The Vulnerability of the Island of Martinique to the Risk of a Tsunami

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1 Over the course of the past three centuries, Martinique has been hit by over a dozen tsunamis (on November 1, 1755, November 30, 1823, November 30, 1824, July 26, 1837, November 18, 1867, 1876, May 5, 1901, December, 1901, March and April, 1902, May 6, 1902, August 30, 1902 and July 24, 1939); however, not all events were recorded since the collective memory has dulled over the years. In reality, the island's vulnerability is the result of an intense densification of its coastal areas and it being in the vicinity of the potential sources of tsunami generators.

2 Due to its spiked orography (presence of two mountain ranges in the north - Mount Pelee and the Carbet Peaks – and the strongly undulated nature of the island's south), anthropogenic activity has developed primarily along the coastal fringe; the island is hence quite vulnerable, for its economic and productive potential is an offering to the tsunami and in general to the storm surge. To this overall depiction should be added the presence of an active underwater volcano off the coast of Grenada and a volcanic mountain range (Cumbre Vieja) in the Canary Islands of which one of the slopes (western flank of La Palma island) is threatening to collapse.

3 Although journalists focus more on the caving in of the Cumbre Vieja, hence echoing the works of H.M. Fritz, whereby the collapse of 500 km3 of volcanic rock would generate the formation of a mega-wave of an amplitude of 650 m (likely to submerge all the islands of the Lesser Antilles and a portion of the North American coastline), in reality, such an apocalyptic vision is indeed erroneous. In fact, the H.M. Fritz modelization was executed in a closed basin whereas the Atlantic is an open system facilitating wave dispersion and hence reducing amplitude. Fritz' works were reconducted by Ch. Mader – world specialist in tsunami modelization – who finds quite varying results: waves of an amplitude of 3 to 4 m may affect the Antilles archipelago and the south-eastern American coastline.

4 Even the results of this new modelization are not at all certain, since the works of R. Paris (CNRS, Clermont-Ferrand) indicate that it is not 500 km3 rock that would slide off, but 20

to 50 km3. Furthermore, such a collapse should not occur before several tens or hundreds of years. Another remarkable element is that the Cumbre Vieja is located 8,000 km from the Caribbean region, hence, there would pursue a near ten-hour period before the initial wave would have any affect on the coastal fringe; under such conditions it would be possible to evacuate thousands of inhabitants.

5 However, the underground volcano Kick'em Jenny – whose crater is situated at a depth of 130 m – and found north of the island of Grenada (at 9 km distance approximately), south of the island of Cariacou and approximately 5 km off Round Island, is located but 230 km from Martinique. In the case of a major eruption of this volcano, a tsunami with a substantial amplitude may reach not only the closest islands (The Grenadines, Saint Vincent, Saint Lucia, Martinique), but also territories somewhat further along such as Barbados, Margarita, Trinidad & Tobago, the Venezuelan coast, the Guadeloupean archipelago and even Porto Rico.

6 In view of the speed of movement of a tsunami (from 650 to 850 km/h), should the Kick'em Jenny erupt, the Caribbean coastal populations would dispose of but forty minutes to evacuate the area and in the worst possible case, twenty minutes. That is to say that under such conditions, it would be virtually impossible to evacuate any of the inhabitants; even before the alert is activated, the disaster would be taking place.

7 In fact, the greatest threat comes from the Kick'em Jenny and not from the Cumbre Vieja. Attention should therefore be focused on prevention: surveillance of precursor signals of an eventual eruption, and once the facts are well established, the inhabitants should be promptly evacuated; drills should be organized on a regular basis. Indeed, Kick'em Jenny's danger level essentially depends on the determination of the authorities of the countries in the region to take the required planning measures before the advent of the event.

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INDEX

Geographical index: Martinique