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On the role of impermeable groins on barred beach morphodynamics: Example of Matalascañas beach, Spain

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Several studies on barred beaches in settings with mesotidal to macrotidal regimes have focused on cross-shore and alongshore bar mobility. Whereas the general link between hydrodynamics, sediment transport and the response of the intertidal bars and shoreline evolution has been recognized in the literature, the role of coastal defense structures (Breakwaters, groins, seawalls) on bar-trough systems morphodynamics have received more much less attention and the field-based experimental studies of these environments are rare. The main aim of this paper is to highlight the contrasting behavior of a natural and protected barred beach under several hydrodynamics conditions.

This paper presents detailed hydrodynamic and morphological data from a field experiment spanning 10 days undertaken in Matalascañas beach, a mesotidal protected vs natural barred beach in the Southern Spanish coast. This mesotidal beach experienced intense erosion in the recent past and therefore it has been partially protected by groins (protection of sea-front touristic residences). During the fieldwork, an intertidal bars in the protected and non-protected areas highlighted contrasting morphological behaviour. The non-protected barred beach shows a less pronounced bar-trough system than the protected zone. Under low energy conditions (significant wave height < 0,6m), onshore bar migration rate in the protected area was more important than the non-protected area. This migration was associated with an onshore sediment transport, resulting from the erosion of the bar's seaward slope. In the same moment, a clear longshore bar migration was observed in the non-protected zone with the absence of this process in the protected zone. During few energetic tides (Significant wave height > 1m), the protected and non-protected zones show a flattening bars processes. The findings of the present study suggest that cross-shore vs longshore bar mobility may even be mitigated by the presence of the groins, which favour onshore than longshore bar migration.