Sumatra faces yet another risk -- major volcanic eruptions

May 16 2012

The early April earthquake of magnitude 8.6 that shook Sumatra was a grim reminder of the devastating earthquakes and tsunami that killed tens of thousands of people in 2004 and 2005.

Now a new study, funded by the National Science Foundation, shows that the residents of that region are at risk from yet another potentially deadly natural phenomenon – major volcanic eruptions.

Researchers from Oregon State University working with colleagues in Indonesia have documented six major volcanic eruptions in Sumatra over the past 35,000 years – most equaling or surpassing in explosive intensity the eruption of Washington's Mount St. Helens in 1980.

Results of the research have just been published in the *Journal of Volcanology and Geothermal Research*.

"Sumatra has a number of active and potentially explosive volcanoes and many show evidence of recent activity," said Morgan Salisbury, lead author on the study, who recently completed his doctoral studies in OSU's College of Earth, Ocean, and Atmospheric Sciences. "Most of the eruptions are small, so little attention has been paid to the potential for a catastrophic eruption.

"But our study found some of the first evidence that the region has a much more explosive history than perhaps has been appreciated," he added.

Until this study, little was known about Sumatra's volcanic history – in part because few western scientists have been allowed access to the region. The most visible evidence of recent volcanic activity among the estimated 33-35 potentially active volcanoes are their steep-sided cones and lack of vegetation, indicating at least some minor eruptive processes.

But in 2007, an expedition led by OSU's Chris Goldfinger was permitted into the region and the Oregon State researchers and their Indonesian colleagues set out to explore the earthquake history of the region by studying sediment cores from the Indian Ocean. Funded by the National Science Foundation, it was the first research ship from the United States allowed into Indonesia/Sumatran waters in nearly 30 years.

While searching the deep-sea sediment cores for "turbidites" – coarse gravel deposits that can act as a signature for earthquakes – they noticed unmistakable evidence of volcanic ash and began conducting a parallel investigation into the region's volcanic history.

"The ash was located only in certain cores, so the activity was localized," said Adam Kent, a professor of geosciences at OSU and an author on the study. "Yet the eruptions still were capable of spreading the ash for 300 kilometers or more, which gave us an indication of how powerful the explosive activity might have been."

Salisbury and his colleagues found evidence of six major eruptions and estimated them to be at least from 3.0 to 5.0 on the Volcanic Explosivity Index. Mount St. Helens, by comparison, was 5.0.

The Indian Ocean region is certainly known to have a violent volcanic history. The 1883 eruption of Krakatoa between Sumatra and Java is perhaps the most violent volcanic explosion in recorded history, measuring 6.0 on the VEI and generating what many scientists believe to have been one of the loudest noises ever heard on Earth.

Sumatra's own Toba volcano exploded about 74,000 years ago, generating a major lake – not unlike Oregon's own Crater Lake, but much larger. "It looks like a giant doughnut in the middle of Sumatra," said Jason "Jay" Patton, another OSU doctoral student and author on the study.

Sumatra's volcanoes occasionally belch some ash and smoke, and provide comparatively minor eruptions, but residents there may not be fully aware of the potential catastrophic nature of some of its resident volcanoes, Goldfinger said.

"Prior to 2004, the risk from a major earthquake were not widely appreciated except, perhaps, in some of the more rural areas," Goldfinger said. "And earthquakes happen more frequently than major volcanic eruptions. If it hasn't happened in recent memory…"

Kent said the next step in the research is to work with scientists from the region to collect ash and volcanic rock from the island's volcanoes, and then match their chemical signature to the ash they discovered in the sediment cores.

"Each volcano has a subtly different fingerprint," Kent said, "so if we can get the terrestrial data, we should be able to link the six major eruptions to individual volcanoes to determine the ones that provide the greatest risk factors."

Provided by Oregon State University

Citation: Sumatra faces yet another risk -- major volcanic eruptions (2012, May 16) retrieved 25 April 2024 from https://phys.org/news/2012-05-sumatra-major-volcanic-eruptions.html