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ODP to Install Long-term Seafloor Observatories in the Japan Trench for Earthquake Studies

16 June 1999 For the first time in the history of ocean drilling, scientists will attempt to establish long-term seafloor observatories in one of the world's most active earthquake zones. Scientific instruments will be installed in deep boreholes located about 150 km off the east coast of Japan, in a region known as the Japan Trench. The instruments will record the earthquakes and the Earth's movement for study of the dynamic process of tectonic collision. At this site, the Pacific Plate is colliding with and sliding under the Eurasian Plate, in a process referred to as subduction. Subduction zones are the locations on Earth where the largest and most destructive earthquakes occur. As plates collide, they can lock and accumulate stress that can be released quickly in the form of earthquakes (seismic deformation). Creeping motion (aseismic deformation) may also occur where the plates slowly collide. Japan's location in the "Ring of Fire" and its proximity to the Japan Trench makes the country vulnerable to frequent and damaging earthquakes. Monitoring the seismic and aseismic deformation over an extended period of time will enable scientists to understand how and when strain is released at the Japan Trench. These data will be used to help establish predictive measures to prevent loss of life and damage to cities. Dr. I. Selwyn Sacks of the Department of Terrestrial Magnetism at the Carnegie Institution of Washington, D.C., USA and Dr. Kiyoshi Suyehiro with the Japan Marine Science and Technology Center are the co-chief scientists for this expedition.

The Instruments and Boreholes

The team of scientists will install a series of different instruments which to date have been limited to continental regions or islands (with the exception of a few temporary ocean bottom seismometers). If successful, this expedition will establish long-term geophysical observatories in the bottom of two boreholes. The holes will be drilled approximately 1 km into the ocean floor

under more than 2 km of water. Each observatory will contain a strainmeter, two seismometers, a tiltmeter, and a temperature sensor. Both observatories will have replaceable data recording devices and batteries installed during the cruise. The seafloor observatories will be serviced by a robotically-controlled vehicles (ROVs) similar to those used for investigating the Titanic. The ROVs will capture the data from the observatories for analysis by an international team of scientists and will be archived with the Japanese Ocean Hemisphere Network Project. Eventually real time power supply and data retrieval will be possible when the observatories are connected to nearby fiber-optic cables. Two drill sites were carefully selected near the plate boundary, the first located in a region with frequent moderate-sized (up to magnitudes of about 7) earthquakes and the second in a region that is aseismic. Observations from these sites combined with those from numerous observatories already established in Japan will give scientists a complete picture of deformation in the region as well as tomographic images of what is happening deep in the subduction zone. **ODP**

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