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# Analysis of a creeping marls event in the coastal cliffs of Bessin, Basse-Normandie, France

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The cliffs' retreat is a major issue for the management of coastal territories. Two coastal areas in "Calvados" and "Pays de Caux", French Normandy, are studied. The Bessin cliff is about 4.3 km long and lies between the World War II artillery batteries of Longues-sur-Mer and Arromanches-les-Bains. On the coastline, the cliff's height varies between 10 and 75 meters above sea level. The site's lithology is mainly composed by two formations: the Bessin limestones lie on top of the Port marls, which act as an aquitard. More or less important water outflows are therefore observed at the contact between the marls and the limestone.

For this communication, we aim to focus on a complex landslide that happened in May 2013 near Cape Manvieux, estimating volumes and modelling the landslide kinematics. For that purpose, some field observations and measurement have been made in order to make a realistic profile and to understand the steps which lead to this 27 m high and 110 m wide event. In addition, a terrestrial LiDAR (Optech Ilris3D) acquisition of the instability was performed in July 2013 and is compared with the Litto3D (the continued DEM over land and see) acquired in 2011 by the IGN. This comparison shows a maximum cliffs' retreat of about 27 m and 30'000 m3 and a deposit accumulation of about 8 m height. In addition, a limestone rock column of 2'000 m3 and 18 m height within the toppled deposits could still collapse in a short time.

Up to now, these site-specific investigations, set in the context of instabilities within the entire study area, let us suppose that the current state of the instability was created by multiple successive events. The landslide could hence be caused by a complex mix of creeping marls conditioned by its water content and pressure induced by overlying formations and toppling of limestone destabilised by the formation of back subvertical crack due to limestone exhumation debuttressing.