

THE OFFICIAL MAGAZINE OF THE OCEANOGRAPHY SOCIETY

Oceanography

CITATION

Tobin, H.J., and D.M. Saffer. 2019. Future opportunities in scientific ocean drilling: Natural hazards. *Oceanography* 32(1):135, <https://doi.org/10.5670/oceanog.2019.134>.

DOI

<https://doi.org/10.5670/oceanog.2019.134>

PERMISSIONS

Oceanography (ISSN 1042-8275) is published by The Oceanography Society, 1 Research Court, Suite 450, Rockville, MD 20850 USA. ©2019 The Oceanography Society, Inc. Permission is granted for individuals to read, download, copy, distribute, print, search, and link to the full texts of *Oceanography* articles. Figures, tables, and short quotes from the magazine may be republished in scientific books and journals, on websites, and in PhD dissertations at no charge, but the materials must be cited appropriately (e.g., authors, *Oceanography*, volume number, issue number, page number[s], figure number[s], and DOI for the article).

Republication, systemic reproduction, or collective redistribution of any material in *Oceanography* is permitted only with the approval of The Oceanography Society. Please contact Jennifer Ramarui at info@tos.org.

Permission is granted to authors to post their final pdfs, provided by *Oceanography*, on their personal or institutional websites, to deposit those files in their institutional archives, and to share the pdfs on open-access research sharing sites such as ResearchGate and Academia.edu.

SPOTLIGHT 10.

Future Opportunities in Scientific Ocean Drilling: Natural Hazards

The source regions of undersea natural hazards, including earthquakes and slope failures, are prominent targets for scientific ocean drilling. The marriage of coring and integrated borehole instrumentation has changed our view of these phenomena, revealing variations in subsurface conditions that precede and follow them.

Since 2004, a series of devastating tsunamis, earthquakes, and submarine landslides resulted in the loss of hundreds of thousands of lives and caused hundreds of billions of dollars worth of damage. Meanwhile, revolutions in instrumentation and remote sensing are enabling us to detect and monitor such events in novel ways and in ever-greater detail. For example, successful borehole observatory installations along the Costa Rica, Hikurangi, and Nankai subduction margins are identifying transient slow fault slip events that were previously undetectable. These successes demonstrate the value of expanded monitoring efforts at subduction and transform fault systems globally (e.g., Cascadia, Alaska, Peru-Chile) to learn more about the diversity of fault environments and behaviors.

Future work will illuminate the earthquake cycle by integrating ever-higher resolution seafloor maps and subsurface images with geological and mechanical research on samples recovered by scientific ocean drilling from fault zones, in situ logging measurements of rock properties and stress recorded in downhole logs, and long-term borehole observations. In addition to movement on active fault systems, submarine slope stability, hazards from gas venting and gas hydrate deposits, and the resulting mass transport and turbidite flows are all significant sources of tsunami hazard. The time is ripe for pursuing ambitious new drilling targets, including collecting cores and in situ measurements to study both the history of and conditions for slope failure on both sedimented continental margins and the flanks of volcanic islands and seamounts.

— Harold J. Tobin and Demian M. Saffer

Siem Offshore personnel assemble a logging tool string on the rig floor of *JOIDES Resolution* during IODP Expedition 362, Sumatra Seismogenic Zone. Photo credit: Tim Fulton, IODP JR50

