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Landslide–generated tsunamis at Réunion Island and their possible sedimentary record in Mauritius Island

Karim Kelfoun (1,2,3), Thomas Giachetti (1,2,3), Philippe Labazuy (1,2,3), Raphaël Paris (4,5)

(1) Laboratoire Magmas et Volcan, UBP - CNRS - IRD, Laboratoire Magmas et Volcans, Clermont-Ferrand, France (k.kelfoun@opgc.univ-bpclermont.fr, 0473346744), (2) CNRS, UMR 6524, LMV, F-63038 Clermont-Ferrand, (3) IRD, R 163, LMV, F-63038 Clermont-Ferrand, (4) Clermont Université, Université Blaise Pascal, GEOLAB, BP 10448, F-63000 Clermont-Ferrand, France, (5) CNRS, UMR 6042, GEOLAB, F-63057 Clermont-Ferrand, France

Landslides that occur on oceanic volcanoes can reach the sea and trigger catastrophic tsunamis. Réunion Island has been the location of numerous huge landslides involving tens to hundreds of km^3 of material. We use a new two−fluid (sea water and landslide) numerical model to estimate the wave amplitudes and the propagation of tsunamis associated with landslide events on Réunion Island. A 10 km^3 landslide from the eastern flank of Piton de la Fournaise volcano would lift the water surface by about 150 m where it entered the sea. The wave thus generated would reach Saint−Denis, the capital of Réunion Island (population of about 150 000 people), in only 12 minutes, with an amplitude of more than 10 m, and would reach Mauritius Island in 18 minutes. Although Mauritius is located about 175 km from the impact, waves reaching its coast would be greater than those for Réunion Island. This is due to the initial shape of the wave, and its propagation normal to the coast at Mauritius but generally coast−parallel at Réunion Island. A submarine landslide of the coastal platform of 2 km^3, would trigger a $\sim$40 m−high wave that would severely affect the proximal coast in the western part of Réunion Island. For a landslide of the coastal platform of only 0.5 km^3, waves of about 2 m in amplitude would affect the proximal coast. Coral megablocks up to 100 m^3 were described by Montaggioni (1978) along the coasts of Mauritius Island, and attributed to cyclones or tsunamis. We surveyed the southern coast of Mauririus and found a marine conglomerate intercalated in lateritic formations at 11 m a.s.l. The conglomerate appears at a depth of 50 to 85 cm and is 20 to 50 cm thick. It is composed of corals (branching forms and brain corals), marine gastropods, fragments of shells, and sands. A C-14 age of 4425 $\pm$ 35 BP was obtained on a coral branch. Considering similarities with tsunami conglomerates associated to volcano flank collapse in the Canary, Cape Verde and Hawaian islands, this conglomerate could represent the first evidence of a tsunami generated by the last flank failure of Piton de la Fournaise volcano in Reunion Island.