



Erosive effects of the storms HELENA (1963) and HUGO (1989) on Basse-Terre island (Guadeloupe - Lesser Antilles Arc).

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Basse-Terre is a volcanic island which belongs to the archipelago of Guadeloupe located in the Lesser Antilles Arc (Caribbean Sea). As a mountainous region in the tropical belt, Basse-Terre is affected by intense sediment transport due to extreme meteorological events. During the last fifty years, eight major tropical storms and hurricanes with intense rainfalls induced landslides and scars in the weathered layers. The purpose of this study is to compare two major meteorological events within a period of 26 years (HELENA in 10/1963 and HUGO in 09/1989) in order to qualify the parameters responsible of the spatial distribution of landslides and scars. The storm HELENA affected Basse-Terre between the 23rd and the 25th of October, 1963. The maximal daily rainfall reached 300 mm in Baillif which is located on the leeward coast at the altitude of 650 m while the maximum wind velocity reached 50 km/h. A similar exceptional event happened when the hurricane HUGO slammed the island in September 17, 1989. The maximum daily rainfall recorded in Sainte-Rose (on the northern coast) was 250 mm while it reached 208 mm in Petit-Bourg and the maximum wind speed was 60 km/h. Aerial images were acquired by the IGN (French Geographical Institute) before and a few weeks after the extreme events: less than three months after the event HELENA and less than a month after the event HUGO. Those images have been orthorectified at a metric resolution and combined in a GIS with a 10 m resolution DEM. Scars and landslides were digitalized and their surface area and mean slope were measured for both HELENA and HUGO. This work confirms several results proposed by a previous study related to the HELENA event: (1) the landslides occurred mainly in the center of the island and (2) the slope is the main parameter for the initiation of landslides, since all of them occurred with a slope superior to 30°. Furthermore, the resiliency of the surface affected by the landslides induced by HELENA was studied from 1963 to 1989 through historical aerial images acquired by the IGN in 1963, 1969, 1984 and 1989. Landslide areas were covered with new vegetation within 6 years after a hurricane, due to the opportune weather conditions of heavy rainfalls and high temperature. The comparison between the landslides mapped after two similar events also shows that the zones affected by landslides are set apart. One can conclude that there are no weak zones which are likely to collapse during every meteorological event. These results are particularly relevant for landslide risk management.