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FOR IMMEDIATE RELEASE

THE SWALLOWING OF EARTH'S OCEAN FLOORS
Ocean Drilling Program scientists probed recycling of oceanic crust

Panama – Ocean Drilling Program (ODP) scientists representing nine countries have concluded a two-month expedition in the South Pacific investigating how much of the sediment on the incoming Cocos plate is scraped off and accreted to the margin of Costa Rica and how much is carried to greater depths in the Earth.

"We also wanted to find the pathways of fluids that move through this system," says Dr. Eli Silver, director of the Institute of Tectonics at the University of California--Santa Cruz and ODP co-chief scientist. "This offers us a chance of studying this process unencumbered with the rapid changes in rates of sediment input to the trench floor that characterize many other regions."

The research team and ship's crew drilled holes in five different sites near Costa Rica. Initial results indicate that a site 400 m landward from the toe of the continental slope has accreted about 10 percent of the incoming sediment, but at a second site, 1600 m landward of the toe, essentially all of the incoming sediment went smoothly under the slope.

The differences in these two sites happen over a short distance and a very short geologic time (a few thousand years). The difference in response between these sites indicates episodic accretion events as part of the initial subduction process, something that has not been previously documented over such short time intervals.

"We speculate that fragments of the lower plate are scraped off when fault scarps attempt to pass beneath the toe of the slope" says Silver. "These faults are seldom considered remarkable, but they may be responsible for 'deciding' which bits of the ocean plate remain at the surface and which descend to greater depths."

The scientists had also hoped to find out why the sea floor near Costa Rica has some of the lowest heat flow measured anywhere on Earth.

"We suspected that this widespread zone of low heat flow is being chilled by unusually high rates of sea-water flow" says Silver. "In our reference site we found evidence for such flow from geochemical indicators in the pore waters. They imply a source of seawater beneath the sediments, suggesting communication with the surface. Cold ocean bottom water percolating through those same fault zones may chill the upper part of the crust sufficiently to produce the very low temperatures measured."

The Ocean Drilling Program is funded by the U.S. National Science Foundation, Australia, Canada, Korea, the European Science Foundation Consortium, Germany, France, Japan, and the United Kingdom.

Joint Oceanographic Institutions for Deep Earth Sampling (JOIDES), an international group of scientists, provides scientific planning and program advice. Joint Oceanographic Institutions, Inc., a nonprofit consortium of 10 major U.S. oceanographic institutions, manages the program.

Texas A&M University, science operator, operates and staffs the drill ship that retrieves core samples from strategic sites in the world's oceans. Lamont-Doherty Earth Observatory of Columbia University is responsible for downhole logging.

Note: U.S. members of JOIDES are: University of California at San Diego, Columbia University; University of Hawaii, University of Miami; Oregon State University; University of Rhode Island, Texas A&M University, University of Texas at Austin; University of Washington, and Woods Hole Oceanographic Institution. The European Science Foundation Consortium consists of Belgium, Denmark, Finland, Iceland, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland and Turkey.

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The following is a brief list of ODP presentations being made at AGU:

OC32A-25: Neogene Evolution of the California Current System: Initial Results from ODP Leg 167

T31A-18: Geochemistry of Ontong Java Plateau Basalt and Gabbro Sequences, Santa Isabel, Solomon Islands; ODP Leg 130

V31B-06: Episodes of Explosive Volcanism in Central America: New Evidence From ODP Leg 165

GP21B-01: Magnetostratigraphy of Sediments from Downhole Magnetic Measurements: Examples from ODP leg 165, Caribbean Sea

OG31C-06: Results of Acoustic and Shear Wave Logging in Gas Hydrates: Preliminary data from ODP Leg 164

T32A-03: Geochemical Evolution of Basement Fluids in the Eastern Flank of the Juan de Fuca Ridge and Implications for Fluid Flow; ODP Leg 168

GP42A-09: Pleistocene Polarity Transition Records: ODP Leg 162

OC21A-08: A Rock Magnetic Study of Sediment From the Low Oxygen Environment of the Santa Barbara Basin at ODP Site 893

GP32A-05: Relative Paleointensity and Oxygen Isotope Records for the Last 300 kyr at ODP Site 983

OC21B-02: Onset of Northern Hemisphere Glaciation at 2.65 Ma; Result of Volcanic Forcing? Evidence from ODP Leg 145

GP21A-11: Rock-Magnetic Evidence for Pyrrhotite From Oceanic Crust at DSDP/ODP Hole 504B

OS21B-11: Geochemistry of ODP Leg 158 Basalts From Beneath the TAG Hydrothermal Mineral

Deposit (26°N), Mid-Atlantic Ridge

OC32A-03: Dansgaard-Oeschger Events Recorded in the Surface Waters of the Santa Barbara Basin, ODP Site 893A

OC32A-27: Miocene Intermediate Water Depth Benthic Foraminifer Stable Isotope Records From ODP Site 982, Rockall Plateau, North Atlantic Ocean

V71D-12: The Roots of Seafloor Massive Sulfide Deposits: Preliminary Results From ODP Leg 169 Drilling in Middle Valley and Escanaba Trough

V22B-03: Alterations of the Upper 1.8 Kilometers of Oceanic Crust: A Lithium Isotope Record at ODP Site 504B

OC12A-05: Oxygen Isotopic Composition and Temperature of Deep Water in the North Atlantic During the Last Glacial Maximum: Evidence from Pore Fluids from ODP Leg 162

OG32B-05: New Sea Beam 2000 Bathymetry and Sidescan Data on the Tonga Forearc and Trench: Results from Boomerang Leg 8, an ODP Site Survey

V32A-09: Structures of the Seaward Dipping Reflector Sequences at Hole 917A from Downhole and Core Measurements (ODP Leg 152, Southeast Greenland Rifted Margin)

OG31C-09: Methane Hydrate and Free Gas on the Blake Ridge From Vertical Seismic Profiling, ODP Leg 164

For more information on the Ocean Drilling Program, please visit our exhibit booth located at 211, 213 and 215.