



The influence of rocky outcrops in the morphodynamics of an embayed beach: example of Suscinio Bay, Morbihan, France

Guillaume Brunier and Mouncef Sedrati

LGO UMR CNRS 6538 - University South Brittany, Vannes – France. (guillaume_brunier@hotmail.fr)

Rock outcrops impact beach and nearshore dynamics of coastal embayments, inducing boundary effects that constrain the cross-shore and alongshore beach morphodynamics. The northwestern coast of France is characterized mainly by seacliffs and headland embayed and pocket beaches with a “low-tide-terrace” active morphology. They also possess several rocky platforms and outcrops between the inner foreshore and shoreface zones which play an important morphological role by generating wave refraction and diffraction and gyre currents. Sediment transport and hydrodynamic circulation are, however, perturbed and complex on these areas. This study analyses the impact of a large rocky outcrops on the morphodynamics of Suscinio embayed beach (Morbihan-South Brittany, France) by comparing beach profiles evolution and hydrodynamic conditions between beach sectors fronted and non-fronted by a large rocky outcrops.

Field work focused on a 5 day period from 13 to 18 November 2016. Eight beach profiles were surveyed along the study area, The sheltered profiles were central (4 profiles) and directly fronted to seaward by submerged large granitic rocky outcrops. The exposed profiles were situated in the both extremities of the study area (2 profiles at each extremity). Two currentmeters and six wave gauges were deployed between the central sheltered and extremely (each limit) non-sheltered profiles. The mean wind speed and directions averaged every three hours highlight closely-spaced high-energy events during the experiment, with long phases of significant lateral wind stress (W to NNW). The measured waves and currents showed two different stages. During low to moderate energy conditions, the non-sheltered zones highlights tidal modulated currents (bidirectional current) when the sheltered zone presents a multi-directional current which correspond to a locally gyre generated current. The significant wave heights were similar in both sheltered and non-sheltered zone. During the high-energy event, a rapid and strong response to both the changes in wind speed and direction were observed. In both sheltered and non-sheltered zones, an unidirectional wind driven current (SE directed current) was measured. Significant wave height values were higher in the sheltered area than the non-sheltered area. The topographic survey of the profiles during low energy conditions shows a global stability of the study area with no significant morphological changes. However, during high-energy conditions, significant changes were observed along the beach, the non-sheltered zones shows erosion in the upper intertidal zone and a weak accretion in the lower intertidal zone (cross-shore sediment mobility) when the sheltered area highlights a significant accretion (on the four sheltered profiles). The net beach volume over the experiment was negative thus showing that sediment may be preserved in the sheltered zone but not in the non-sheltered zone under high-energy conditions. The findings of the present study may suggest that sheltered zones can be preserved against erosion processes during high-energy but the atypical generated currents generated in the some zone during low to moderate conditions may enhance erosion processes.