**CALL FOR APPLICATIONS**

**Apply to participate in *JOIDES Resolution* Expeditions 397 and 398**

 **Expedition 397: Iberian Margin Paleoclimate**

6 October to 6 December 2022

The Iberian Margin has rapidly accumulating sediment that contains a high-fidelity late Pleistocene record of millennial climate variability (MCV). Sir Nickolas Shackleton demonstrated that piston cores from this region can be correlated precisely to polar ice cores from both hemispheres. Moreover, the narrow continental shelf off Portugal results in the rapid delivery of terrestrial material to the deep-sea environment, thereby allowing correlation of marine and ice core records to European terrestrial sequences. Few places exist in the world where such detailed marine-ice-terrestrial linkages are possible. The continuity, high sedimentation rates, and fidelity of climate signals preserved in sediments make this region a prime target for ocean drilling. During IODP Expedition 339, Site U1385 was drilled and recovered a complete record of hemipelagic sedimentation for the last 1.43 Ma with a mean sedimentation rate of 11 cm/kyr. IODP Expedition 397 will extend this remarkable sediment archive through the Pliocene and recover a complete depth transect of five sites that will provide a complete suite of downhole records with which to study past variability in the major subsurface water masses of the North Atlantic.

There are ten primary scientific objectives:

1. Document the nature of MCV for older glacial cycles of the Quaternary, including changes in surface and deep-water circulation during the “100-kyr world”, Mid Pleistocene transition, “41-kyr world”, and intensification of Northern Hemisphere Glaciation.

2. Derive a marine sediment proxy record for the Greenland and Antarctic Ice Cores to examine the amplitude and pacing of MCV during the Quaternary.

3. Determine interhemispheric phase relationships (leads/lags) by comparing the timing of proxy variables that monitor

surface (Greenland) and deep-water (Antarctic) components of the climate system, thereby overcoming problems of age

determination on millennial and sub-millennial time scales.

4. Study how changes in orbital forcing and glacial boundary conditions affect the character of MVC and, in turn, how MCV interacts with orbital geometry to produce the observed glacial-to-interglacial patterns of Quaternary climate change.

5. Reconstruct the climate transitions into (inception) and out (termination) of glacial periods at high temporal resolution.

6. Reconstruct the history of changing local dominance of northern-sourced versus southern-sourced deep water using the depth transect of IODP Expedition 397 sites on orbital and suborbital time scales during the Quaternary.

7. Investigate climate during past interglacial periods, including the warm Pliocene period prior to the intensification of

Northern Hemisphere glaciation.

8. Link terrestrial, marine and ice core records by analyzing pollen and terrestrial biomarkers that are delivered to the

deep-sea environment by rivers.

9. Contribute to the development of a global stratigraphy having sufficient resolution to study abrupt climatic events and their phase relationships.

10. Interface with projects aiming to recover old ice (including the European “Beyond EPICA - Oldest Ice” core project) to integrate marine sediment cores recovered during Expedition 397 with existing and future ice cores from Antarctica.

**Expedition 398: Hellenic Arc Volcanic Field**

6 December 2022 to 5 February 2023

The Hellenic Arc Christiana-Santorini-Kolumbo (CSK) volcanic field, which includes Santorini caldera and its Late Bronze Age eruption, provides a unique opportunity to address how subduction-related volcanism impacts life. Better understanding of island-arc volcanism requires study of the processes that drive such volcanism, and how the volcanoes interact with the marine environment. What are the links between crustal tectonics, volcanic activity, and magma genesis? What are the dynamics and impacts of submarine explosive volcanism and caldera-forming eruptions? What are the reactions of marine ecosystems to volcanic eruptions? The rift basins around the CSK field, as well as Santorini caldera, contain volcano-sedimentary fills up to several hundreds of meters thick. We propose to drill six sites, four in the rifts basins and two in Santorini caldera. Deep drilling is essential to characterize and interpret the depositional packages visible on seismic images, to chemically correlate primary volcaniclastic layers in the rift fills with their source volcanoes, to fill in gaps in onland volcanic records, to provide a precise chronostratigraphic framework for rift tectonic and sedimentary histories, and to characterize the subsurface microbial life.

There are five primary [1-5] and two secondary [6-7] scientific objectives:

1. Arc volcanism in an active rift environment: To reconstruct the volcanic history of the CSK volcanic field since the Pliocene by exploiting a >3.8 My marine volcano-sedimentary archive.

2. The volcano-tectonic connection: To reconstruct the subsidence and tectonic histories of the rift basins, and use the rift as a natural experiment for studying the relationship between CSK volcanism and major crustal tectonic events.

3. Arc magmatism in a region of extending crust: To document magma petrogenesis at the CSK volcanic field in space and time, and to seek effects of crustal thinning on magma storage, differentiation and crustal contamination.

4. Unravelling an iconic caldera-forming eruption: To document the processes, products and potential impacts of the late Bronze-Age eruption of Santorini.

5. Volcanic hazards from submarine silicic eruptions: To study the histories, dynamics and hazards of Kameni and Kolumbo submarine volcanoes.

6. Transition from continental to marine environments in the southern Aegean.

7. Biological systems reactions to volcanic eruptions and seawater acidification.

**For more information on the expedition science objectives and the *JOIDES Resolution* expedition schedule,** see <http://iodp.tamu.edu/scienceops/>. This site includes links to individual expedition web pages with the original IODP proposals and expedition planning information.

**Application deadline:** 1 November 2021

**WHO SHOULD APPLY:** We encourage applications from all qualified scientists. The JOIDES Resolution Science Operator (JRSO) is committed to a policy of broad participation and inclusion, and to providing a safe, productive, and welcoming environment for all program participants. Opportunities exist for researchers (including graduate students) in all shipboard specialties, including micropaleontologists, sedimentologists, volcanologists, petrologists, igneous geochemists, inorganic and organic geochemists, microbiologists, paleomagnetists, physical properties specialists, and borehole geophysicists. Good working knowledge of the English language is required.