



Geomorphological response of coastal boulder ridges to storminess in Brittany (France)

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High-energy Coastal Boulder Deposits (CBD) such as Supratidal Boulder Ridges (SBR) are coastal forms of accumulation for which morphodynamic features are still poorly understood. On the European coast of the North-Eastern Atlantic, SBR morphosedimentary dynamics are driven by storm-related extreme events (defined by the concomitance of uncommonly large storm wave event, storm surge and spring tide), locally accentuated by a nearshore plunging bathymetry. Recently, several studies reported large CBD reworking from Northern Galicia (Spain) to Aran Islands (Ireland). They were induced by the extreme event of 2008 and the storm series of winter 2013–2014 that hit the coasts of NW Europe. Hence, a hydro-geomorphological survey have been started in 2014 on several SBR in Brittany in order to assess their morphosedimentary dynamics.

To measure the geomorphological changes, a yearly repeated kite-aerial photography survey had been carried out on the SBR of Vierge Island and Pors Carn Point, respectively North and South of western Brittany, in France. Both SBR are emplaced on steeped supratidal platforms at elevations of ~ 8 m. above mean sea level and distances of 20 to 40 m. from the platforms' edge. A structure-from-motion algorithm was used to reconstruct digital surface models and orthorectified images from aerial photographs at high resolution. At the same time, in-situ wave parameters and water levels had been computed from pressure sensors data.

The subsequent hydro-geomorphological diachronic analysis provided new results regarding the SBR morphosedimentary dynamics in Brittany. During extreme events, the studied SBR were broadly reworked (e.g. 08/02/2016), whereas during single storms several boulders disconnected from the SBR were quarried and transported with a higher frequency than hypothesized. Geomorphic and hydrodynamic results were also used to calibrate a chronology of morphogenetic storms for SBR based on 70 years of modelled wave data. For Brittany, no significant trend was evidenced and actual SBR morphosedimentary dynamics are likely the same as occurred during the last 70 years. It would be interesting to compare this study with similar processes in Northern areas such as Ireland, Scotland or Iceland. In these areas a growing significant wave height since mid-20th was evidenced and a likely higher frequency of extreme events is expected.