

## 2009 Annual Report: Cruise Summaries

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### R/V Atlantis



(Woods Hole Oceanographic Institution)  
 During this cruise, DSV *Alvin* completed its 4,500th dive!

Days at sea: 212; Cruises: 11; *Alvin* dives: 92  
 Investigators Served: 233; Nautical miles: 22,108

In January, R/V *Atlantis* recovered 45 ocean bottom seismometers that had been deployed for a year in an area of active transform faults on the East Pacific Rise. The purpose of this work was to investigate earthquake predictability by examining foreshock sequences of earthquakes.

The second cruise of the year focused on retrieving instruments and data from two Ocean Drilling Program boreholes at the subduction zone off Costa Rica. Together with data collected previously, these new results will provide a valuable long-term record of hydrologic, geochemical, and geodynamic activity at this subduction zone. During this

This was followed by another cruise on the Costa Rica margin to investigate the structure, function and evolution of methane-derived carbonate ecosystems. R/V *Atlantis* then spent two months out of service in San Diego, Calif. The vessel then departed for *Alvin* dives and the deployment of resistivity probes at hydrothermal vents on the Juan de Fuca Ridge. This was followed by operations using the remotely-operated vehicle *ROPOS* to install nodes for the Neptune cable observatory on the Juan de Fuca tectonic plate as part of the Ocean Observatories Initiative, and then *Alvin* dives at ODP sites to download data and collect instruments from seafloor observatories.

During the following transit to San Francisco, two VIP dives were conducted—one for Susan Avery and a representative from NSF, and one for two Navy representatives. The next cruise involved exploration and evaluation of petroleum seeps using *Alvin* and the AUV *Sentry*. R/V *Atlantis* then headed for the Guaymas Basin in the Gulf of California. The first cruise there used sidescan sonar and seafloor imaging to investigate the distribution of off-axis sills and their implications for the thermogenic flux of carbon in this sedimented rift basin.

Two cruises followed to study the distribution and diversity of thermoacidophiles associated with hydrothermal vent deposits. This included collection of vent deposits and deployment of thermocouple arrays to study microbial colonization and succession.

### R/V Knorr



(Woods Hole Oceanographic Institution)

Days at sea: 251; Cruises: 9  
 Investigators Served: 184; Nautical miles: 46,233

At the beginning of this year, R/V *Knorr* conducted two cruises with the new long-coring system: the first to study the oceanographic control and distribution of seafloor microbial life along a transect to Hawaii, and the second near the Galápagos Islands for paleoceanographic purposes.

These cruises were followed by collaborative research with the HOTS (Hawaii Ocean Time-series: Biogeochemistry and Ecology Component) program off Hawaii, and sampling for the GEOTRACES program. R/V *Knorr* then transited to Dutch Harbor, AK, for investigations of the impacts of sea ice on the hydrographic structure and nutrients of the Eastern Bering Sea shelf during summer.

The end of July brought the vessel back to Honolulu, HI, where it began work for the Navy using multiple autonomous underwater vehicles. After a long transit to Woods Hole, R/V *Knorr* prepared for departure to Nuuk, Greenland, to recover several moorings and conduct water column work. The vessel then participated in a continuing international effort to quantify and monitor the variability of fluxes connecting the Arctic and North Atlantic Oceans. The measurements collected in this seven year program will help researchers understand the role of the Arctic and Sub-Arctic in steering decadal scale climate variability.

In mid-November, *Knorr* made the transit from Woods Hole to Tampa, FL, for a major maintenance and shipyard period.

### R/V Oceanus

Days at sea: 113; Cruises: 7  
 Investigators Served: 49; Nautical miles: 18,412

Although we had expected R/V *Oceanus* to be laid up for 2009, final negotiations with NSF and ONR resulted in the ship being assigned 112 days of work, most of which occurred in the second half of the year. After being out of service for the month of January, R/V *Oceanus* transited to Jacksonville, Florida, for maintenance during a yard period. It was then out of service from the beginning of March through early June when it departed to perform various mooring operations at the continental slope off Woods Hole.



(Woods Hole Oceanographic Institution)

In late July, the vessel departed for Piraeus, Greece, to perform water column sampling and coring operations to investigate how certain micro-organisms are adapted to living in hypersaline waters. At the end of July, R/V *Oceanus* departed Piraeus, Greece, for transit to Port Everglades, FL, but was re-routed to Woods Hole due to a delay in the planned scientific activities off Florida. A short cruise was then conducted to collect live benthic foraminifera.

At the beginning of October, R/V *Oceanus* departed Woods Hole for the delayed cruise to deploy two buoys on a single-point, inverse-catenary mooring to measure wind stress and surface wave properties at a planned anchor position about 300 nautical miles due east of Jacksonville, FL. Upon completion of scientific activities, the vessel began its return to Woods Hole when it was determined that the mooring had broken loose. R/V *Oceanus* was diverted for reconnaissance and was able to recover one of the buoys. It then conducted a cruise in the Gulf of Maine and Bay of Fundy where scientists studied red tides (toxic *Alexandrium* blooms) and collected suspended cyst samples just off the northern flank of Georges Bank.

### R/V *Tioga*



(Photo by Tom Kleindinst, Woods Hole Oceanographic Institution)

Days at sea: 92; Investigators Served: 57

In January, one of two gear bearings on R/V *Tioga*'s port propulsion engine failed leading to an unscheduled maintenance period. The engine was reinstalled in early February with sea trials conducted the following day. *Tioga* was then involved in a variety of coastal projects in Massachusetts Bay, as well as continuing to support work at Martha's Vineyard Coastal Observatory (MVCO). Mooring and tripod deployments were completed south of Martha's Vineyard, and a new multi-corer was tested successfully.

The month of May was almost completely devoted to right whale tagging and the deployment of whale detection moorings in the shipping lanes east of Cape Cod, with *Tioga* mainly operating out of Chatham, Mass. June and July brought the expected seasonal return of red tide blooms to New England. *Tioga* conducted some "emergency" duty operating out of Portland, ME, and Portsmouth, NH. The summer months kept R/V *Tioga* busy with a full schedule of varying types of work.

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As in years past, one week in early August was dedicated to educational day trips in Buzzards Bay for the WHOI Summer Student Fellows. R/V *Tioga* also worked in Nantucket Sound and south of Martha's Vineyard with tripod recoveries, CTD surveys, and AUV *REMUS* work. Many days were spent at MVCO performing maintenance and installations.

In September, *Tioga* operated out of Scituate Harbor to support an Oregon State University project on board the R/V *Sharp* performing dye studies and the study of shoaling internal waves in Massachusetts Bay. Work was also performed at Massachusetts Maritime Academy's pier at Taylor's Point conducting ADCPs and bathymetry surveys.

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