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New Geological Research Suggests Undersea Cracks Along East Coast Continental Shelf Pose Danger Of Landslides And Tsunamis

ScienceDaily (May 10, 2000) — AUSTIN, Texas — Geological research by scientists from The University of Texas at Austin's Institute for Geophysics, the Woods Hole Oceanographic Institution and Columbia University's Lamont-Doherty Earth Observatory suggests that landslides on the outer continental shelf and slope along the Mid-Atlantic coast could have the potential to trigger tsunamis that might have devastating effects on populated coastal areas. Tsunamis are sometimes inaccurately referred to as tidal waves.

The research has been published in the May 2000 issue of the journal Geology. Lead researcher Dr. Neal Driscoll of the Woods Hole Oceanographic Institution, Dr. Jeffrey Weissel of Columbia University's Lamont-Doherty Earth Observatory and Dr. John Goff, a research scientist at UT Austin's Institute for Geophysics, said newly discovered cracks along the edge of the eastern continental shelf could be an early warning sign that the seafloor is unstable in these areas.

These cracks -- together with evidence of past landslides in the same area -- indicate the sea floor could slump, or slide downhill like an avalanche, triggering huge waves. They said wave heights similar to the storm surge from a category 3 or 4 hurricane, up to several meters above normal, could occur along the Virginia-North Carolina coastline and lower Chesapeake Bay, the areas of highest risk.

The researchers said that a large submarine landslide would be a rare event on human time scales. But if such a landslide were to occur on a continental margin near a populated coastal area, the results could be catastrophic due to the increase in development since World War II.

Driscoll, an associate scientist in the Woods Hole Institution's Geology and Geophysics Department, and his colleagues found the cracks using NOAA bathymetric data along the U.S. East Coast. The researchers say it is unclear whether these cracks are fossil features or whether they are still active -- and therefore potentially able to produce a large submarine landslide.

"Coastal areas face increasing threats from a number of natural hazards as their population grows," Driscoll said. "The public is aware of the damage to coastal areas caused by severe storms like hurricanes, thanks to better storm tracking and media coverage of these events.

"Tsunamis -- resulting from offshore earthquakes, landslides and volcanic activity -- are just as destructive but are not as common. As a result, public awareness of tsunamis is limited, as is our ability to forecast when and where they will strike."

UT Austin's Goff said: "We know that major slides can happen on the U.S. Atlantic continental slope -- but we don't know if the conditions are right for this particular area. While geometry of the cracks is certainly suggestive of slide potential, we do not know if the underlying geology is unstable.

"The nearby Albermarle-Currituck slide implies that our study area may be prone to a major slide. But that slide probably occurred when sea level was perhaps 100 meters (300 feet) lower than it is today and when the seashore was very close to the continental slope." Goff said the question is: "Can such a slide be triggered during the present times of high sea level?"

The researchers say more and better bathymetric surveys are needed to find evidence for past landslides and to identify areas of sea floor susceptible to future slope failure.

The Office of Naval Research funded their study, with some additional support from NASA. The researchers plan to survey the Mid-Atlantic site in great detail in May using an ONR-funded sonar system called SubScan developed by Edgetech, Florida Atlantic University, and Woods Hole Oceanographic Institution.

The high-resolution towed system surveys the surface layers as well as the layers beneath the surface, producing detailed three-dimensional images of the seafloor. The two-week cruise leaves Woods Hole May 6. It will determine if the cracks are normal faults offsetting the seafloor or relic features that have a surface expression. The researchers said that knowledge about submarine landslides would lead to a better understanding of how large-scale slope failure, canyon cutting and sedimentation interact to create the continental margins

Driscoll noted that the tsunami that struck northern Papua New Guinea in July 1998 with almost no warning killed about 2,000 people. A 1929 tsunami from a landslide associated with a magnitude 7.2 earthquake on the Grand Banks left 51 dead along the south coast of Newfoundland. Tsunami wave heights recorded from that earthquake and landslide reached an estimated 40 feet in some areas along the coast.

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