GEOPHYSICISTS

In Memoriam

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Robert B. Abel, 81, 10 October 2007, Ocean Sciences, 1985

Luiz M. Barreto, 71, 11 April 2006, Geomagnetism and Paleomagnetism, 1989

Lester Tomlinson, 63, 2 December 2006, Geomagnetism and Paleomagnetism, 1990

Honors

Walter J. Arabasz, director of the University of Utah Seismograph Stations and research professor of geophysics at the university, has received the John Wesley Powell Award from the U.S. Geological Survey (USGS) for his outstanding scientific leadership in helping the public and elected officials understand and reduce the impact of earthquakes. The award—named for the scientist and explorer who served as the second USGS director—recognizes an individual or group, not employed by the federal government, whose contributions to the USGS's objectives and mission are noteworthy.

Joern Thiede, director of the Alfred Wegener Institute for Polar and Marine Research in Bremerhaven, Germany, and past president of the Scientific Committee on Antarctic Research, was presented with the Georg von Neumayer Medal "for outstanding and deserving achievements in the field of polar research" by Margit Conrad, state minister for environment in Bad Durkheim, Germany.

Robert Woodward has been appointed USArray Director for the Incorporated Research Institutions for Seismology (IRIS), with responsibility for overall coordination of USArray activities as part of EarthScope. Previously, Woodward was with Science Applications International Corporation (SAIC), where he managed geophysical research and development projects.

MEETINGS

Central American Subduction System

Workshop to Integrate Subduction Factory and Seismogenic Zone Studies in Central America,
Heredia, Costa Rica, 18–22 June 2007

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The driving force for great earthquakes and the cycling of water and climate-influencing volatiles (carbon dioxide, sulfur, halogens) across the convergent margin of Central America have been a focus of international efforts for over 8 years, as part of the MARGINS program of the U.S. National Science Foundation, the Collaborative Research Center (SFB 574) of the German Science Foundation, and the Central American science community. Over 120 scientists and students from 10 countries met in Costa Rica to synthesize this intense effort spanning from land to marine geological and geophysical studies.

A major topic of discussion at the meeting was the location of the seismogenic zone. The smectite to illite transformation is no longer a viable explanation for the onset of seismicity. Instead, laboratory measurements and theory point to fluid pressure and content as critical variables, and detailed seismic studies and mapping and sampling of fluid vent structures have led to a new hydrologic model for the erosional fore arc. Additionally, a change from high to low heat flow in the crust entering the Costa Rica trench coincides with a deepening in the onset of seismicity, suggesting that the shallow limit of earthquake generation is temperature-related.

One exciting discovery discussed at the meeting has been the recording of pressure pulses in near-trench boreholes that are synchronous with slow earthquakes recorded as strain transients on land. However, the onset of microseismicity off the Nicoya peninsula does not coincide with the start of locking at the plate interface as revealed by Global Positioning System (GPS) measurements, suggesting different processes at play. Seismicity is also related to incoming bathymetry, with earthquakes closely following the subduction of seamounts and faults. Understanding the mechanical coupling between these features in the seismogenic zone is the target of plans under way to drill off Costa Rica as part of the Integrated Ocean Drilling Program (IODP).

The meeting also led to a confluence of observations from many disciplines bearing on enhanced cycling of volatiles at the Nicaragua margin. The volcanoes of Nicaragua erupt magmas with unusually low fraction of oxygen-18 ($\delta^{18}O$) and high ratios of barium to lanthanum, pointing to an unusual flux from the subducting plate. Marine seismic surveys show reduced velocities in the area of bend faulting in the subducting plate outboard of Nicaragua, consistent with up to 10–17% serpentinization of the uppermost 3–4 kilometers of the mantle. The serpentinized plate may thus provide a major source of water for generating arc volcanism. Seismic tomography reveals a low S-velocity region vertically beneath the Nicaraguan volcanoes, consistent with rising water-rich melts. The water contents of Nicaragua magmas are among the highest in the world. New geochronological studies of lavas and tephras throughout Central America have improved estimates for the volume flux of erupted material. These flux data, combined with volatile data from melt inclusions and fumarolic measurements, demonstrate that water may be balanced across the margin to within 80% but that carbon dioxide is not, with as little as 10–30% of the input accounted for in volcanic fluxes. Such volatile flux estimates have important implications for both long- and short-term climate.

Conference participants agreed that because so many regions are at great risk, continued monitoring is critical to improving our understanding of subduction hazards in Central America. For further details, see http://www.nsf-margins.org/CostaRica2007/index.html.

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