

Interactive comment on “Large-scale coastal and fluvial models constrain the late Holocene evolution of the Ebro delta, Spain” by Jaap H. Nienhuis et al.

E. Anthony (Referee)

anthony@cerege.fr

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General comment: This is a fine effort that attempts to combine shoreline processes and fluvial water and sediment discharge to account for the evolution of the Ebro River delta based on reduced complexity models. This combination is a novel approach that needs to be encouraged but it is based on many simplified assumptions that can be called into question. The authors have been quite exhaustive in integrating into their model as many parameters and aspects as possible, but one ends up with the impression that the output has been geared to fit input parameters that are not always well determined. This can be expected given the complexity of delta morphogenesis, interactions between fluvial sediment supply and wave climate, and uncertainties re-

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garding long-term large-scale environmental changes involved in such morphogenesis. These weaknesses should not, however, detract from the utility of the combined simple modeling approach proposed by the authors in this paper.

Specific comments:

1. The evidence on the inception and growth of the Ebro delta is altogether rather scanty to be used as a justification for the stages in delta growth replicated by the combined model, especially for the earlier stages of evolution. The use of the presence of beach ridges as a criterion for affirming that the delta was already extant 6000 years ago seems, in this regard, rather dubious as these forms could simply reflect shoreline reworking by waves.
2. The sediment input and grain-size parameters also need to be reconsidered. The construction phases of the delta are based on the supply of sand-sized sediment to the shore. What justifies the choice of a grain size of 0.2 mm in the river channel, given the much larger size range and the dominance of coarser bedload in the channel?
3. The assumption that the wave climate and storminess in this part of the Mediterranean did not change significantly in the course of the evolution of the Ebro is doubtful. More cautious wording should be used regarding this aspect.
4. The changes in delta plan-shape associated with the successive lobes are based on the fluvial dominance ratio but the input data justifying this ratio are rather poorly constrained, and the authors do not seem to consider morphodynamic feedback between lobe plan shape, wave approach direction and alongshore sediment fluxes, except for the current spits.
5. How do recent post-dam changes in water and sediment discharge fit in with the evolution of the modern delta and with the evolution of the two spits flanking the present channel mouth?