



Analyze of waves dynamic over an intertidal mudflat of a sandy-gravelly estuarine beach – Field survey and preliminary modeling approach

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As well as marine submersion or erosive phenomena, clay-silted sediment in-filling on estuarial and bay beaches are a main issue in these human-attractive areas. Coupled sandy/gravelly and clay/silty intertidal areas can be observed in these particular coastal areas, depending of rivers characteristic (discharge of particle, water flow), ocean dynamics (wave exposure, current) and sediments sources. All around the world, sandy/gravelly beaches are exposed to punctual or continuous input clay sediments. Vilaine estuary, Bay of Arcachon and Bay of Seine in France, Plymouth Bay in UK and also Wadden Sea in Deutschland are few examples of muddy/sandy coupled or mixed system. The beach of Bétahon (Ambon town, Brittany – France) is located on the external Vilaine estuary and is an example of this issue. This meso-macrotidal intermediate (low tide terrace) beach presents heterogeneous sediments. The upper intertidal zone is composed by sand and gravel and characterized by a steep slope. A very gentle slope characterized the lower part of the beach and is constituted by silt and clay. Clay/sand limit is characterized by a decimetric erosion cliff of mudflat along the beach. In order to understand bed variations and sediment transport of this complex heterogeneous beach, a well understanding of wave dynamic across the beach is necessary. This study focus on wave dynamics over the beach, using field observations and MIKE 21 3D wave numerical model. This paper is a preliminary approach of an upcoming global understanding of this estuarial beach behavior. Swell from deep-sea to near-shore area is modeled over a 100 km² area and real wind, deep sea wave characteristic, river water flow and tidal level are defined as open boundary conditions for the regional model. This last one is based on multiple bathymetric surveys over the last 50 years. Local model, triangular mesh gridded to 5 meters, covering Bétahon beach, is based on topographic and photographic survey of the mudflat since 2005 (an amplitude above 1.4 meters has been observed over a start reference state). Modeling significant wave height, wave direction and period are compared to a cross-shore wave dynamics survey over the beach, during one week. Surf zone positions over the beach, wave characteristics at local and regional scales, impacts of mudflat altitude on waves are analyzed and discussed.