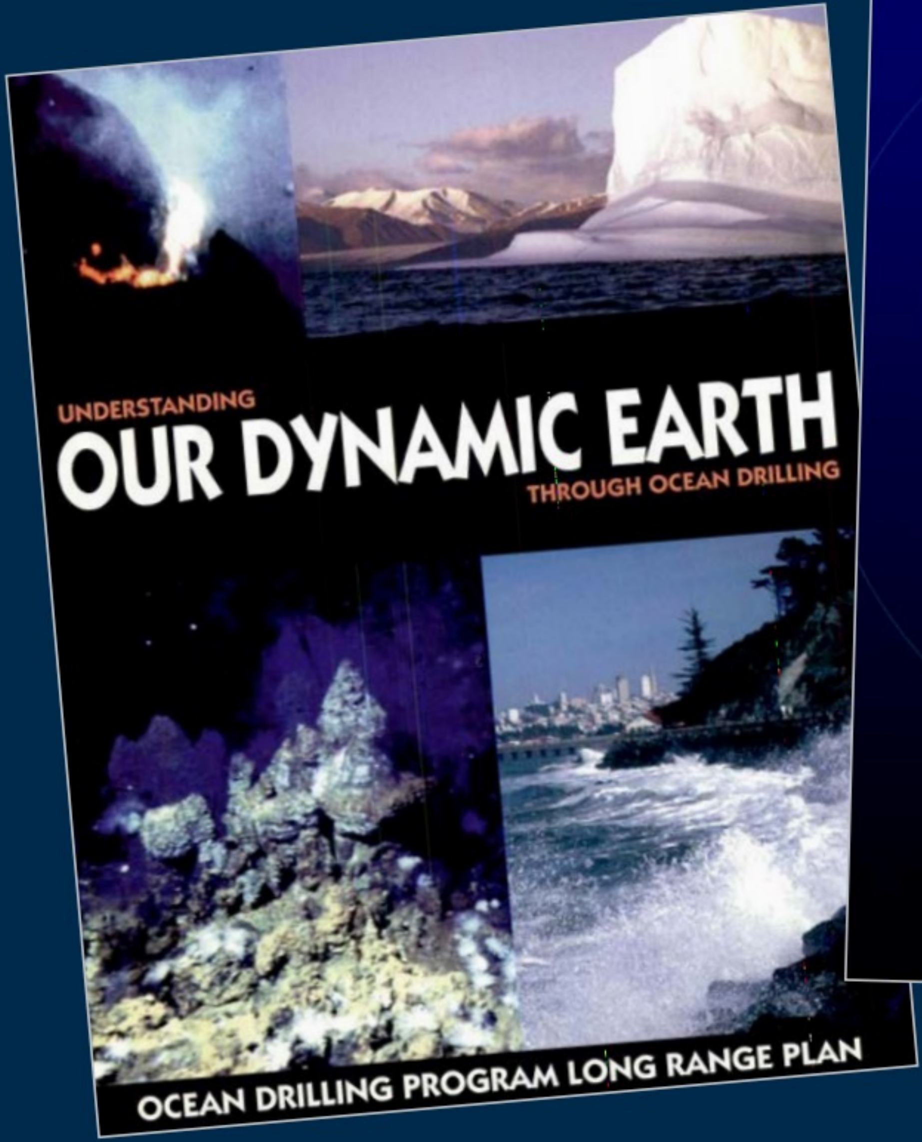
Mission

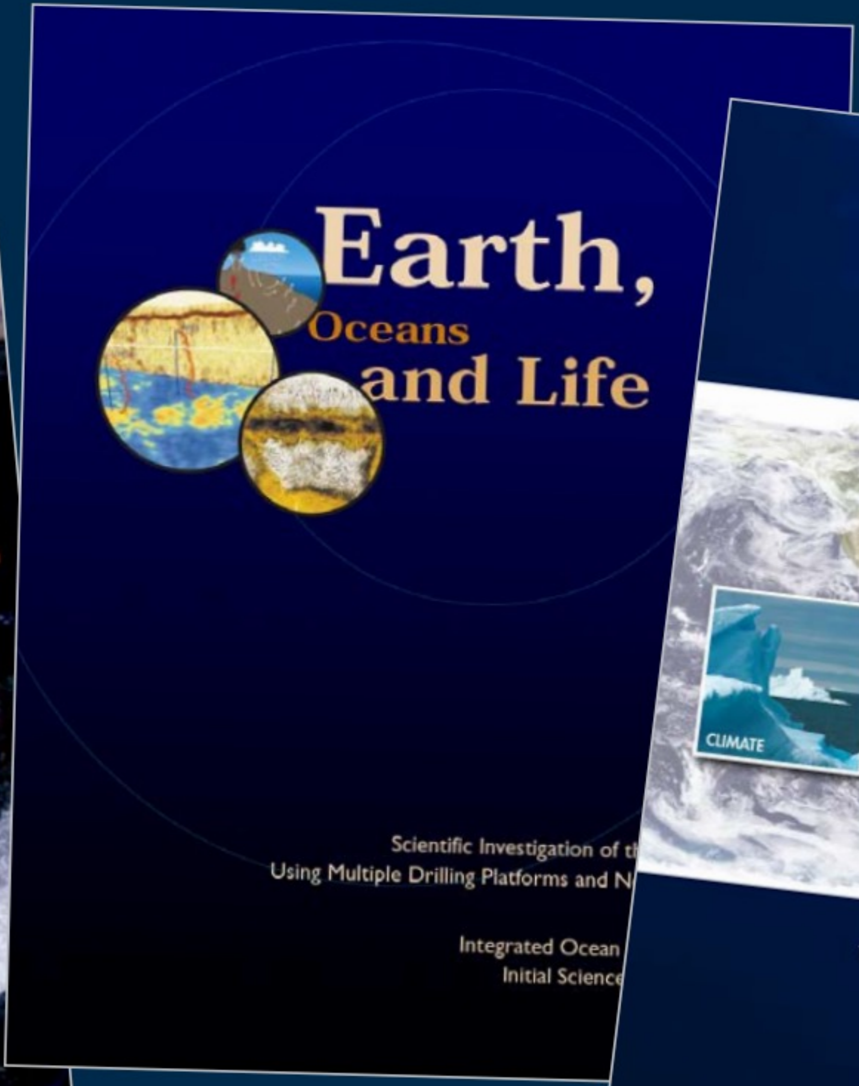
The *2050 Science Framework for Scientific Ocean Drilling* guides multidisciplinary subseafloor research into the interconnected processes that characterize the complex Earth system and shape our planet's future.

Vision

To be globally recognized as the authoritative source of information about ocean and Earth system history and its links to society.

Anthony Koppers & Rosalind Coggon
Co-lead Editors
and the Science Framework Authors and Reviewers
representing the international scientific ocean drilling community


UNDERSTANDING
OUR DYNAMIC EARTH
THROUGH OCEAN DRILLING
OCEAN DRILLING PROGRAM LONG RANGE PLAN


Earth,
Oceans
and Life
Scientific Investigation of
Using Multiple Drilling Platforms and
Integrated Ocean
Initial Science


Illuminating Earth's
Past, Present, and Future
CLIMATE
DEEP LIFE
PLANETARY DYNAMICS
GEOHAZARDS
THE INTERNATIONAL OCEAN DISCOVERY PROGRAM
EXPLORING THE EARTH UNDER THE SEA
SCIENCE PLAN FOR 2013–2023

Developing a community-driven science plan for future scientific ocean drilling

J-DESC Workshop
"Scientific Ocean Drilling beyond 2023"

PROCEED
Expanding Frontiers of Scientific Ocean Drilling

International Ocean Discovery Program (IODP)
IODP-India
NCAOR, Ministry of Earth Sciences, India

SPADE
Workshop

Scientific Ocean Drilling Beyond 2023
NEXT

IODP-CHINA

Australian and New Zealand
International Ocean Discovery Program Consortium

Ocean Planet
Workshop

PROCEED:
Expanding Frontiers of Scientific Ocean Drilling

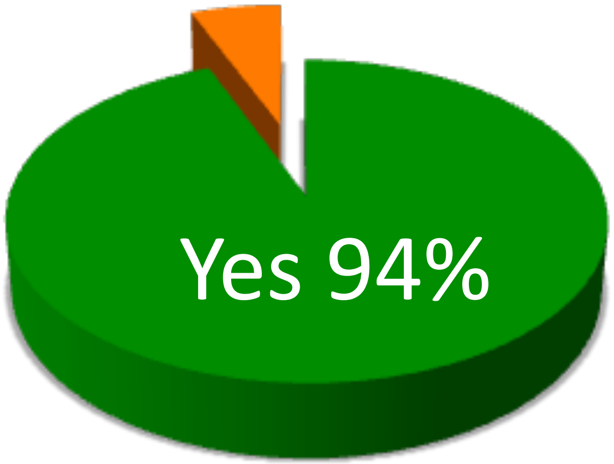
A two-day workshop to define new goals for a future international scientific ocean drilling program to be developed beyond 2023.

6-7 April 2019
Austrian Academy of Sciences, Vienna

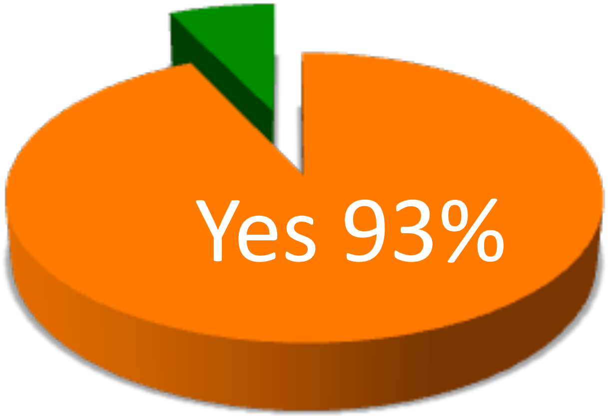
ECORD
EUROPEAN CONSORTIUM FOR OCEAN RESEARCH DRILLING

PROCEED: The content of the current science plan is appropriate to guide ocean drilling beyond 2023 but a new architecture is required

Is the scientific content of the current science plan still relevant?



…but…



Do we need a new architecture for a new Science Plan?

PROCEED: In developing a new Science Plan we need to consider audience, purpose, content and architecture

- **NEW Science Plan** needs to highlight that this is a **NEW Program advancing NEW Frontiers**

- **BALANCE** between:
  - **ACHIEVABLE TOPICS →** *demonstrate success to public/funding agencies*
  - **ASPIRATIONAL GOALS →** *may not complete within 15-year program*
- **TIMEFRAME** of the new Science Plan:
  - include science **ACHIEVABLE in 5, 10, 15 & 15+ YEARS**

- **CONTENT & ARCHITECTURE** depend on **TARGET AUDIENCE & PURPOSE**

- **MULTIPLE AUDIENCES → DIFFERENT SP VERSIONS/FORMATS** needed

FUNDING AGENCIES

PUBLIC

SCIENTISTS

Developing a community-driven framework for future Scientific Ocean Drilling

J-DESC Workshop
"Scientific Ocean Drilling beyond 2023"

Australian and New Zealand International Ocean Discovery Program Consortium

Ocean Planet Workshop

PROCEED
EXPANDING FRONTIERS OF SCIENTIFIC OCEAN DRILLING

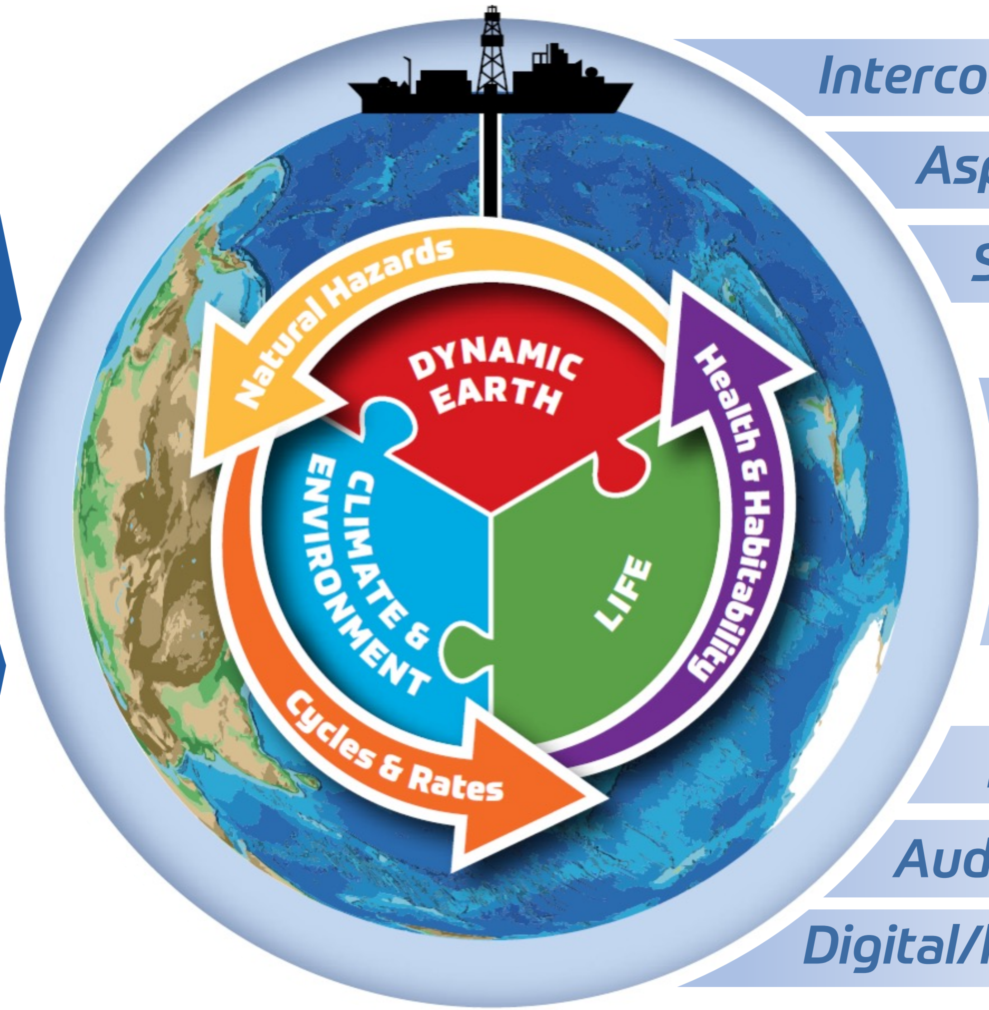
International Ocean Discovery Program (IODP)
IODP-India
NCAOR, Ministry of Earth Sciences, India

SPADE Workshop

SCIENTIFIC OCEAN DRILLING BEYOND 2023
NEXT

IODP-CHINA

Science Framework Working Group



Interconnected
Aspirational
Societal Impact
Inclusive
Collaborative
Technology
New structure
Audience-specific
Digital/hyperlinked

The outcome of an extensive peer review process and a high level of community input is an exciting 30 year outlook

Aug 2019
SFWG Roadmap ***COMMUNITY REVIEW***

Sept 2019
ENDORSED ***BY IODP FORUM***

Oct 2019
Writing/Review Team – *First meeting*

8 Dec 2019
Draft 1 *ONLY in person meeting (AGU)*

15 Jan 2020
Draft 2 *Internal Review* Rebalance Science Content

21 Feb 2020
Version 1 ***COMMUNITY REVIEW***

120 reviews

1,717 comments:

Wording (758), Graphics (127)
Missing Science (76)

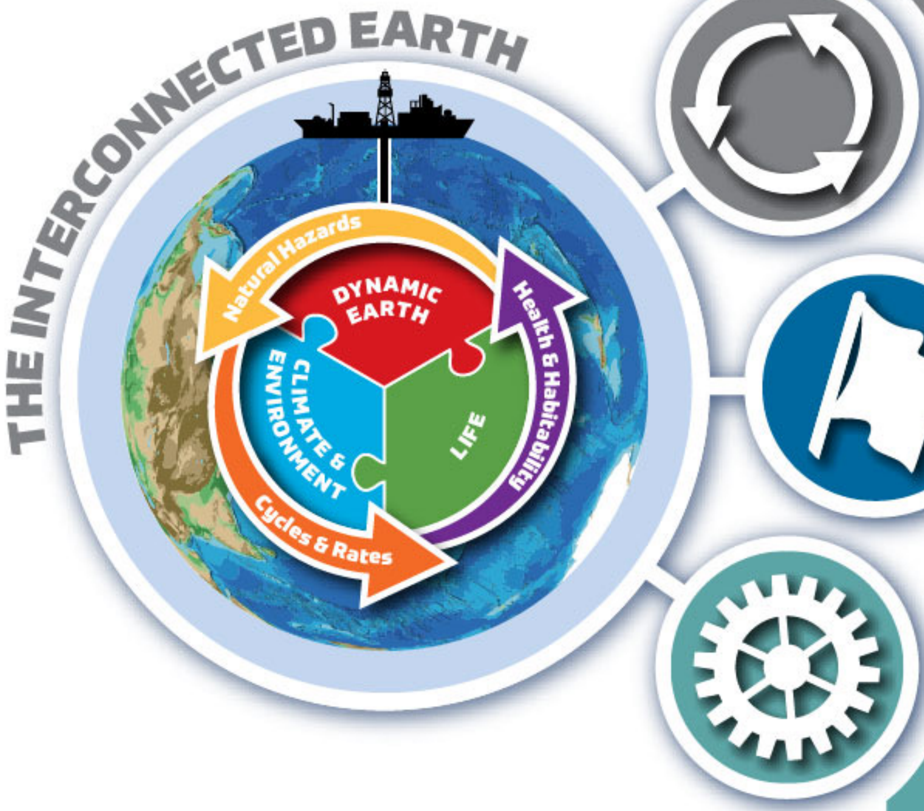
April – July 2020
Lead Editors & professional team Focus on Design / Graphics / Frontiers Rewrite followed by *Internal Review*

20 July 2020
Version 2 ***COMMUNITY REVIEW***

178 reviews

Sept 2020
ENDORSED ***BY IODP FORUM***

The Framework structure combines broad interconnected science topics and aspirational goals



STRATEGIC OBJECTIVES

Broad areas of scientific inquiry that focus on understanding the interconnected Earth system.

FLAGSHIP INITIATIVES

Long-term drilling endeavors that aim to inform issues of particular interest to society, typically combining goals from multiple Strategic Objectives.

ENABLING ELEMENTS

Key facets of scientific ocean drilling that facilitate our research activities, enhance our scientific outputs, and maximize their impact.

ENDURING PRINCIPLES

- Open Access to Samples and Data
- Standard Measurements
- Bottom-Up Proposal Submissions and Peer-Review
- Transparent Regional Planning
- Promoting Safety and Success Through Site Characterization
- Regular Framework Assessments
- Collaborative and Inclusive International Program
- Enhancing Diversity

The NEW 2050 Science Framework is significantly different from its predecessor science plans…

IT IS A FRAMEWORK, NOT A SCIENCE PLAN

- in place **before** new program(s) are developed
- the **foundation** on top of which new programs/facilities are built
- eight **enduring principles** will underpin its implementation
- written by the community **for the community**

...net was relatively young accelerated the loss of the atmosphere, killing any life that emerged or forcing it underground. Scientific ocean drilling studies of active volcanism on Earth and the effects of Earth's geodynamo can be used to understand the development and retention of atmospheres on other planetary bodies and the possibility that life once developed there. Investigations of mantle plume and rift volcanism on Earth are also important for understanding how terrestrial planetary bodies in our solar system transfer heat and cool advectively.

Searching for Life in the Universe

A primary pursuit of space agencies is the quest to find life elsewhere in the universe. The US National Aeronautics and Space Administration (NASA) Mars 2020 and European Space Agency (ESA) ExoMars missions will be the first to specifically examine the implications of a "thicker atmosphere" enveloping early Mars for finding traces of ancient life at or near the surface. The 2019 NASA *Roadmap to Ocean Worlds* aims to identify new ocean worlds, characterize their oceans, evaluate their habitability and potential for preserving life, and ultimately understand any form of life that would be found. To ground truth and complement these important objectives we need to determine the potential biosignatures in each habitable niche on planets. Such an endeavor requires learning first-order lessons from the evolution of life on Earth. By investigating the continuum from no life to life on Earth, scientific ocean drilling can provide a more holistic picture of the requirements for biochemical functioning of life and planetary habitability. Such knowledge will inform the search for life elsewhere in the universe and help identify the best candidates for extraterrestrial exploration.

This artist's impression shows the planet K2-18b, its host star, and an accompanying planet in this system. K2-18b is now the only super-Earth exoplanet known to host both water and temperatures that could support life. *Credits: ESA/Hubble, M. Kornmesser.*

Samples from Extreme Environments

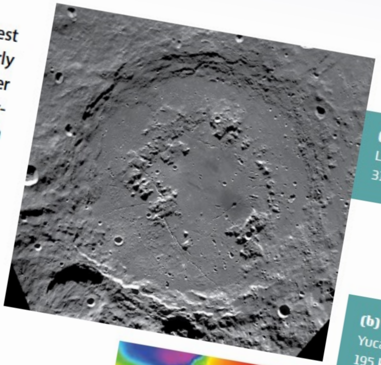
Sample return from extraterrestrial bodies has greatly advanced our knowledge of the formation and evolution of the solar system. To obtain determinative evidence of Martian life, various space agencies, including NASA, ESA, JAXA, and the Canadian Space Agency, are planning to start the Mars Sample Return project in 2026, with samples returning to Earth for analyses and microbial study around 2031. Collaboration with scientific ocean drilling will offer space agencies an opportunity to first develop and test technologies on microbial samples collected in extreme environments through drilling in the ocean basins, before applying those techniques to extraterrestrial samples.

NASA's OSIRIS-REx spacecraft was launched on September 8, 2016, and is now traveling to the carbonaceous asteroid Bennu, whose regolith may record the earliest history of our solar system. Bennu may contain the molecular precursors to the origin of life and Earth's ocean. In October 2020, the spacecraft will briefly touch Bennu's surface to retrieve a sample. *Image credit: United Launch Alliance*

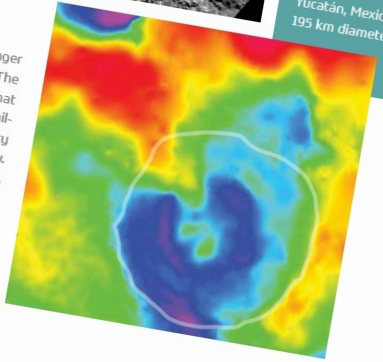
"Scientific ocean drilling will provide greater insight into the processes involved in impact crater formation by investigating meteorite impact structures and their ejecta on Earth."

Investigating Impact Craters

Although asteroid impact processes have been of interest to space agencies for decades, they are still relatively poorly understood. Scientific ocean drilling will provide greater insight into the processes involved in impact crater formation by investigating meteorite impact structures, such as Chicxulub in Mexico and in Chesapeake Bay in Virginia, USA, and their ejecta on Earth. We will sample material in and around the impact craters, as well as through geologic time, to capture pre-impact conditions, the impact itself, post-impact recovery processes, and impact-induced hydrothermal habitats. Scientific ocean drilling will also sample the most valuable impact-generated materials dispersed globally in the ocean.



(a) Schrödinger Basin
Lunar Far Side
316 km diameter



(b) Chicxulub Crater
Yucatán, Mexico
195 km diameter

(a) Mosaic of images from the Schrödinger Basin, an impact crater on Earth's moon. The impact structure looks very similar to the that of the (b) Chicxulub impact that occured ~66 million years ago on Earth, here shown in gravity measurements. (a) From http://lroc.sese.asu.edu/posts/161. (b) From: Lowery et al. (2019), https://doi.org/10.5670/oceanog.2019.133.

FUTURE COLLABORATION

The perspectives of scientific ocean drilling and space agencies regarding our planet are complementary, presenting opportunities for mutually beneficial collaborations. Scientific ocean drilling requires teams to effectively and efficiently collect new scientific data in challenging and unexplored environments, which can inform approaches for missions beyond Earth. We anticipate that close cooperation between scientific ocean drilling and space organizations, including their science and engineering teams, will foster scientific and technological breakthroughs in drilling, coring, and analytical techniques and facilitate new directions for scientific ocean drilling and remote robotic investigations of planetary bodies.

The 2050 Science Framework Structure

STRATEGIC OBJECTIVES

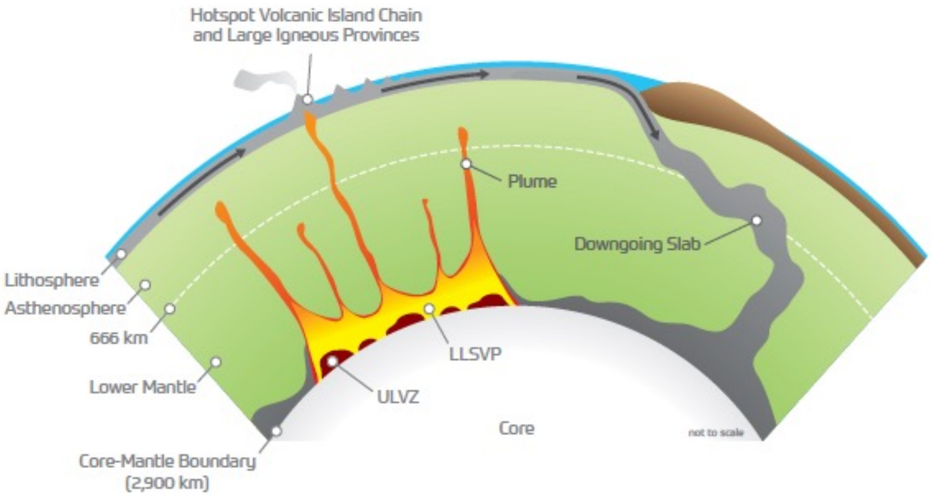
Broad areas of scientific inquiry that focus on understanding the interconnected Earth System.

than 100 million-year-old oceanic crust. At slow-spreading mid-ocean ridges where melt supply is limited, serpentinization of mantle rocks exposed to seawater weakens the rock, releases heat, and produces a mix of chemicals (including hydrogen and abiotic methane) that is the building block for unique, yet poorly understood, ecosystems, in conditions that may resemble those of early Earth. The role serpentinization plays supporting microbial life is an ongoing scientific ocean drilling research area.

Crustal aging and serpentinization. By drilling age transects across multiple ocean basins, from mid-ocean ridges, to subduction zones, to passive margins, we can explore the links between serpentinization, aging oceanic crust, the mantle, and ocean, and their impacts on geochemical cycles, natural resources, and life. Integrated coring and in situ geochemical and microbial monitoring and hydrological experiments along transects will target critical gaps in ocean crustal sampling with regards to crustal age, spreading rate, later intraplate volcanic overprinting, and sediment thickness. Such systematic sampling is essential to determine the range of crustal serpentinization effects across the full age spectrum and ocean crustal styles.

HOTSPOT VOLCANISM AND LARGE IGNEOUS PROVINCES

As oceanic crust spreads away from mid-ocean ridges, it commonly traverses "hotspots" in the underlying mantle where narrow plumes of material may be upwelling within Earth's interior. When these hotspots are long-lived, they mark tectonic plates with age-progressive volcanic chains for up to 80 million years or longer, but they also may produce short-lived, high-volume oceanic plateaus. Although tens of thousands of volcanic seamounts and many large igneous provinces (LIPs) are found in the ocean basins, scientific ocean drilling has explored fewer than a dozen hotspot systems. Major gaps in our knowledge remain about the deep mantle heritage and the chemical, isotopic, and mineralogical makeup of mantle sources that feed hotspots. Scientific ocean drilling offers opportunities to learn about the origin and mobility of mantle plumes, whether two large low shear wave velocity provinces (LLSVPs) in the deepest mantle regions (imaged using seismology) are acting as plume nurseries, if bolide impacts may be related to the generation of some LIPs, and how LIPs and excessive intraplate volcanism may drive Earth's climate system past tipping points.



Scientific ocean drilling offers the opportunity to learn about the composition and evolution of oceanic plates, mantle anomalies, mantle plume nurseries, and oceanic volcanic chains. This conceptual sketch illustrates the connections among these elements in Earth's interior. ULVZ = Ultra low velocity zone. LLSVP = Large low shear wave velocity province. *Illustration by Geo Prose, inspired by Figure 20 in Sager et al. (2016), https://doi.org/10.1016/j.earscirev.2016.05.011*

Mantle plumes modulating Earth's climate. Long-lived mantle plumes play a significant role in broad-scale regional uplift of oceanic lithosphere, with these topographic fluctuations impacting both sedimentation and ocean circulation. For some hotspot systems, these vertical motions appear more significant when the plumes are centered on mid-ocean ridges such as Iceland today or on triple junctions such as Shatsky Rise, Kerguelen Plateau, and Broken Ridge that formed in the Cretaceous. It remains unknown whether the plume/ridge and plume/triple junction correlation is random or whether large-scale tectonics or mantle convection is responsible for the emplacement of plumes in those specific plate-boundary settings. Their effects on Earth's climate therefore remain undetermined. We also don't know why there are more LIP emplacements between 150 and 50 million years ago than between 50 million years ago and today. Scientific ocean drilling can investigate how LIP emplacements affect regional plate tectonics and mid-ocean ridge spreading, what level of topographic fluctuation results from long-lived plumes lifting up oceanic lithosphere, and how the massive magmatism constituting LIP emplacement may have affected Earth's climate system and global ocean health.

Chemically zoned and moving plumes. A new research avenue centers around understanding the spatial geochemical zonation of hotspot tracks and what it might reveal about the internal structure and composition of mantle plume stems and about LLSVPs from which they may originate. Scientific ocean drilling is essential for recovering unaltered igneous rocks that contain tiny parcels of melt trapped during crystal growth (so-called "melt inclusions") that allow us to learn about the pressure, temperature, and composition of hotspot mantle source regions. Recovery of lava erupted from seamounts and LIPs also allows us to add new paleomagnetic inclination and geochronological constraints on plume mobility—whereby scientific ocean drilling can test geodynamic computer models of deep-rooted plume stems getting deflected in the large-scale mantle flow—and help refine plate motion histories, which underpin global tectonic evolution models.

PLATE DESTRUCTION IN SUBDUCTION ZONES

At subduction zones, the majority of mature, hydrated oceanic lithosphere descends back into the asthenospheric mantle, recycling igneous rocks, sediments, water, and carbon back into Earth's interior. The subduction of oceanic lithosphere is responsible for ocean-circling chains of volcanoes and ocean trenches that extend to 2 km deeper than the height of Earth's tallest mountains. Some of the largest earthquakes and tsunamis occur along the roughly 42,000 km of subduction zones. Volatiles released from the downgoing hydrated oceanic lithosphere give way to gas-rich explosive eruptions that also endanger the highly populated regions bord

Subduction zone behavio

The subduction process is re
of its geometries, speeds of
rollback, deformation pattern
It remains difficult to establis
lithosphere and the overlying
tures it carries will be process
We don't know how much of e
into the arc volcanoes or recyc
Scientific ocean drilling can de
ples, and the dynamic observations such as temperature and pore pressure, that are required to define subduction zone behavior and mantle recycling. Drilling allows us to assess spatial variations in subduction conditions, including enhanced deformation where a seamount or LIP sits on the downgoing slab, that may affect seismic, fluid flow, magmatic, and landscape responses.

Oceanic Crust Obduction

Not all oceanic lithosphere gets recycled at subduction zones. Oceanic lithosphere that is exposed on land is called an ophiolite (e.g., Troodos, Semail) or accreted terrane (e.g., Wrangellia, Siletz). Ophiolites provide invaluable, accessible windows into the deep Earth. Indeed, the standard model for oceanic crustal structure was long based on the Troodos ophiolite in Cyprus. However, the origins and emplacement of ophiolites, and hence their interpretation in terms of past seafloor spreading, remain controversial. Land-to-sea investigations, partnering scientific ocean and continental drilling, in places such as the Semail Ophiolite in Oman or the Izu-Bonin-Mariana and Japan Trenches, will provide new avenues to elucidate the origins of ophiolites. By sampling lava sequences in a range of settings, including in fore-arc and back-arc basins, we will be able to identify where and why some oceanic crust is able to avoid being recycled back into Earth's interior.

Broad areas of scientific inquiry that focus on understanding the interconnected Earth System.

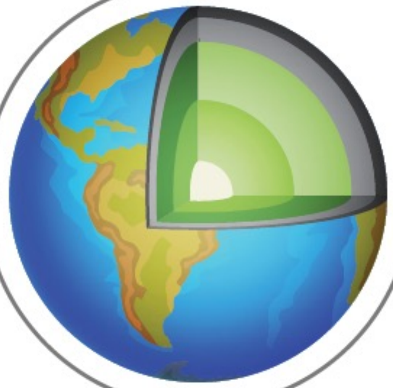
The 2050 Science Framework Structure

FLAGSHIP INITIATIVES

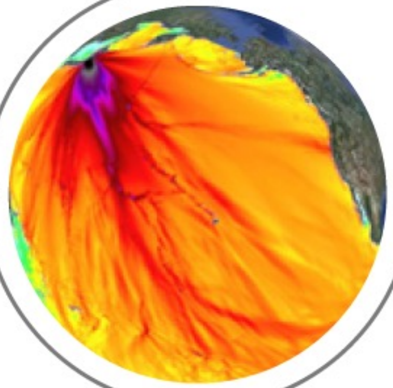
Long-term drilling endeavors that aim to inform issues of particular interest to society, typically combining goals from multiple Strategic Objectives.

1 Ground Truthing Future Climate Change

2 Probing the Deep Earth



3 Assessing Earthquake and Tsunami Hazards



4 Diagnosing Ocean Health

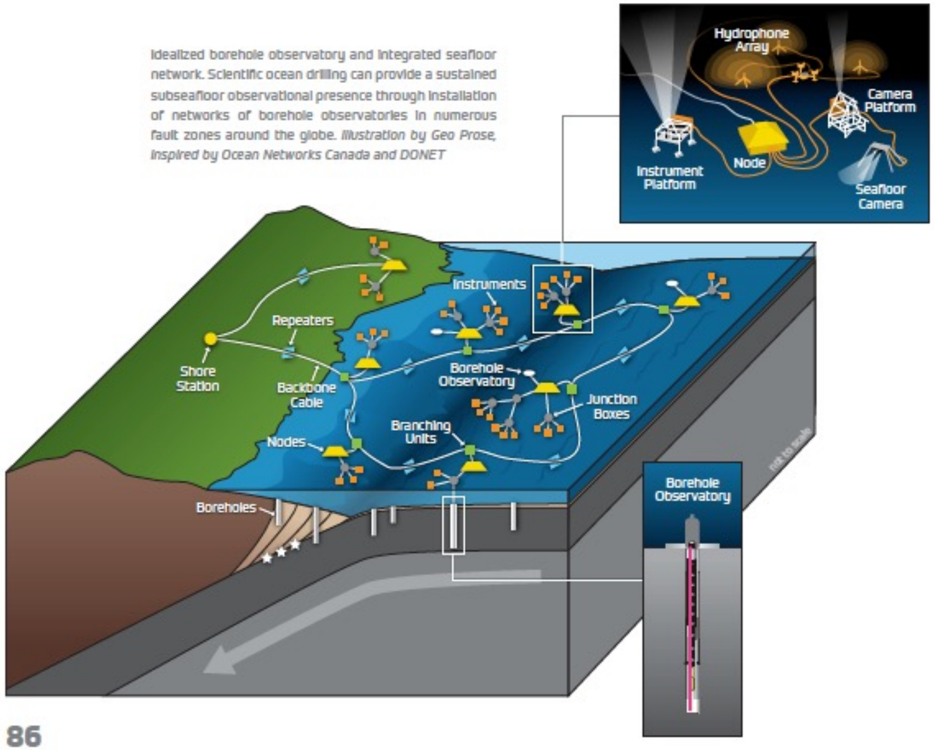
5 Exploring Life and Its Origins

Exciting new approaches have been developed for recognizing past earthquake slip on subseafloor faults. These techniques include quantifying the heating within a fault zone during seismic slip by probing the geochemical characteristics of rocks recovered through scientific ocean drilling and investigating the thermal maturity of organic material within them through laboratory experimentation. Various novel thermal proxies are being developed to estimate the amount of past frictional heating on faults. Estimates of temperature increases experienced by these fault rocks, particularly those in the near surface, can constrain the maximum displacement and seaward extent of past earthquakes in these fault systems. These parameters ultimately affect the earthquake magnitude and resulting tsunami extent and allow quantification of the frictional work accomplished during earthquake rupture. These and other approaches offer a tantalizing means to use scientific ocean drilling to improve records of past earthquake occurrence and assess the potential for near-surface rupture and tsunami generation.

WHAT FACTORS LEAD TO MASSIVE SUBDUCTION EARTHQUAKES?

The massive earthquakes in 2011 in Japan and in 2004 in the eastern Indian Ocean highlight our lack of understanding of the factors that promote and amplify seismic slip at subduction zones. In both cases, slip was larger and/or extended farther seaward toward the trench than expected. Scientific ocean drilling has already played an important role in revealing some of the physical properties of the subduction faults that led to the earthquakes and tsunamis in these two regions. To make significant headway in understanding the slip potential of major subduction zone faults globally requires collecting a broad range of observations from diverse environments at different stages in the earthquake cycle.

To understand how and why earthquakes occur requires knowledge about how fault zone lithology, chemical environment, and physical conditions such as temperature and



Idealized borehole observatory and integrated seafloor network. Scientific ocean drilling can provide a sustained subseafloor observational presence through installation of networks of borehole observatories in numerous fault zones around the globe. *Illustration by Geo Prose, inspired by Ocean Networks Canada and DONET*

effective stress control the sliding stability and slip behavior of faults. Cores and in situ physical and chemical measurements collected within active fault zones, along with recovery of sedimentary sequences and oceanic crust from regions before they enter the subduction zone, can provide that needed information. To date, such investigations have been undertaken in only a few locations globally and most have targeted the earthquake-generat
segments of subduction zones. Even there, only relativ
shallow depths have been sampled and with limited spa
coverage. It is equally important to collect similar data
subduction zone faults that appear to creep without la
earthquakes to resolve which properties cause some fa
zones to lock up between large earthquakes while oth
creep without generating significant earthquakes,
why some may slip both slowly (aseismically) and rapi
(seismically) along the same part of a fault zone over ti
Scientific ocean drilling will advance understanding of the key factors that generate large earthquakes and tsunamis, as it provides the only way to directly access, sample, and instrument major offshore fault zones.

The factors that produce sudden, large seafloor displacements that can generate tsunamis remain poorly understood. In particular, a class of earthquakes known as "tsunami earthquakes" generates much larger tsunamis than expected given the earthquake's magnitude. These events are a challenge for tsunami warning, as they do not generate strong shaking—typically the indicator that prompts evacuation from the coast and low-lying regions. The earthquake and landslide processes that cause large seafloor displacements and therefore tsunamis of all types remain poorly understood. Targeted scientific ocean drilling to reveal the physical conditions that promote tsunami generation in different tectonic or structural environments is needed to identify the sources of potential hazards.

THE WAY FORWARD

The underlying physical processes governing the spectrum of observed fault slip behaviors at subduction zones can only be addressed with an integrated, system-level approach that combines evidence of past and present fault behaviors, ground truth data on the physical conditions and materials within plate boundaries, and data collected by robust, high-precision, subseafloor instruments that continuously monitor the fault zones. This multifaceted approach requires a sustained scientific ocean drilling effort in a representative range of the world's subduction environments. Because many of the faults that produce devastating earthquakes and tsunamis, or faults' slip effects, reach across the coastlines, there are numerous opportunities to integrate observations from scientific ocean drilling with those from onshore geophysical networks, surface geology, and continental drilling. Such an effort will contribute important information about how some of the world's largest and most active undersea faults work and

Long-term drilling endeavors that aim to inform issues of particular interest to society, typically combining goals from multiple Strategic Objectives.

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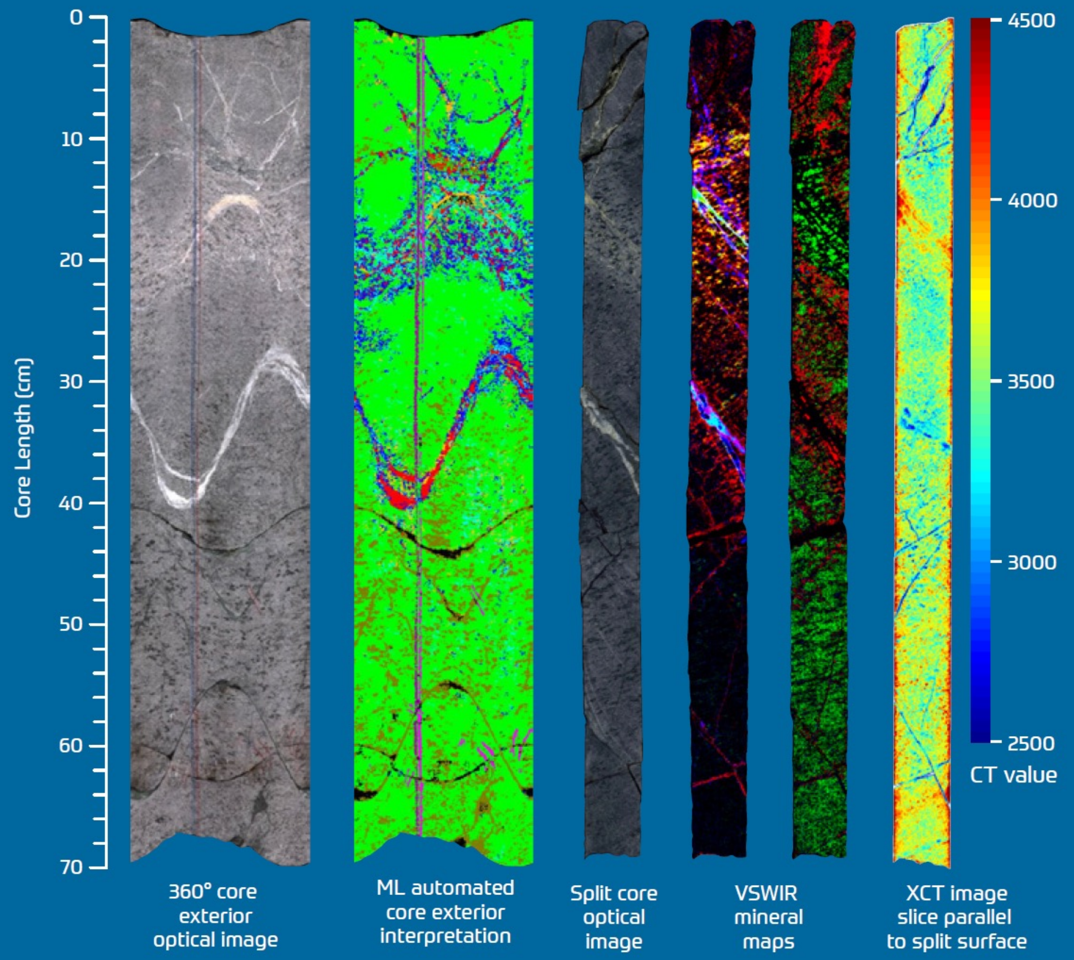
The 2050 Science Framework Structure

ENABLING ELEMENTS

1. Broader Impacts and Outreach
2. Land to Sea
3. Terrestrial to Extraterrestrial
4. Technology Development and Big Data Analytics

Digital Observations of Oman Drilling Project Core GT2A-120Z2 and Machine Learning Image Interpretations



Who We Are

We are an international scientific community pioneering global-scale interdisciplinary research below the seafloor of the world ocean. **WE RESEARCH** processes that connect the solid Earth, ocean, life, climate, and society. **WE EXPLORE** the interconnected Earth in places that can only be accessed and understood through scientific ocean drilling. **WE TRAVERSE GEOLOGIC TIME** to reveal the many interactions that shaped Earth's past in order to illuminate our future. **WE COMMUNICATE** knowledge gained through scientific ocean drilling to the global community.

Scientific Ocean Drilling Through 2050

Two hundred million years of Earth history are locked in sediments and rocks beneath the world ocean. Scientific ocean drilling provides access to this archive, allowing scientists to examine the interconnected processes that characterize the complex Earth system. It furnishes critical details about geologic processes as well as natural hazards that pose risks to society. Analyses of samples recovered by scientific ocean drilling establish the geologic context for interpreting human impact on climate and the environment, providing the data needed to improve the accuracy of computer models that predict the pace of rising sea levels and the melting of polar and glacial ice. Sampling and analyses also offer glimpses of the types of microbial life that might exist elsewhere in our solar system and beyond.

The *2050 Science Framework* guides scientists on important research frontiers that scientific ocean drilling should pursue. Seven *Strategic Objectives* focus on understanding the interconnections within the Earth system. Five *Flagship Initiatives* integrate these objectives into long-term research efforts that address issues facing society. Four *Enabling Elements* advance the goals of scientific ocean drilling through education and outreach initiatives, partnerships, collaborations, continued technology development, and innovative applications of advanced data analytics.

The 2050 Science Framework Structure

ENDURING PRINCIPLES

Open Access to Samples and Data. Standard Measurements. Bottom-Up Proposal Submissions and Peer Review. Transparent Regional Planning. Promoting Safety and Success Through Site Characterization. Regular Framework Assessments. Collaborative, Inclusive International Program. Enhancing Diversity.

STRATEGIC OBJECTIVES

Broad areas of scientific inquiry that focus on understanding the interconnected Earth system.

FLAGSHIP INITIATIVES

Long-term drilling endeavors that aim to inform issues of particular interest to society, typically combining goals from multiple Strategic Ob…

ENABLING ELEMENTS

Key facets of scientific ocean drilling that facilitate our research and enhanc…

The **NEW** 2050 Science Framework is significantly different from its predecessor science plans…

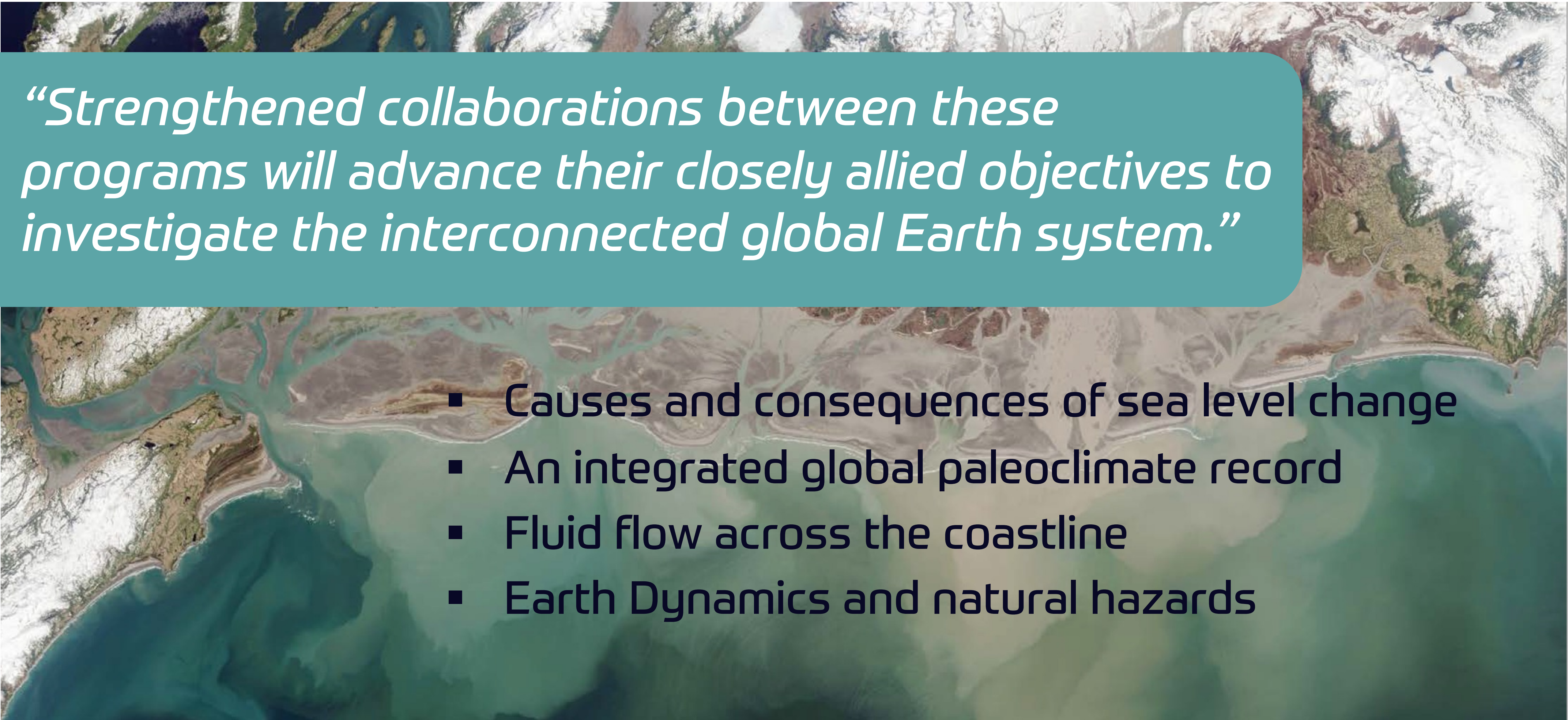
IT REQUIRES INVESTIGATION OF THE WHOLE EARTH SYSTEM

- focuses on **multidisciplinary science**
- emphasizes science with **societal impact** and/or **interest**
- drastically **different in structure** which will affect implementation

A PLAN FOR UNTIL THE MID-21st CENTURY

- **much longer ranging** across multiple program cycles
- need to maintain, **revise**, evaluate it

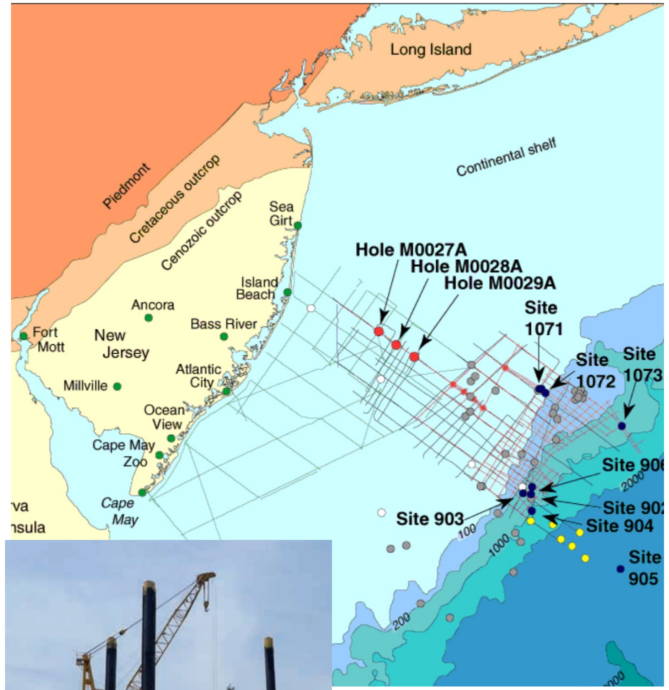
ENABLING ELEMENT 2 LAND TO SEA

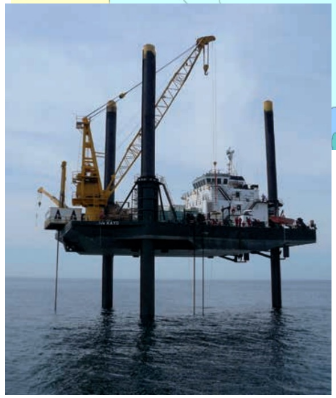


"Strengthened collaborations between these programs will advance their closely allied objectives to investigate the interconnected global Earth system."

- Causes and consequences of sea level change
- An integrated global paleoclimate record
- Fluid flow across the coastline
- Earth Dynamics and natural hazards

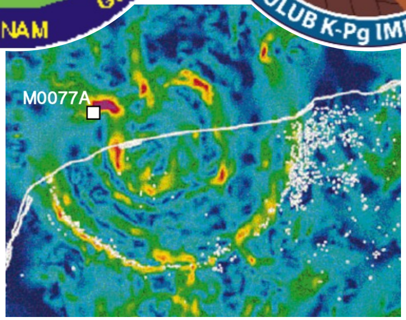
LAND 2 SEA: Strengthened collaborations between scientific ocean and continental drilling will build on previous successes

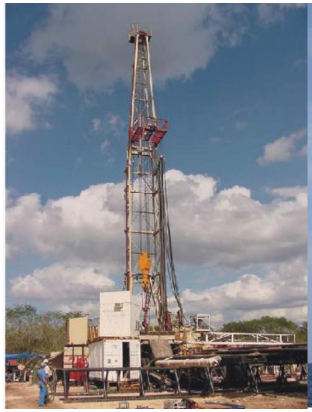




IODP Expedition 313

Mountain, Proust, et al.





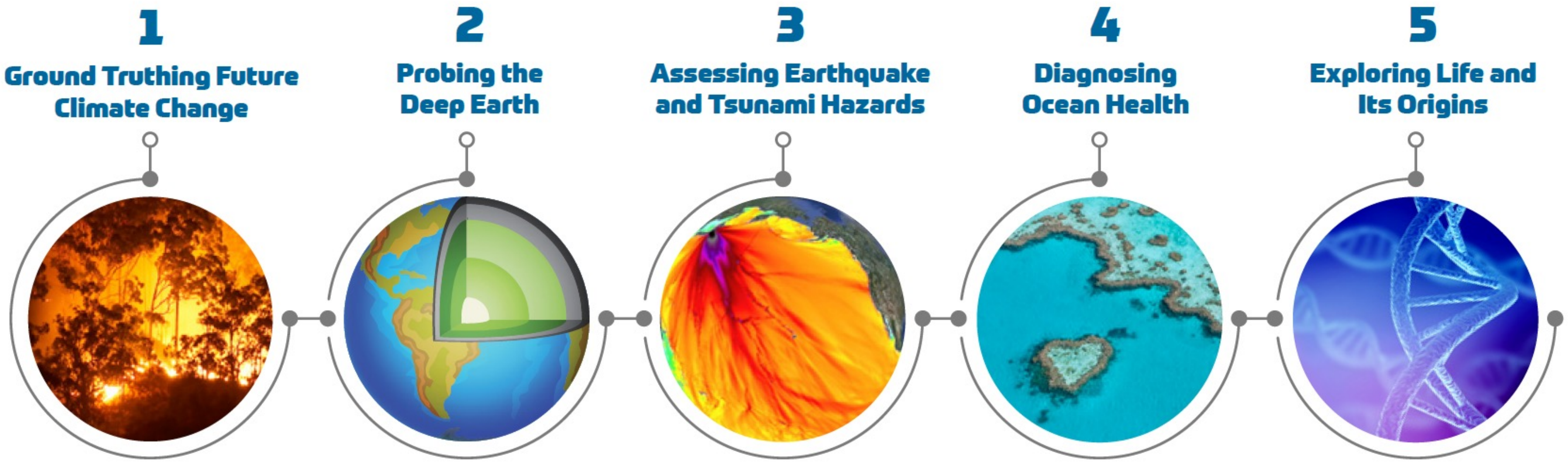
IODP-ICDP Expedition 364

Morgan, Gulick, et al.

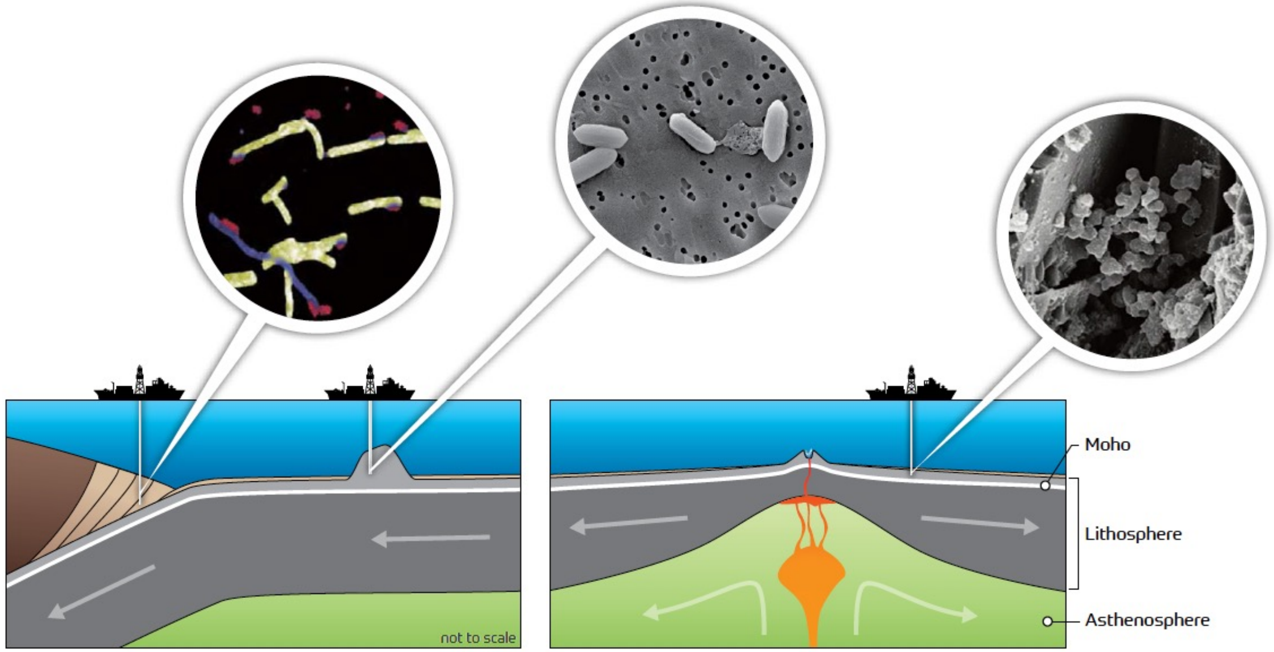
Kelemen, Matter, Teagle, et al.

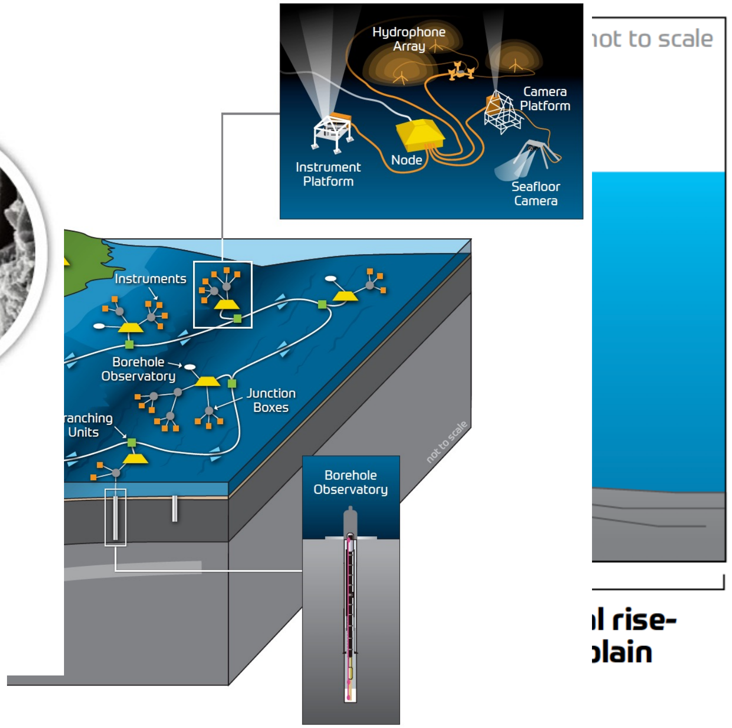
The 2050 SF's multi-decadal outlook provides an opportunity to develop ambitious multi-expedition strategies

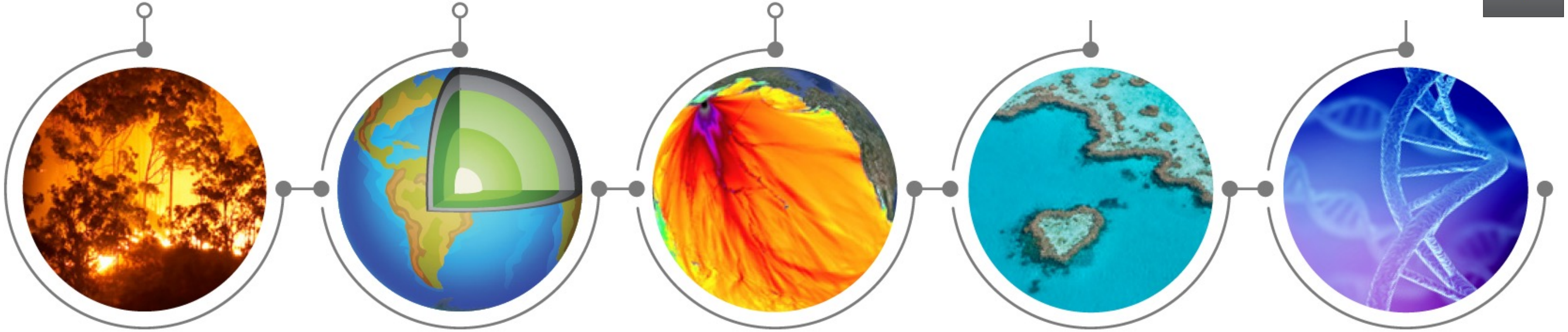
"… will require the community to develop strategies and technologies to implement multiple coordinated expeditions, taking advantage of the 25-year timeframe of the Science Framework."



The 2050 SF's multi-decadal outlook provides an opportunity to develop ambitious multi-expedition strategies







SCIENTIFIC OCEAN DRILLING: LOOKING AHEAD

The outcome of this **extensive peer review** process and the high level of **community input** and involvement has resulted in an exciting new outlook on more than 25 years of future scientific ocean drilling, with a focus on **new scientific frontiers** and research of **societal impact and interest.**

THANK YOU

to everyone who has contributed to this process!!

Organising committee:

G. Camoin (EMA), N. Hallmann (EMA), D. McInroy (ESO), A. Morris (ESSAC), G. Uenzelmann-Neben (EFB), W. **Piller** (ESSAC),

Scientific committee:

C. Boschi, R. Coggon, A. Delacour, T. Dunkley-Jones, M. Forwick, M. Godard, P. Grunert, M. Harris, V. Heuer, H. Kleiven, W. **Kurz**, A. McCaig, J. Mueller, U. Nicholson, M. O'Regan, A. Sluijs,
M. **Strasser**

PROCEED: In developing a new Science Plan we need to consider audience, purpose, content and architecture

- Include a **MISSION STATEMENT** – what we will do/how we will do it
- **UP-FRONT SECTIONS** to highlight:
  - *Exceptional past successes and Serendipitous nature*
  - *Outstanding legacy (including training/diversity)*
  - *Technology – including new capabilities*
  - *Links with other programs (e.g. ICDP, Planetary Science)*
- Use **NEW TERMINOLOGY** - e.g. 'Grand Challenges'
- **REDUCE** the number of science questions – from 14 to 5-10
- Science questions should be: **CLEAR**, **BROAD**, important for **SOCIETY**
- Focus on **INTERDISCIPLINARY LINKS** between research fields
- The final 'documents' should include:
  - **non-linear digital** Science Plan with **hyperlinks**
  - **printed (linear)** executive summary with clear **infographics**