

Expedition 320: Pacific Equatorial Age Transect (PEAT I)
Week 6 Report (13 – 19 April 2009)

19 April 2009

OPERATIONS

This week we finished operations at Site U1334, made the transit to Site U1335 (PEAT-6C), finished coring in Hole U1335A, and started coring operations in Hole U1335B.

Hole U1334C

After coring in the three holes at Site U1334 was finished, logging Hole U1334C was our final planned operation. After preparing the hole, we raised the bit to 95 m and rigged up for logging. Unfortunately, while lowering the first tool string down the pipe, the logging winch failed and we had to stop logging. Preparations are underway to repair this at the end of the expedition in Honolulu. Once the wireline, logging tool string and drill string were recovered, we began the transit for Site U1335 (PEAT-6C) at 2200 hr on 13 April.

Site U1335, Hole U1335A

The 375 nmi voyage to Site U1335 (PEAT-6C) took 42.3 hr at an average of 8.9 nmi/hr. Once the ship was stabilized over the new site at 1630 hr on 15 April, we assembled the drill string, lowered it to the seafloor, and spudded Hole U1335A at 0355 hr on 16 April. Cores U1335A-1H to 36H were taken from 0 to 341.4 m and recovered 354.7 m (104%). We then switched to XCB coring and took Cores 37X to 45X from 341.4 to 421.1 m and recovered 67.9 m (85%). We retrieved Core U1335A-45X after taking ~1 hr to advance only 3 m. When retrieving this core, it became stuck in the drill string and we had to drop another core barrel on top of it to free it. When Core 45X was recovered, it contained hard limestone and the XCB bit was very worn down, so we decided it was best to stop coring in this hole. The basement depth is deeper than anticipated, and suggests higher seismic velocities in the sediment column from Site U1335 than those from the nearest ODP Site 574.

SCIENCE

During this week we continued analyzing cores from Site U1334 and started processing cores from Hole U1335A.

Lithostratigraphy

Site U1334: Core description, imaging and color reflectance logging has been completed for Holes U1334B and U1334C with only modest refinement to the lithologic description provided in last week's report.

Site U1335: Hole U1335A has been described down through Core 17H. The uppermost cores of Pliocene-Pleistocene age contain foraminifer-rich biogenic oozes with cyclic variations in the relative contributions of nannofossils, radiolarians, diatoms, and clays. The cores of late and middle Miocene age are nannofossil oozes. A downhole color change takes place in these sediments from white to yellow to light greenish gray, similar to that seen at Site U1334. Core description and other lab measurements continue.

Biostratigraphy

Site U1335: Initial biostratigraphy indicates that sediments recovered at Site U1335 span a succession from the Pliocene-Pleistocene to the late Oligocene (calcareous nannofossil zone NP25, younger than 26.8 Ma), including a very expanded sequence of middle and early Miocene nannofossil ooze and chalk. The top 56 m recovered a late Miocene (~9 Ma) to Pleistocene succession. Initial biostratigraphic assessment suggests the presence of at least one major hiatuses through the basal late Miocene (~ 9 to 11 Ma; nannofossil zones NN8 to NN9; planktonic foraminifera zone M12). Below we recovered a thick succession (~290m) of middle and early Miocene nannofossil oozes. Late Oligocene carbonates were recovered in the basal ~70 m of the hole. At the resolution of initial biostratigraphy the hole recovered complete Miocene-Pliocene, early-middle Miocene and Oligocene-Miocene boundaries. Calcareous nannofossil preservation is moderate throughout, with some more etched assemblages in the Pliocene-Pleistocene. Planktonic foraminifers are moderately preserved throughout, but are absent around the Oligocene-

Miocene boundary. Radiolarians are moderately well preserved throughout. Benthic foraminifers are present through most of the section and indicate lower bathyal to abyssal paleodepths.

Paleomagnetism

Site U1335: Paleomagnetism measurements have been completed down through Core U1335A-8H. The resulting magnetostratigraphic record extends from the Brunhes (Chron C1n; 0-0.78 Ma) down into Chron C5r (11-12 Ma). From Core U1335A-5H through 8H, the paleomagnetic quality varies on the scale of several meters, with poor quality intervals likely resulting from more extreme reduction diagenesis. Magnetic susceptibility values are higher and strongly cyclical again from Core U1335A-13X downwards.

Physical Properties

We reprocessed data from previous sites to remove intervals with drilling disturbance and end of core section effects (new automated feature in database query). A problem with discrete P-wave x-axis velocity data was identified and fixed by software adjustments and corrections to previous data. We are currently conducting full physical property program on Holes U1335A cores.

Stratigraphic Correlation

Site U1334: Using whole-round magnetic susceptibility and gamma ray density measurements, Holes U1334A, U1334B, and U1334C have been spliced to form a continuous section to ~338.8 m core composite depth (CCSF), with interruptions between 222 and 245 m CCSF caused by coring gaps and lack of correlation due to very weak susceptibility signals within the grayish green-colored sediment intervals. Sedimentation rates between the basement and the lower Oligocene section are ~8 m/m.y., increase in the lower Oligocene to 24 m/m.y., and then decrease throughout the Oligocene and Miocene to 4 m/m.y.

Site U1335: Magnetic susceptibility and gamma ray attenuation (GRA) density data for the first 25 cores reveal a pronounced cyclic sedimentary pattern through most of the cored interval that can be used to guide coring offsets in the next two holes to retrieve a complete stratigraphic record.

Geochemistry

Sediment geochemistry this week continued work on calcium carbonate analyses from Site U1334 and on organic carbon by acidification from Sites U1332, U1333, and U1334. At Site U1334, carbonate contents are low in the upper 20 m but increases up to >80% by 50 m; high values (>60-80%) continue to ~250 m where it returns to lower values (15-85%) in the basal section. Organic carbon was determined on samples that were acidified to remove calcium carbonate prior to combustion. At Sites U1332-U1334, organic carbon content are very low (mostly <0.1% with a few peaks up to ~0.28%). Site U1334 interstitial water analyses continued, including a high-resolution porewater transect across Cores U1334C-13H to Core 22H. We used 61 rhizon samples (one per core section) to span an interval with a pronounced dissolved iron peak and light grayish green ooze with low magnetic susceptibility. This high-resolution sampling is allowing a more detailed look at the characteristics of the dissolved manganese and iron peaks, resulting from inferred suboxic diagenesis of organic carbon.

TECHNICAL SUPPORT AND HSE ACTIVITIES

The shipboard labs and staff continued to process remaining cores from Hole U1334C. Ongoing activities include inventory updates and communicating to shore the supplies required for the next expedition as well as storeroom organization. A second test of the seismic source for Vertical Seismic Profiles was conducted prior to the planned experiment during logging in Hole U1334C – the test was successful.

We continue to work on outstanding action items reported in the TAMU Environmental Health and Safety Audit Review of the laboratories. A fire and boat drill was held on April 13 for the entire ship's complement; some USIO staff and scientists practiced lowering the lifeboats and some were shown use of emergency signaling flares and smoke signals.