Press Release

GEOMAR
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Why the seafloor starts moving
Kiel marine scientists find possible cause of landslides off Northwest Africa

13 February 2018 / Kiel. **When the seabed loses its stability and starts to move, it often happens in much larger dimensions than landslides ashore - and at slopes with very low gradients. At the same time, discplacement of large amounts of sediment under water scan cause devastating tsunamis. However, why and when submarine landslides develop is hardly understood. Marine scientists from GEOMAR Helmholtz Centre for Ocean Research Kiel have now published possible causes based on observations on submarine landslides off the coast of northwest Africa in the international journal *Geology*.**

8150 years ago, a 10-20 meter high tsunami overran northern Europe. The Shetland Islands and the coast of Norway were hit particularly hard. The cause ofthe tsunami was the Storegga landslide, 300-2000 meters below sea level. Submarine landslides are often much larger than landslides onshore. The Storegga landslide affected an area larger than Scotland and the material today covers hundreds of kilometers on the seabed. Searching for the causes of such landslides is much more difficult underwater than on land due to their inaccessibility.

A group of scientists from Kiel and Bremen have now discovered a potential cause of landslides off the coast of Mauritania and published the results in the international research journal *Geology*. They combined results from drilling with seismic data and were able to show that a certain stratification of the seafloor was responsible for at least one slide in this region.

"Submarine landslides happen on very shallow slopes, often with gradients as low as 1or 1.5 degrees," says lead author Dr. Morelia Urlaub from the GEOMAR Helmholtz Center for Ocean Research Kiel. The slope in the Storegga slide area, for example, had 1.6 degrees. The landslide studied off the Mauritanian Cap Blanc had a maximum slope of 2.8 degrees. When a layer gives way, all overlying layers move down the slope. It is difficult to determine the composition of this particular layer because it is destroyed with the landslide.

In the case of the landslide off Mauritania, the researchers were lucky. In the immediate vicinity of the failed area of the Cap Blanc landslide parts of the slope are still intact. Thus, Dr. Urlaub was happy to note that the Ocean Drilling Program (today: International Ocean Discovery Program) had sampled the sediment exactly in this area. "We were able to use these old 1980s cores to look for the weak point in the slope," she says. The combination of this drilling and seismic data showed that the slope was slipping just where a clay layer overlies ooze made up of the remains of fossil planktonic organisms.

This plankton mud mainly consists of diatoms. These phytoplankton organisms form shells out of silica. In some phases of the Earth's history, large amounts of diatoms form, the shells of which, after dying, sink to the bottom of the sea and form thick layers.

Since diatomaceous oozes appear to be a common feature off the Northwest African coast as observed in seismic data, the authors assume that this phenomenon is also the reason for other mega-slides in the region. Thus, the assumptions for the Cap Blanc slide could be transferred to other areas of the region.

The outcome of this study may therefore help to identify areas, which are prone to landslides

Reference:
Urlaub, M., J. Geersen, S. Krastel, T. Schwenk (2018): Diatom ooze: Crucial for the generation of submarine megaslides? *Geology*, https://doi.org/10.1130/G39892.1
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