



Morphological response of a double nearshore bar system under oblique waves

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The Sète beach (Mediterranean Sea - France) is characterized by two nearshore bars which are generally considered to run parallel to the shore. However in-situ wave/current/bathymetry measurements have shown the possible reorganization of this double bar system during storms associated with oblique waves. Two situations are studied. During the field campaign in 1999, the bar system was submitted to moderately oblique stormy waves. At the end of the campaign, the inner bar was divided in segments which were oriented parallel to the wave crests and to the current. During the field campaign in 1994, the stormy waves were strongly oblique. The response of the bar system led to the appearance of rhythmic features along both bars.

The nonlinear surf zone model MORFO55 is used to understand the mechanisms which govern the bar reorganization under energetic wave conditions. This model is based on a wave and depth averaged shallow water equations solver with wave driver, sediment transport and bed updating (Garnier et al. 2006, J. Fluid Mech.). Modeling shows that the main characteristics of the bar response can be simulated from self-organization processes. The wave incidence has a tremendous influence on the bar response. Particularly, in agreement with the observations, the outer bar is stable for moderate obliquity while it is unstable for strongly oblique waves.