ECORD INVITES YOU TO HOST A LECTURE

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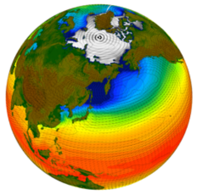
ECORD
EUROPEAN CONSORTIUM FOR OCEAN RESEARCH DRILLING

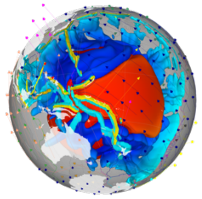
THE ECORD DISTINGUISHED LECTURER PROGRAMME



Climate & Ocean Change

Biosphere Frontiers

Earth Connections



Earth in Motion

The **ECORD Distinguished Lecturer Programme** (DLP) is designed to bring the exciting scientific discoveries of IODP to the geosciences community in ECORD and non-ECORD countries. Distinguished Lecturers will give lecturers in each of the four main thematic areas of IODP Science Plan 2013-2023. http://www.iodp.org/Science-Plan-for-2013-2023/

HOW TO APPLY?

Apply via electronic mail to: **essac@plymouth.ac.uk**

The application should include: 1) a list with more than one choice of speaker (1st, 2nd, optionally 3rd choice) – this provides more flexibility in scheduling and increases your institution's chance of hosting a lecture; and 2) the name, address, telephone number and email address of a contact person in your institution for communications with the ESSAC Office and the lecturer. Distinguished Lecturer will then liaise directly with you to decide a suitable date. ECORD funding will cover the speaker's travel expenses; host institutions are asked in turn to provide local transportation, housing, and meals for the speaker. Only one lecture per institution will be funded. The schedule of the lecturers will be principally based on the applications received by **15 October 2018**, although later applications can also be considered.

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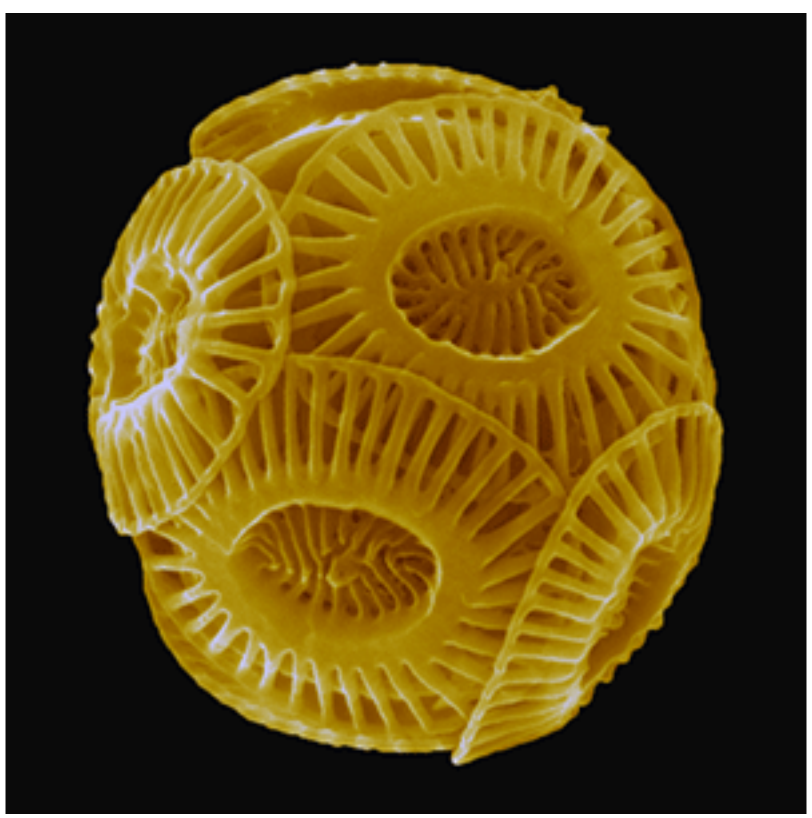


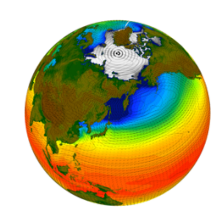
Evolution and adaptation of calcareous nannoplankton to Plio-Pleistocene oceanographic environments

Luc Beaufort (CEREGE, France)

Because of their relative high evolutionary rates, great abundance and broad geographic distribution, the calcite remains of coccolithophores (coccoliths) are intensively used in biostratigraphy, and their appearance and extinction datums have been calibrated to the Geologic Time Scale.

The development in the recent years of new tools in microscopy (automation) and computing (Artificial Neural Network /deep learning methods) makes possible automatic detection of species of coccoliths with simultaneous automated morphometry. I show here how these new tools allow to use the size of coccoliths of the Order Isochrysidales for enhanced stratigraphic resolution of the Plio Pleistocene stratigraphic interval. The coccoliths of the Order Isochrysidales, which includes the cosmopolitan genera Emiliania, Gephyrocapsa, and Reticulofenestra, are the most abundant coccolithophores in the Neogene fossil record. Their size and thickness are highly variable, both within and between populations, This morphological variability is part of an adaptive strategy. Measurements of mass, length and width were obtained automatically on several hundred coccoliths per samples collected at orbital to suborbital-resolution in 11 cores drilled in the Indo-Pacific Warm-pool and Bay of Bengal during IODP Expeditions 353, 363 and IMAGES III, and XIII in the tropical Indo-Pacific Oceans, all of which span the upper Pleistocene and some of them extending into the Pliocene. A bimodal distribution in size is apparent in most of the samples with a mode separation ~ 3 µm. The mass and size of the large and small groups show mirrored (opposite) fluctuations. A general pattern of distinct, synchronous and consistent morphological fluctuations is common to all sites in the studied area. Their rhythm closely parallels the eccentricity cycles of the Earth's orbit. The complete description of this pattern not only have paleoceanographic applications (carbon cycle, seasonality, strength of monsoon), it can also be used in biostratigraphy. This new methodology, which associates automated microscopy, deep learning algorithm and time series analysis, produces fast, reliable and precise biostratigraphic subdivisions for the Neogene.

Climate & Ocean Change



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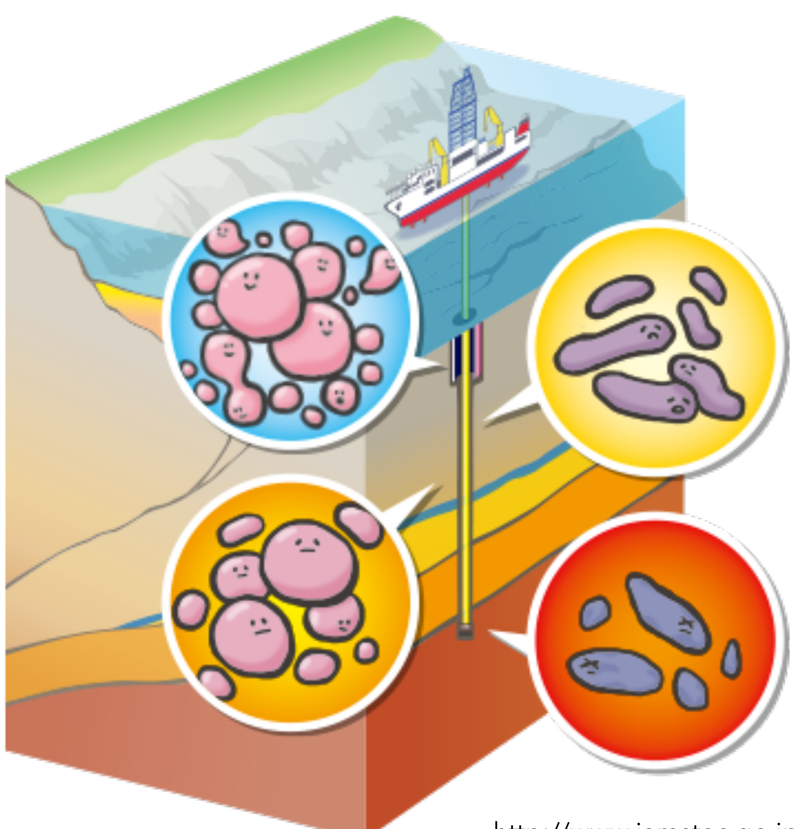
Exploring the limits of Earth's habitability by scientific ocean drilling: The impact of temperature on microbial life and carbon flow in deep sub-seafloor sediments

Verena Heuer (MARUM, Germany)

The ocean floor is an important interface at which geological, physical, biological and chemical processes interact. Geological processes shape the ocean floor and result in vastly different environments, such as mid-ocean ridges where new ocean floor is formed, subduction zones where old ocean floor is transferred back into the Earth's interior, cold seeps and hot vents which release fluids and gases from within the ocean floor, and vast areas and volumes of sediment. In these environments, temperature varies widely, and microbial communities are widespread and surprisingly diverse despite energy limitations. Microbial life persists even in sediments of Cretaceous age, at sediment depths of up to 2.5 km below the seafloor, and in deeply buried oceanic crust. However, the total amount of subsurface biomass is still a matter of debate, the metabolic activities of deeply buried microbes are barely explored, and the factors posing ultimate limits to deep life and the habitability of Earth remain to be resolved.
This lecture will specifically address the role of temperature in deep geosphere-biosphere interactions. It will investigate the impact of temperature on the abundance and activity of microorganisms, on the biotic and abiotic transformation of sedimentary organic matter, and on carbon flow within the ocean floor. To this end, we will discuss the results and technological challenges of recent scientific ocean drilling expeditions in high temperature environments, in particular IODP Expedition 337 Shimokita Deep Coalbed Biosphere and Expedition370 Temperature Limit of the Deep Biosphere off Cape Muroto. The former was the first scientific ocean drilling expedition to target a deep hydrocarbon reservoir by riser-drilling technology, and it recovered up to 2.5 km deep, 60°C coal-bearing sediments and associated fluids and gases. The latter aimed to probe the deepest extent of life in ocean-floor sediments, known as the biotic fringe, and applied particularly strict contamination control measures when up to 120°C sediments were retrieved from a 1.2 km deep borehole in the Nankai Trough subduction zone. The lecture will conclude with a discussion of open questions, future challenges and drilling targets within IODP's Biosphere Frontier Theme.



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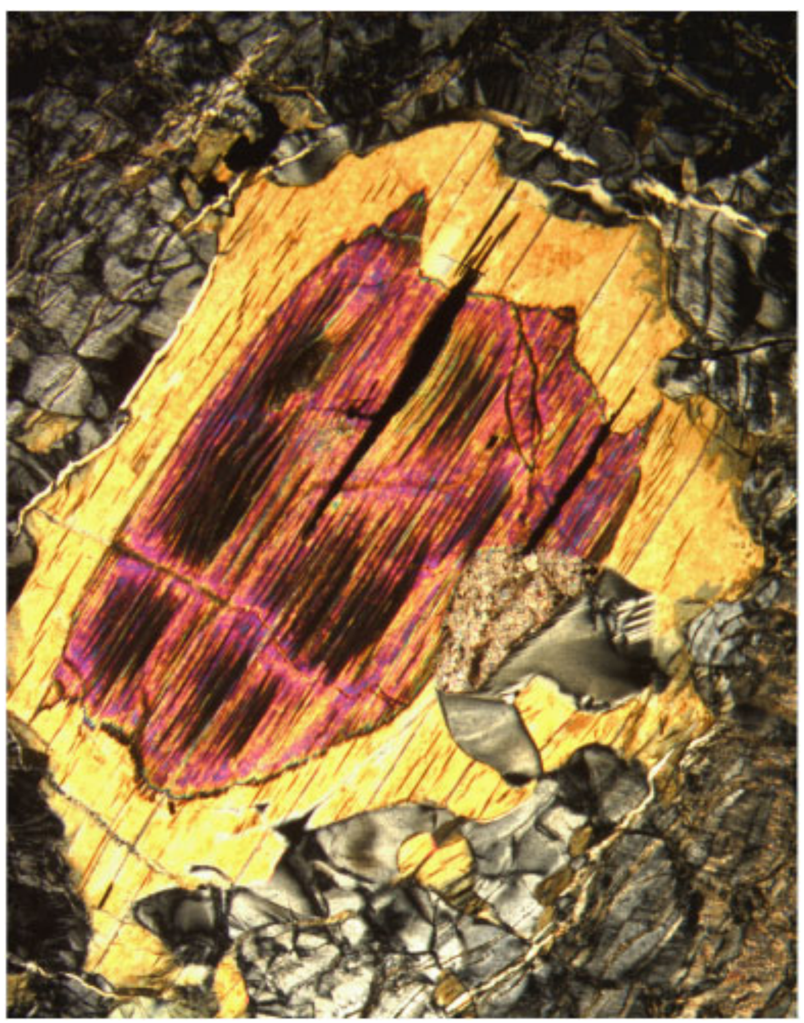
Drilling the oceanic mantle lithosphere: A window on melt extraction and mantle metasomatism at ridges

Marguerite Godard (Géosciences Montpellier, France)

The oceanic crust represents more than 70% of the Earth's surface and its continuous formation along spreading centres is one of the most notable demonstrations of plate tectonics. It is widely accepted that partial melting of the upwelling mantle beneath spreading centres feeds the dominantly basaltic ridge magmatism. Abyssal peridotites exposed at avolcanic segments and tectonic windows along slow and fast spreading ridges have long been considered as simple mantle residues of mid-oceanic ridge basalt formation. Over the last 25 years, petrological and geochemical studies of abyssal peridotites revealed more complex petrogenetic processes (mantle metasomatism, melt impregnation, …) and suggested that the transport of melts from the mantle toward the surface contributed also to the composition and architecture of the shallow mantle. Scientific drilling provides the only means to document, from the micro- to tens of meter scale, the structural and textural heterogeneities resulting from these magmatic processes. So, although drilling expeditions targeting successfully mantle peridotites along ridges were rare (ODP Legs 153 and 209 along the Mid-Atlantic Ridge, ODP Leg 147 at Hess Deep), scientific drilling was, and remains, determinant for our understanding of the processes driving the construction of the oceanic lithosphere.



Earth Connections

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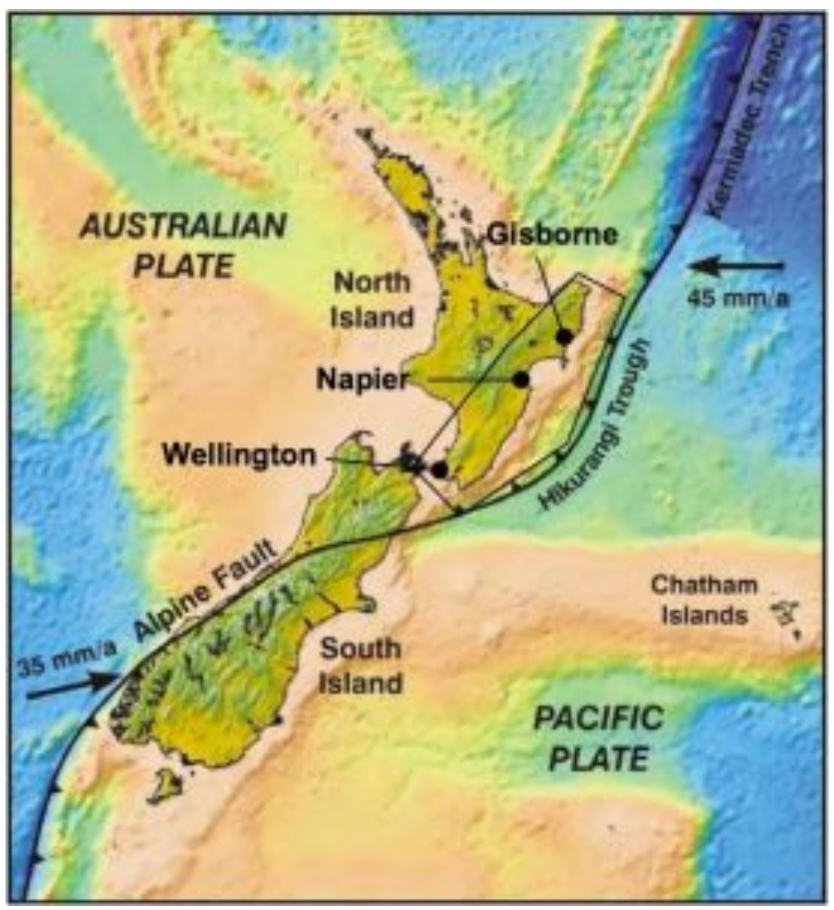
Unlocking the secrets of slow slip using next-generation seismic experiments and IODP drilling at the north Hikurangi subduction zone, New Zealand

Rebecca Bell (Imperial College, UK)

Subduction plate boundary faults are capable of generating some of the largest earthquakes and tsunami on Earth, such as the 2011 Tōhoku, Japan. However, in the last 15 years a new type of seismic phenomena has been discovered at subduction zones: slow slip events (SSEs), where slip occurs too slowly to produce seismic waves. SSEs may have the potential to trigger highly destructive earthquakes and tsunami on faults nearby, but whether this is possible and why SSEs occur at all are two of the most important questions in earthquake seismology today. IODP Expeditions 372 and 375 drilled the north Hikurangi subduction zone in New Zealand, where well-characterised SSEs occur every 1-2 years at depths of <2 -15 km below seafloor. The expedition installed two borehole observatories close to the patch of slow slip to investigate physical property changes over the slow slip cycle, and collected geophysical log and core data to characterize the sediment and rock types involved in slow slip. New seismic images (made using man-made acoustic waves) collected in 2017-2018 will in the future allow us to better understand the slow slip environment in 3D below and around the drill sites. In this presentation Rebecca Bell will discuss the objectives and preliminary findings of Expedition 372/375 and the recent seismic experiments, which aim to unlock the secrets of slow slip.



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