resentative Peter Webb, will be held at the Byrd Polar Research Center at The Ohio State University, March 6–7, 1994, to gauge the U.S. community's breadth of interest and to discuss the submission of proposals for the June 1, 1994, U.S. Antarctic Program deadline. Persons interested in attending this workshop or in receiving further information on the Cape Roberts Project should contact Peter Webb.

A project prospectus, *Antarctic Stratigraphic Drilling, Cape Roberts Project, Workshop Report*, can be obtained from the representatives named below. We welcome 1-page research statements-of-interest regarding drill core or site investigations. Please direct them to the appropriate ISC member and forward a copy to Peter Barrett. The science plan is under review and will be updated as research statements-of-interest are received.

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# Study of Recent Tsunamis Sheds Light on Earthquakes

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In the space of one year, three major destructive tsunamis, or seismic sea waves, devastated coastal regions of Nicaragua (September 2, 1992), Flores Island, Indonesia (December 12, 1992), and Hokkaido, Japan (July 12, 1993). The maximum run-up heights of each of these tsunamis were more than 10 m, and a total of about 1500 people were killed. Field surveys were made for these tsunamis and reported in *Eos* [*Satake et al.*, 1993; *Yeh et al.*, 1993; *Hokkaido Tsunami Survey Team*, 1993]. The survey teams, typically consisting of scientists and engineers from various fields, documented the behavior of the tsunamis in detail. Tsunami survey data are used for various types of research, ranging from coastal behavior of tsunamis to past and future earthquakes.

Most tsunamis are caused by shallow submarine earthquakes. Indeed, all three tsunamis mentioned above were caused by magnitude 7–8 earthquakes. Fault motion causes ocean bottom deformation, which generates tsunamis; this tsunami generation and propagation can be simulated on computers. The synthetic tsunamis from seismologically estimated fault parameters usually reproduce the observed tsunami waveforms [*Satake*, 1992].

The Nicaraguan earthquake, however, caused much larger tsunamis than are to be expected from seismological analysis. Several similar earthquakes have occurred in the world and have been called "tsunami" earthquakes [*Kanamori and Kikuchi*, 1993], but why these tsunamis are unusually large is not known. Seismic wave analysis of the Nicaragua event shows that the fault motion continued for an unusually long time. Furthermore, comparison of the tsunami field data with computations from various fault models shows that the Nicaragua fault motion occurred in the top 10 km of oceanic crust, which means the earthquake was much shallower than typical subduction-zone earthquakes. We now believe that unusually large tsunamis are due to slow fault motion within subducted sediments.

Tsunami waveforms are particularly useful in the study of old earthquakes for which little good-quality seismic data exists; such data have been available only since the 1960s, whereas tsunami waveforms have been recorded since the mid-19th century. It is important to study old earthquakes because the typical recurrence time of a large subduction-zone earthquake is 100 years. Tsunami analysis of the 1957 Aleutian earthquake—which was believed to be the third largest of the century—showed that it was actually much smaller. The earthquake has been downgraded to seventh in the rankings.

Geologists use even older tsunami data. Recently, a tsunami deposit was found that provided evidence for an earthquake occurring in the Seattle area about 1000 years ago [*Atwater and Moore*, 1992]. The recurrence of large earthquakes in the Pacific northwest, along the Cascadia Subduction Zone, has been estimated from tsunami deposits as well as from other paleoseismological data. Abnormal sediments in Texas and Mexico have been interpreted to be tsunami deposits, apparently from a gigantic meteorite impact near Yucatan at the Cretaceous/Tertiary boundary [*Bourgeois et al.*, 1988], when a mass extinction took place. Study of deposits from recent tsunami events will provide an important calibration to quantify such geological studies.

Coastal behavior of tsunamis needs to be examined in more detail. For example, the field survey of the Hokkaido tsunami revealed that the maximum run-up height was 30 m in a small valley on Okushiri Island, but 20 m or less a short distance away; the run-up height varies significantly with local topography. Three-dimensional run-up procecsses are currently being modeled by theoretical, numerical, and experimental methods [*Liu et al.*, 1991]; the field data will be used to test these models.

To prepare for the hazards of future tsunamis, such as the one expected to occur in the Pacific northwest, we need to integrate studies of paleoseismology, tsunami generation, and coastal processes.—*Kenji Satake, Department of Geological Sciences, University of Michigan, Ann Arbor*

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# Canopy Research Network Seeks Input

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In July 1993, the Canopy Research Network was established with a 2-year planning grant from the National Science Foundation to bring together forest canopy researchers, quantitative scientists, and computer specialists to establish methods for collecting, storing, analyzing, interpreting, and displaying three-dimensional data that relate to tree crowns and forest canopies.

The CRN is now soliciting input from scientists in other fields who may have developed techniques and software to help obtain answers to questions that concern the complex three-dimensional structure of tree crowns and forest canopies. Over the next 3 years, the CRN plans to compile an array of research questions and issues requiring information on canopy structure, examine useful information models and software tools