

September 26, 2005

**IODP EXPEDITION 311:
CASCADIA MARGIN GAS HYDRATES
WEEK 4 REPORT**

OPERATIONS

TRANSIT TO SITE U1325 (CAS-02C): The 188 nmi transit to Site U1325 was completed in 19.5 hrs at an average speed of 9.6 kts. Upon arrival on site, we switched to DP mode, settling on location at 07:25 on 20 September, 2005.

HOLE U1325A (CAS-02C): The Logging While Drilling and Measurements While Drilling (MWD/LWD) tool string was assembled and the drill string run to the seafloor. During function testing of the tool string, a leak in the top drive swivel wash pipe packing was discovered, which required 1.5 hrs to repair. Hole U1325A was spudded at 23:10 hr establishing a seafloor depth of 2212.0 mbrf. The hole was logged to 350 mbsf without incident and within the prescribed protocol guidelines, requiring no corrective actions. After displacing the hole with 105 barrels of 10.5 ppg sepiolite mud, the drill string was tripped to the rig floor for the downloading of LWD/MWD logging tools while transiting in DP mode to Site U1326. The bit cleared the rotary table at 05:15 hr, officially ending Hole U1325A.

HOLE U1326A (CAS-03C): After completing data download and tool change out, the LWD/MWD BHA was deployed, function tested, and the drill string was tripped to the seafloor. Hole U1326A was spudded at 14:45 hr on 22 September tagging the seafloor at 1839.0 mbrf. After a controlled rate spud-in to maintain the quality of the near-surface LWD/MWD logs, Hole U1327A was advanced at a relatively high real-time penetration rate of 50 m/hr. The hole was drilled to a total depth of 300 mbsf, completing logging operations at 04:15 hr on 23 September 2005. After displacing the hole with 98 barrels of 10.5 ppg sepiolite mud, the drill string was pulled clear of the seafloor ending Hole U1326A.

HOLE U1327A (CAS-01B): We transited 8.5 nmi to Site U1327 in DP mode and Hole U1327A was spudded at 18:30 hr on 23 September 2005, establishing a seafloor depth of 1333.0 mbrf. The same controlled spud-in, followed by optimization of drilling parameters to maintain a 50 m/hr penetration rate was followed in Hole U1327A. Logging operations were completed at a total depth of 300 mbsf at 08:15 hr on 24 September 2005. After displacing the hole with 98 barrels of 10.5 ppg sepiolite mud, the drill string was pulled clear of the seafloor ending Hole U1327A.

HOLE U1328A (CAS-06A): The ship was moved in DP mode to Site U1328, arriving at 13:00 hr on September 24, 2005. Prior to spudding Hole U1328A, a bottom-camera survey was conducted to ensure that no chemosynthetic communities were present. Hole U1328A was spudded at 15:55 hr, tagging the seafloor at 1279.0 mbrf. Spud and drilling parameters remained unchanged from the previous site, and like all previous sites, no corrective action was required within the prescribed drilling protocol guidelines. The total depth of 300 mbsf was reached at 04:15 hr on 25 September 2005. After displacing the hole with 98 barrels of 10.5 ppg sepiolite mud, the drill string was recovered back to the rig floor with the bit clearing the rotary table at 11:00 hr on 25 September 2005, officially ending Hole U1328A. During the pipe trip, the ship was offset 9.9 nmi in DP mode to Site U1329 (CAS-05D). Data download and LWD/MWD tool preparation continued during the DP move to Site

U1329.

ENGINEERING DEVELOPMENT ACTIVITIES: Preparation continued for deployment of the Pressure Core Sampler (PCS) and assistance was provided with readying the APCT/APCT3 and DVTP temperature tools. In addition, the PCS gas manifold system was installed and plumbed in the PCS van and a dry run of PCS core handling was conducted with key participants.

SCIENCE

Our initially planned drilling location was scheduled to be Site CAS-03B; however, a large slump identified from recently available multi-beam data lead us to switch priority to alternate Site CAS-03C. Approval depth (EPSP and territorial) at Site CAS-03C was 300 mbsf, 50 m shallower than our desired penetration to allow the entire LWD/MWD tool string through the interval of interest. Therefore, we decided to change the drilling sequence, occupying Site CAS-02C prior to Site CAS-03C, to allow more time for response from the late depth extension request, which ultimately did not arrive prior to completion of the hole.

The downhole logging program during Expedition 311 was specifically designed to assess the presence and concentration of gas hydrates on the Cascadia accretionary prism. LWD/MWD operations are being conducted prior to coring each site. The LWD/MWD tools measure in-situ formation properties with instruments that are located in the drill collars immediately above the drill bit. LWD/MWD logging tools have been deployed at four sites this week (Sites U1325, U1326, U1327, and U1328); with an additional planned fifth logging site (Site U1329). The LWD/MWD tools used during Expedition 311 include the GeoVISION, EcoScope tool, TeleScope MWD tool, ProVISION NMR tool, and the advISION tool. The use of these tools prior to coring will identify intervals of interest where special tools (such as the PCS or the HYACINTH pressure coring tools) can be used to attempt to recover gas hydrate samples. In addition to providing a large array of data and helping the strategy for the deployment of special tools, the LWD/MWD tools have also allowed the monitoring of drilling performance and the reaction of the formation as the drill string advances. The Annular Pressure While Drilling (APWD) sensor on the EcoScope tool makes it possible to monitor bottom hole fluid pressure. It allows detecting downhole events, such as building formation pore pressures, liquid influx or gas flows, which could require immediate action to guarantee the safety of the tools and of the operations.

One of the most notable characteristics of a gas-hydrate-bearing sedimentary sections on recorded downhole log data is the relatively high electrical resistivity nature of the gas hydrates. It has been shown that resistivity data and images can be used to identify gas-rich and gas hydrate-bearing intervals. On Expedition 311, considerable effort has been made to obtain high quality resistivity log data from the LWD/MWD tool string. Both the GeoVISION and EcoScope tools yielded high quality resistivity log measurements from all four sites logged to date during Expedition 311. The GeoVISION resistivity logs from all four sites are characterized by distinct intervals of elevated resistivities, which in most cases probably indicate the presence of gas hydrate. The resistivity logs from Hole U1325A exhibited relatively subtle increases in recorded resistivities within the stratigraphic section overlying the predicted depth of the BSR as inferred from seismic. The resistivity logs from Holes U1326A and U1327A are both characterized by a very distinct relatively thick (~20-m-thick) high resistivity intervals, with maximum resistivity log values ranging from 8 to 12 ohm-m, at a depth of about 100 mbsf. The resistivity log from Hole U1326A

also contains a less significant high resistivity interval at a depth of ~260 mbsf, which is below the predicted depth of the seismic inferred BSR. The GeoVISION derived resistivity log and image data from Hole U1328A reveals several thick high resistivity intervals immediately below the seafloor and extend to a depth of about 40 mbsf. The depth of the BSR at Site U1328 appears to coincide with subtle resistivity log response in Hole U1328A at a depth of ~220 mbsf. The potential occurrence of gas hydrates within the log measured high resistivity intervals will be further examined as the Expedition 311 LWD/MWD logging program continues and when the coring portion of this effort gets underway.

TECHNICAL ACTIVITIES

The week was spent preparing the vans and laboratories for coring. The installation of the IR camera track on the catwalk was completed. The marine specialists were trained in the use of the Parr pressure vessels for gas hydrate sampling and in the use of the IR camera track. A pre-seismic operations planning meeting was held on September 24, 2005 in preparation for VSPs.

HSE ACTIVITIES: There was a H₂S Alert , fire, and boat drill on September 20, 2005. The METs team responded with four members to an H₂S emergency. The rest of the technicians and scientists reported to their lifeboat stations.