

## Expedition Co-chief Scientists

### Professor Jody Webster

Jody Webster is a Professor in the School of Geosciences, the University of Sydney, Australia. He is an expert on carbonate sedimentology and stratigraphy and interpretation of marine geology and geophysical data. Jody graduated from the University of Sydney in 2000 and spent several years in the US carrying out his post-doctoral research on fossil coral reefs and carbonate platforms. His research has focused on understanding coral-reef and carbonate-platform evolution and their implications for addressing fundamental problems in climate change and tectonics. In 2010, Jody was Co-Chief scientist on IODP Expedition 325 Great Barrier Reef Environmental Changes. Jody's interests also involve linking observational and numerical modeling data to accurately show how reef and carbonate platform evolution in the Indo-Pacific are controlled by changes in sea level, subsidence and growth rates.



### Professor Christina Ravelo

Christina Ravelo is a paleoceanographer and paleoclimatologist who has studied the Pacific and Atlantic subarctic, the Indo-Pacific tropics, and coastal mid-latitude upwelling systems. Christina graduated from Lamont-Doherty Earth Observatory of Columbia University and was a post-doctoral researcher at Princeton University before moving to Santa Cruz where she is now Professor in the Ocean Sciences Department at the University of California, Santa Cruz. She is an expert in the application of light stable isotopes and trace-metal geochemistry to study climate variability and how it responds to changes in global and local boundary conditions. Christina has been involved in numerous ODP/IODP expeditions throughout her career, including as Co-Chief scientist in 2009 on IODP Expedition 323 in the Bering Sea and most recently as a Stratigrapher in 2019 in the Southern Ocean.



### Expedition Operator

Mission specific platform (MSP) expeditions are conducted for IODP by the European Consortium for Ocean Research Drilling (ECORD), which represents the ocean drilling community of 15 European countries and Canada. Operations are undertaken by the ECORD Science Operator, comprising the British Geological Survey, the University of Bremen, and the European Petrophysics Consortium, made up of the universities of Leicester (UK) and Montpellier (France).

During the expedition, regular updates will be posted on the webpage, through blogs and via social media:

<http://www.ecord.org/expedition389>



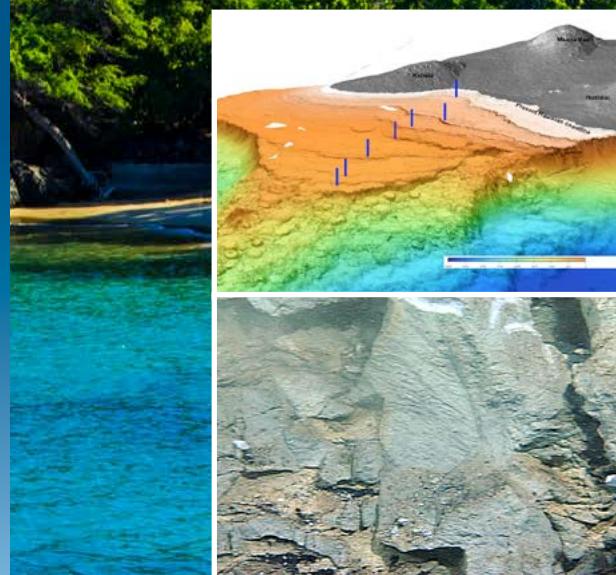
### International Ocean Discovery Program

The International Ocean Discovery Program (IODP) is an international marine research programme supported by 21 countries, which explores Earth's history and structure recorded in seafloor sediments and rocks, monitors sub-seafloor environments and research the deep biosphere and microbial life. Through multiple platforms - a feature unique to IODP - scientists can sample and analyse the deep data across a wide range of disciplines and themes, including climate change, processes and effects, the deep biosphere and solid earth cycles and dynamics.

**Credits:** front cover, Hawaii beach; insets from top, 3-D image of the suite of submarine terraces of NW Hawaii (from Webster, Ravelo et al, IODP Proposal 716-Full2), exposed Hawaiian reef section at 1000 metres below sea level. Inside, map and logo: ECORD Science Operator (ESO).



# The Hawaiian Drowned Reefs Expedition



*A unique archive of sea-level, climate and reef response*

## IODP Expedition 389



European Consortium for  
Ocean Research Drilling

[www.iodp.org](http://www.iodp.org)  
[www.ecord.org](http://www.ecord.org)

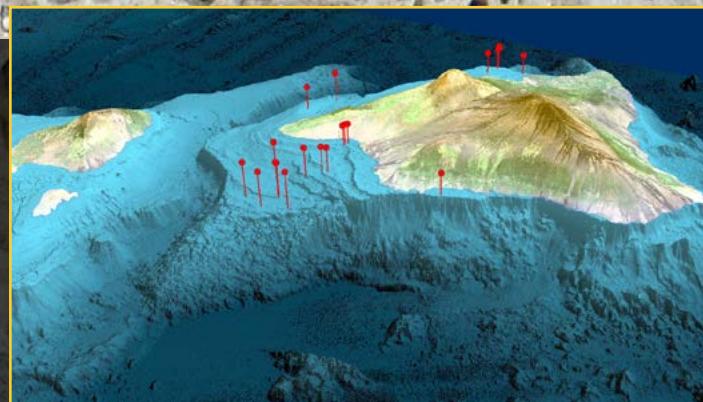
Surrounding the island of Hawai'i are a series of twelve fossil coral reefs that formed as the reef communities successively grew and were drowned by rising sea-levels and / or the near constant subsidence of the crust around the ever-growing volcanic archipelago of Hawai'i. When combined with Hawai'i's location away from the influence of any of the large Quaternary ice-sheets, or strong boundary ocean currents that can mask the sea-level and paleoclimate signals, this location represents a unique succession of expended reef sequences, key for the recovery of high-resolution climate and reef response records.

Covering important time periods in the Earth's climate history, the information contained in these natural fossil reef archives will help scientists reconstruct sea-level change at a much higher resolution than previously possible at a stable far-field site. It will also enable them to investigate the links between global sea-level change and global climate change, and therefore the mechanisms that control abrupt climate change.

These records of natural climate change on a range of scales, from seasonal and decadal signals to the much longer term millennial scale changes, will also provide a framework for evaluating the effects of climate change originating from human activity.

The scientific team will core in up to eleven locations, to a depth of 150 m below the seafloor, with the aim to address questions on four main themes:

- To reconstruct **sea-level change** in the central Pacific over the last 500,000 years;
- To reconstruct the **variability in climate** over the last 500,000 years, as recorded in the fossil corals, and better understand the differences in response between a seasonal – inter-annual variation in climate against what represents a more permanent shift in sea surface temperature, rainfall and storm tracks;
- To understand how **coral reef systems respond** both geologically and biologically to rapid changes in sea-level and climate – for example can reefs turn on and off when they reach certain limits, and how do they recover from disturbances in the system;
- To explain the **subsidence and volcanic history** of Hawaii.



Location of the drillsites of IODP Expedition 389

The offshore coring phase will last for up to 60 days and involve coring beneath the seafloor from a specialised geotechnical vessel, using a seabed rockdrill. Twenty nine scientists, including Hawaiian participants, and the two Co-chief Scientists, will participate in the expedition Science Party, which is planned and conducted by the European Consortium for Ocean Research Drilling (ECORD) as part of the International Ocean Discovery Program (IODP).



Due to the limited facilities available offshore, only a minimum number of measurements will be made on the vessel. For this reason, not all members of the Science Party will participate offshore. The entire team will meet for an onshore phase (the "Onshore Science Party") held at the IODP Bremen Core Repository and MARUM laboratories in Germany, planned for early 2024. Here, the core will be split into a working and an archive half. The working half will be described, analysed and sampled by the team of scientists. The other half of the core material will be saved at the IODP Bremen Core Repository for future research needs by the global scientific community. The initial results from the expedition will be published in peer-reviewed journals, the IODP Proceedings, and in the ICDP-IODP Program Journal Scientific Drilling. One year from the end of the onshore phase, the cores and all "shipboard data" acquired during the offshore and OSP become available for use by any scientific researcher who wishes to study them.