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Anthropogenic Impacts on Coastal Processes at Guadiaro River Mouth (Cádiz, Spain)

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ABSTRACT

The mouth of Guadiaro river (Cadiz, south of Spain) opens to the Alboran basin of the Mediterranean Sea, between the Spanish and North African coasts, next to the Strait of Gibraltar, where the Spanish coastal orientation is NNE-SSW, so that the stretch is mainly affected by eastern ("Levantes") wind and wave action. The river sources are in Grazalema Sierra (Cádiz), western Penibetic ridge, and although the Spanish Mediterranean facade is climatically dry and supports a very irregular rainfall regime, rains in that "Sierra" are among the highest and homogeneous in Spain throughout the year, much more than in the rest of the ridge. Maybe that is why the Guadiaro estuary has remained functional until preset years while all other river mouths estuaries were filled to become deltas along the eighteenth century (Diez, 1996).

As most of Spanish rivers, the Guadiaro had suffered a major regulatory process and an upstream transfer has been recently implemented from its basin to the Atlantic through Guadalete river basin, therefore the mouth flow is becoming reduced, especially in its peaks. The closure of its mouth, favoured by the reduced flow of the river in a low tide basin sea, has been studied several times in the last decades (Muñoz et al, 2010), mainly because the spit closing it grows in the NNE direction when alongshore transport occurs mainly, and almost permanently, in the opposite direction.

This paper is mainly based on most of those documents, whose researches have used numerical models such as SMC and MIKE 21, obtaining relevant results on the refraction but not diffraction. Two successive main structural actions that can have modified coastal processes were introduced in the environment of the mouth: a couple of jetties (1973), one of which was soon removed (1975), and the marina and harbour of Sotogrande (whose breakwater was built in 1986 and extended 1n 1994)). The influence of these elements is not well reflected in the numerical models.

In this paper the comparative evolution of the mouth from the Little Ice Age is analyzed and it also studies the most detailed recent changes and the works carried out on the beach embedded in the north of the jetty, now sheltered by the breakwater of the port of Sotogrande. This beach has suffered significant erosion and changes since the construction of this marina and harbour. The study of this beach can also induce new elements to understand the dynamical processes in the mouth and its littoral surroundings. The results of this study show the process of beach erosion and its relation to changes in the mouth, and are fundamental for the shore protection design along the whole coastal stretch.

References

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