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Reply to comment by M. Ortega-Sánchez et al. on "High-angle wave instability and emergent shoreline shapes: 1. Modeling of sand waves, flying spits, and capes"

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[1] We would like to thank Ortega-Sánchez et al. for highlighting Carchuna beach (southern Spain) [*Ortega-Sánchez et al.*, 2003] as another natural example where large-scale cuspate shoreline features are coincident with a wave climate dominated by high-angle waves, providing an independent test of the hypothesis presented by *Ashton et al.* [2001] and *Ashton and Murray* [2006a, 2006b]. Ortega-Sánchez et al. discuss a series of large-scale cuspate shoreline features and also demonstrate the apparent formation of smaller-scale shoreline undulations along a relatively straight portion of the coast, suggesting that a straight coast in this subregion may also be responding to the high-angle-wave instability. In model simulations, cuspate features are not completely regular, with variations in the spatial wavelength of up to a factor of two, and some portions of the coast can temporarily attain fairly straight configurations between cuspate features (see Figure 9 and auxiliary material in the work of *Ashton and Murray* [2006a]). The self-organization mechanism can explain both variation in wavelength and the appearance of different quasi-rhythmic features at distinctly different scales—both observed at Carchuna beach.

[2] As discussed in detail by *Ashton and Murray* [2006a] and investigated by others [*Falqués and Calvete*, 2005], we agree that the assumptions underlying our numerical model become less appropriate at spatial scales much less than a kilometer (for an open-ocean coast). When the scale of shoreline features is not much greater than the storm surf zone [*Ortega-Sánchez et al.*, 2004], breaking-wave dynamics, local hydrodynamics, and deviations from shore-parallel contours, factors not captured by the exploratory model, become increasingly important in morphologic evolution. Many other factors not included in this simple model will influence the specific evolution and shape of a natural coast, including the geologic framework, preexisting coastline configurations, and the external supply of sediment. Direct comparison between the model results and a natural example should be performed with care, as the objective of the described exploratory model [*Murray*, 2003] is to investigate the range of shoreline behaviors resulting from the simple interactions considered, and not to reproduce in detail the evolution of any particular coastline.

[3] We also urge caution in the interpretation of the figures demonstrating how model behaviors change with variation in the model parameters A, the fraction of waves approaching from the right (the asymmetry), and U, the fraction of unstable, high-angle waves [*Ashton and Murray*, 2006a, Figure 9a]. A and U are model-specific parameters used to determine the wave climate in the numerical experiments [e.g., *Ashton and Murray*, 2006a, Figure 8], and should not be directly related to a natural wave climate with the expectation of a quantitatively accurate comparison. *Ashton and Murray* [2006b] present a methodology for more rigorously analyzing and characterizing a wave climate, introducing a stability parameter, Γ. Approximate values of this stability parameter can be computed using wave energy roses such as those presented in the comment by *Ortega-Sánchez et al.* [2008], and its computation should be more straightforward than approximations of the model parameter H.

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