Geophysical Research Abstracts
Vol. 14, EGU2012-8835, 2012
EGU General Assembly 2012

Erosion under extreme climatic events in tropical climates : the case of the storm Helena (1963) in the Guadeloupe island (Lesser Antilles Arc)

P. Allemand (1), E. Lajeunesse (2), O. Devauchelle (2), and C. Delacourt (3)

(1) Univ Lyon 1 & ENS-Lyon &CNRS, LGL - TPE, villeurbanne, France (allemand@univ-lyon1.fr), (2) IPGP Paris & CNRS, Paris, France, (3) Université de Bretagne Occidentale & IUEM & CNRS, Laboratoire DO, Brest, France

he volume of sediment exported from a tropical watershed is dramatically increased during extreme climatic events, such as storms and tropical cyclones (Dadson et al. 2004; Hilton et al. 2008). Indeed, the exceptionally high rainfall rates reached during these events generate runoff and trigger landslides which accumulate a significant amount of sediments in flooded rivers (Gabet et al., 2004; Lin et al., 2008). We estimate the volume of sediments mobilized by the storm Helena (26 to 28 October 1963) on Basse-Terre Island in the archipelago of Guadeloupe. This is achieved using images acquired by IGN (Institut Géographique National) a few weeks after the storm which produced numerous landslides. All the available images from this campaign have been pseudo-orthorectified and included in a GIS with a Digital Elevation Model with a resolution of 10 m. Two hundred fifty three landslides have been identified and mapped. Most of them are located in the center of the island, where the highest slopes are. The cumulated surface of the landslides is 0.5 km2. Field observations on Basse-Terre show that landslides mobilized the whole regolith layer, which is about 1m thick. Assuming an average landslide thickness of 1m, we find that the total volume of sediment mobilized by the storm Helena is 0.5 km3. The associated denudation averaged over all watersheds affected by landslides is 1.4 mm with a maximum of 5 mm for the watersheds of Vieux-Habitants and Capesterre. The impact of the storm Helena is then discussed with respect to 1) the erosion induced on the Capesterre catchment by the highest flood available in a two years survey record (less than 0.1 mm/y); 2) the long term denudation rate of the major watersheds of Basse-Terre estimated by reconstructing the initial volcanic topography (between 0.1 and 0.4 mm/y).