

IODP Expedition 339: Mediterranean Outflow

Week 2 Report (21-27 November 2011)

Operations

Just prior to concluding the port call in Ponta Delgada, the home port of registry for the *JOIDES Resolution* was changed from Monrovia, Liberia to Limassol, Cyprus. The vessel departed for Site U1385 (proposed site SHACK-04A), the first site of the expedition, at 0800 hr on 22 November. We covered the 741 nmi transit in 68 hours at an average cruising speed of 11.1 knots. During the voyage, the co-chief scientists, ancillary program proponent and senior USIO and Siem Offshore personnel met for a final clarification of operations at Site U1385. The clock was advanced one hour placing the vessel on Lisbon time. This is the same time zone as UTC or +6 hours relative to Central Standard Time.

The vessel arrived on site at 0400 hr on 25 November. The initial pipe trip was extended by the routine measuring and “rabbiting” that occurs on the first deployment of the drill string. Following a three-hour VIT survey of the seabed during which no obstructions were observed, Hole U1385A was spudded with the APC at 2300 hr on 25 November. The recovery of the first core established the seafloor depth at 2598.0 mbrf (2586.7 mbsl). Piston coring with non-magnetic core barrels advanced to a total depth of 151.1 mbsf (17 cores), which was the depth objective of the site. Cores U1385A-4H through -17H were oriented. There were APCT deployments at 30.0 (-4H), 58.5 (-7H), 87.0 (-10H), and 115.5 (-13H) mbsf. The APC experienced partial strokes on -14H and -17H. The last core only advanced 7.7 m when the formation firmed up and abruptly stopped the APC. The drill crew experienced difficulty extracting the sinker bars from the drill string prior to pulling out of the hole. It required 4.5 hours of IODP rig time to remove a deformed section of coring line before operations could resume. This involved the removal of 100 m of coring line, the re-heading of the line, and the redressing of the oil saver.

Following a vessel offset of 20 m east of Hole U1385A, operations on Hole U1385B began at 0030 hr on 27 November. The water depth calculated from the recovery of the first core is 2597.9 mbrf (2586.6 mbsl). Piston coring using non-magnetic core barrels continued to a total depth of 147.9 mbsf (16 cores). The week ended beginning operations in Hole U1385C.

Science Results

During the second week of Expedition 339, all science teams underwent training on analytical equipment, software, and the lithostratigraphy team on description techniques used during the core description process. Particular attention was paid to training on DESCLogik, the software used to capture core description data. All teams also worked to define and prepare their methods for the expedition scientific activities and we conducted science seminars related to the expedition objectives.

By week's end, we completed coring operations in two holes at Site U1385, the deepest site of the expedition. The overall objective of this site, located on the western Iberian Margin, is to recover a late Pleistocene sediment record that will greatly improve the precision with which marine sediment records of climate change can be correlated to and compared with ice core and terrestrial records.

Seventeen cores were retrieved from Hole U1385A recovering 155.87 m of sediment (102.9% recovery) and sixteen cores were retrieved from Hole U1385B recovering 150.73 m of sediment (103%). Core sections are being processed in the ship's core laboratory using the multisensor track systems to measure the sediment's physical and paleomagnetic properties and the archive section halves are being described lithologically and digitally imaged. Sediment and interstitial water samples are being measured for inorganic and organic geochemistry and water samples are also being measured for oxygen isotopic composition.

All cores recovered from Holes U1385A and U1385B were logged on the special track multisensor logger (STMSL), which measures magnetic susceptibility and density. All cores from Hole U1385A and Cores 1H through 8H from Hole U1385B were logged using the whole round multisensor logger (WRMSL) and the natural gamma radiation logger (NGR). The WRMSL measures magnetic susceptibility, gamma ray attenuation bulk density, and P-wave velocity at a higher resolution than the STMSL. Obtained results are coherent with those expected for mud/ooze pelagic sediments. Thermal conductivity was measured in one section per core for Hole U1385A. Samples for moisture and density (MAD) measurements were taken from Hole U1385A. Preliminary results indicate a coherent pattern with a progressive increase in density when increasing depth.

By noon 27 November, the Lithostratigraphy team has described through Core Section U1385A-12H-2. Cores 339-U1385A-1H and 2H are composed of nannofossil ooze and silty or clayey nannofossil ooze, with abundant silt- and clay-sized detrital carbonate and a notable absence of siliciclastic clays. The sediment colors in the upper 2 cores are primarily varying shades of gray. Cores 339-U1385A-3H through -4H-7 contain more siliciclastic material, classified as nannofossil muds and nannofossil clays. From Section 339-U1385A-4H-7 through 339-U1385A-12H-2, the nannofossil content increases again, so that these sediments are classified as muddy nannofossil ooze to nannofossil ooze with clay. Bioturbation throughout these cores ranges from sparse to moderate, with scattered occurrences of recognizable ichnofauna. The most notable physical features observed are at least 3 subvertical faults in Sections 339-U1385A-10H-3, -10H-4, and -12H-2. Each of these faults is traceable for several decimeters along the core, and shows offset of 5-10 cm.

Core catcher samples from Holes U1385A and U1385B were prepared for calcareous nannofossil, planktonic and benthonic foraminifer, ostracod, and pollen studies. In order to elaborate a more accurate chronology based on nannofossil data, additional samples were taken at selected sections. Biostratigraphic data were mainly based on the identification of nannofossil,

as well as planktonic and benthonic foraminifer events that allowed us to estimate an age of circa 1.2/1.4 Ma for the bottom of Hole U1385A. Micropaleontological analyses of core catcher samples from Hole U1385B are in progress.

Paleomagnetists performed detailed measurements of the response function of the magnetometer to aid in the deconvolution of the long-core paleomagnetic measurements and are in the process of conducting a full range of paleomagnetic analyses on cores and samples from Site U1385. The aims of these analyses are to determine the magnetostratigraphy, the geomagnetic field behavior, and to study the environmental magnetism of the cores. Shipboard analyses conducted so far suggest that a useful magnetic signal is preserved in the APC cored intervals, helped by the use of an orientation tool (“Flexit“) during coring. Preliminary comparison with biostratigraphic data and consistently positive magnetic paleoinclinations suggest the recovery of the Brunhes magnetochron in Cores U1385-1H through 10H and the Brunhes/Matuyama boundary in Core U1385-11H. Paleomagnetic directions from discrete samples for comparison with the split-core results will be determined when time permits.

Education and Outreach

This week education and outreach activities included two ship-to-shore videoconferences. One with a classroom of 5th graders from a U.S. School in Washington, DC and a second one with two high school classes that were visiting the Science Museum Centro Ciência Viva de Tavira (Algarve, Portugal) in the framework of the Portuguese National Science and Technology Week 2011 (Semana C&T 2011).

Some members of the shipboard science party and technical staff have started to share their experiences on the JR Web Portal blog (thejr.org website), social networks (e.g. Facebook, Twitter), or their University websites.

Technical Support and HSE Activities

The USIO technical staff assisted the scientific party in preparing the laboratories for coring and processing core samples. The Operations Superintendent gave three tours of the drill floor for the science party. The gun array for VSP work was made ready. A Fire and Boat Drill was held for all participants on 22 November.