Scientific Ocean Drilling Behind the Assessment of Geo-hazards From Submarine Slides

Barcelona, Spain, 25–27 October 2006

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Submarine slope instability represents a geo-hazard for its destructive potential on nearshore structures and life and offshore seabed structures. Submarine slides may bear a tsunamigenic potential and are capable of methane gas release into the seawater and atmosphere. A recent workshop sponsored by the European Science Foundation (ESF; http://www.esf.org), “Scientific Ocean Drilling Behind the Assessment of Geo-hazards From Submarine Slides,” held in Barcelona, Spain, 25–27 October 2006, reviewed the current state of knowledge on submarine slope failures and how scientific drilling can improve our knowledge of the process and help to mitigate the derived risks (a report with full details of participants and program can be found at http://www.geohazards.no/IGCP511/). The workshop gathered 50 scientists and representatives of private companies, mainly from the European area, representing a wide spectrum of disciplines such as geophysics, stratigraphy, sedimentology, paleoceanography, marine geotechnology, geotechnical engineering, and tsunami modeling.

During the workshop, it was agreed that scientific drilling offers the possibility of answering a number of scientific questions, among them, (1) What is the frequency of submarine slides? (2) What was the tsunamiogenic potential of past submarine slides, and what is the tsunamigenic potential of unfailed submarine slopes? (3) Do precursory phenomena of slope failure exist? (4) Can we monitor seafloor gravitational movements such as creep? (5) What makes up weak layers in midlatitude continental margins? And (6) when and under what circumstances do weak layers form? Scientific drilling also offers the possibility of testing at least two existing hypotheses on basic mechanisms of submarine slide generation and of massive releases of gas: (1) focusing of fluids and lateral transfer of stresses under variable overburden on permeable layers and (2) proving the link between methane emissions during rapid climatic changes and submarine slides.

Workshop participants agreed that both megaslides and smaller-size slides should be addressed by drilling where slope instability is recognized as a recurrent phenomenon in the stratigraphic succession. Not only sediments which encompass several hazardous industrial contaminants including the chlorinated solvent trichloroethylene (TCE). Noting that many geophysical techniques proposed for DNAPL detection in subsurface environments lack the spatial resolution or sensitivity to detect small contaminant pools, Ajo-Franklin et al. used an ultrasonic technique called geophysical research letters, 42 (2005). Eos, Vol. 88, No. 17, 24 April 2007