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Joint press release of the Kiel Cluster of Excellence "The Future Ocean" and GEOMAR Helmholtz Centre for Ocean Research Kiel:

Seabed in Motion - Coastal Areas at Risk?

24 September 2013/Kiel. What is the probability that severe tsunamis are caused by submarine landslides? Which coastal regions are threatened worldwide? Questions such as these were discussed by 130 researchers from 30 countries this Monday through Wednesday during an international conference at GEOMAR Helmholtz Centre for Ocean Research Kiel.

Strong earthquakes such as the Tohoku earthquake off Japan in March 2011 are among the largest natural disasters in recent years. The consequences of the quake which triggered a more than 30 meter high tsunami will remain visible for a long time. But even less powerful quakes in the sea or underwater may trigger so called submarine landslides, which in turn can lead to flooding of coastal areas or destruction of infrastructure such as offshore platforms, submarine cables, or pipelines

From 23 - 25 September 2013, more than 130 scientists and industry representatives from around the world were discussing the current results of this research, as part of the 6th International Symposium on Submarine Mass Movements and Their Consequences. This, the world's most important meeting of this kind, was organized by the Cluster of Excellence "The Future Ocean" and the GEOMAR Helmholtz Centre for Ocean Research Kiel and was being held in Germany for the first time ever.

Submarine landslides are among the most important phenomena in the ocean. Like landslides in the mountains which alter the appearance of valleys, submarine landslides change the morphology of the continental margins, the transition from the shallow coastal zone to the deep ocean. Submarine landslides should not be underestimated as a natural hazard and can - depending on their size - trigger tsunamis several meters high - with devastating consequences for densely populated coastal areas and coastal industrial plants.

The causes of landslides in the ocean are diverse and subject to controversial debates in the scientific community. Submarine landslides mostly occur along the so-called "weak layers", sedimentary layers with reduced strength compared to the surrounding seabed. Just as an avalanche slab may detach from mountains, entire submarine slope sections may slide down the continental margins. Participants of the symposium discussed when and why the slopes destabilize. Earthquakes play an important role in this context. "While earthquakes are the most common trigger for submarine landslides, weak layers probably determine the type and shape of the landslides. The exact composition of such weak layers, however, is still unclear and it may well be that such layers are only weak during additional earthquake loading" summarizes Professor Sebastian Krastel-Gudegast from the Institute of Geosciences at Kiel University and organizer of the conference.

An important component in the study of landslides is the deciphering of past earthquakes because the records of measurements go back only about 100 years, too short a time to be able to indicate the frequency with which large earthquakes can recur in many areas. "Predicting whether and when an earthquake causes a submarine slope to fail is still somewhat of a lucky guess", says Pro-

fessor Michael Strasser from the Geological Institute at ETH Zurich. " Based on the available fragmentary database, we are essentially at a stage comparable to the Farmer's Almanac of past centuries." In recent years, Strasser has led the first campaign specifically assigned to drill submarine landslides triggered by earthquakes. With new measurement methods and technically advanced drilling systems, the researcher and his colleagues have explored the continental slope off Japan where continental plates collide and earthquakes are occurring repeatedly. "We hope to gain important insights into the recurrence rates of earthquake-triggered landslides soon," says Strasser. The geologist takes sediment samples from drill ships to investigate the age and structure of submarine landslide deposits in detail. For example, they want investigate how and why a slope started to slide down and whether it might have been the cause of a historical disaster or tsunami.

But not only the risks originating from unstable slopes were discussed in Kiel: Slopes are of great scientific interest in other respect as well, e.g., due to the occurrence of natural resources, such as oil, gas and precious metallic ores. In addition, researchers decipher climatic trends of the past from the sediment layers, and investigate the nutrient cycles in the ocean.

Background information

The 6th Symposium on Submarine Landslides and their Consequences is supported by the International Geoscience Programme (IGCP) 585 "Earth's continental margins. Assessing the Geohazard from Submarine Landslides (E-Marshall). E-Marshall is a joint initiative of UNESCO and the International Union of Geological Sciences. The symposium is held every two years and brings researchers together from all areas of the geosciences.

E-MARSCHAL - www.igcp585.org

Concurrent with the conference, a book is published that summarizes the current state of research: Sebastian Krastel, et al.: "Submarine Mass Movements and Their Consequences - 6th International Symposium", Springer Publishing House, ISBN 978-3-319-00971-1

Links

www.geomar.de GEOMAR Helmholtz Centre for Ocean Research Kiel

www.futureocean.org Cluster of Excellence "The Future Ocean"

Images:

Under www.geomar.de/n1512 images are available for download.

Contact:

Professor Sebastian Krastel, Institute Geosciences, Kiel University, Phone: +49-431-880-3914, skrastel@geophysik.uni-kiel.de

Professor Michael Strasser, Geological Institute, ETH Zürich, Phone: +41-44 632 61 50, strasser@erdw.ethz.ch

Friederike Balzereit, Public relations, Cluster of Excellence "The Future Ocean", Phone: +49-431-880-3032 / 0160-97262502, fbalzereit@uv.uni-kiel.de

Dr. Andreas Villwock, GEOMAR Helmholtz Centre for Ocean Research Kiel, Communication & Media, Phone: +49-431 600-2802, avillwock@geomar.de