Caribbean at risk of tsunami

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Detailed view of the c. 1 million tonne block, being undercut by wave erosion, on the northern margin of Morne aux Diables volcano. Tension cracks on the inland side of the block are clearly visible.

Up to 30,000 residents and tourists could be under threat from a newly discovered tsunami risk in the Caribbean, according to experts in disaster risk management.

The heavily populated coast of Guadeloupe will have little warning if a tsunami is triggered by the collapse of a volcano on the nearby island of Dominica.

A team of geologists, led by Dr Richard Teeuw from the University of Portsmouth, have discovered that a flank of the volcano Morne aux Diables ("Devils' Peak") shows signs of collapse and if so, a million-ton chunk of rock could crash into the sea, producing tsunami waves up to

almost 3 metres (10 feet) high.

Such a rock fall could also weaken three million tones of rock upslope, potentially resulting in much larger landslides and waves of up to five metres.

Dr Teeuw said: “It’s not a case of if this landslide and tsunami will happen, but when. The trigger will probably be a major earthquake, occurring after the heavy rain and coastal erosion of the hurricane season . It could happen in a hundred years or it could happen next week.

“Guadeloupe is a densely populated island with popular tourist beaches, many of which are wide with low angle gradients, which leads to ‘tsunami run-up’ and increased wave heights. In places, there is no protection from coral reef which otherwise might absorb some of the tsunami wave energy.

“There would be damage to property and if people were on the beach then there could be loss of life. This part of the world is well-prepared for hurricane hazards, but is relatively unprepared for the rapid impact of a tsunami.”

The vulnerable area of rock was left exposed several thousand years ago when the flank of the volcano collapsed into the sea. Dr Teeuw will study the seabed for evidence of an ancient tsunami next year. Since the original collapse, coastal erosion has undercut cliffs along the over-steepened margin of the volcano, leaving the remaining flank of the volcano unstable.

Dr Teeuw and colleagues made their discovery after carrying out geomorphological surveys backed up by 3-D images from Google Earth which show clearly visible tension cracks. The results convinced them that they were looking at a serious landslide and tsunami hazard.

The Guadeloupe archipelago is about 50 kilometres north of Dominica and tsunami waves would hit its shores within minutes of the volcano's collapse, giving little chance to warn people on the coast.

The island of Dominica has the highest concentrations of potentially active volcanoes in the world. The area is regularly exposed to hurricanes and occasional severe seismic activity.

Dr Teeuw and his team of students and geoscientists will return to Dominica this summer, part-funded by the Royal Geographical Society, for further geomorphological surveys, to better understand the probable size of the various landslide zones on the flanks of Morne aux Diable.

A further survey is planned for 2010, when the seafloor along the margin of the volcano will be examined, allowing better estimates of the likely tsunami hazard. Examining the age of the sediment on the seabed will also help to determine when past coastal landslides occurred.

Dr Teeuw said: "The earthquake associated with the ancient flank-collapse of Morne aux Diables volcano was probably much larger than any experienced around Dominica in historical times. If so, that has serious implications, raising the possibility of rare, but catastrophic, tsunami waves in the Caribbean region."

Dr Teeuw wants to raise awareness about potential tsunami hazards to emergency planners, disaster managers and the people of Guadeloupe and Dominica to help reduce their vulnerability and the risk of disaster.

He made the discovery while supervising student research projects around Morne aux Diables volcano and his work, published in the newsletter of the American Geophysical Union (Eos, 90 (10), 81-82).

Source: University of Portsmouth