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Effects of a groyne field on inner bar dynamics: Anglet, France

Inaki de Santiago (1), Denis Morichon (1), and Philippe Arnould (2)

(1) SIAME EA4581, Université de Pau et des Pays de l'Adour, Anglet, France (inaki.desantiagogonzalez@univ-pau.fr; denis.morichon@univ-pau.fr), (2) LIUPPA EA 3000, Université de Pau et des Pays de l'Adour, Anglet, France (philippe.arnould@univ-pau.fr)

Groynes are usually designed to limit beach erosion by mitigating longshore sediment transport. However, little is known about their side effects on inner-bar morphodynamics in double sandbar systems. While most of the studies are focused on natural systems where the outer-bar morphology drives inner-bar dynamics (offshore to nearshore process), this work focuses on the role of groynes on the inner bar dynamics (nearshore to offshore process).

The study is based on 3-years field observations carried out at the beach of Anglet in the south-west of France. This engineered beach is 4 km long, limited by a rocky headland in the south and a 1 km long jetty at the entrance of the Adour river in the North. The study area concerns the south part of the beach and includes a series of four groynes, unevenly spaced and extending about 100 m seaward. Morphology changes observations were derived from images collected with a video system (http://sirena.univ-pau.fr/), and bi-annual topo-Bathymetric surveys. A special attention was paid to study the mechanisms controlling the observed morphology changes using the XBeach numerical model.

Data analysis reveals that the study site is dominated by a double sandbar system. Both bars can evolve from reasonably alongshore-uniform to crescentic bars. Surprisingly, the beach may show episodes where the inner bar evolves from alonghsore uniform to non-uniform despite an alongshore uniform outer bar. Numerical results corroborate that the formation of inner bar crescentic features can be formed without the presence of an outer non-uniform bar under certain wave conditions for the study site. This study shows that inner bar evolution in the presence of groynes can be controlled by topographic rip channels and not only by morphological coupling as usually observed on natural double sandbar systems.