

## **Last century seabed morphodynamics of the Magra River estuary (Western Mediterranean Sea)**

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The estimation of morphological and volumetric changes of the delta system at the mouth of the Magra River is presented in this paper using bathymetric and sedimentological data. The data series were collected during several hydro-oceanographic surveys carried out from 1882 to 2014, processed following the hydrographic international standards and stored in the Italian Navy Hydrographic Institute database. In particular, bathymetric data characterized by the same standard and accuracy were collected using different devices such as sounding lines, single-beam and multi-beam acoustic system. This research compares Digital Terrain Models (DTMs), derived from highly accurate bathymetric data and covering different time scales (secular, half-century and decade) in order to assess and quantify the seabed morphodynamics in relation with the river sedimentary budget. The methodology and data exploitation consist mainly in the production of DTMs to study the elevation change, two-dimensional and three dimensional maps, cross-sections of the seabed, difference surfaces and computation of net volumes as well as an historical sedimentological map. These products are also an useful contribution to the aim of EU RISC-KIT Project. The results of the analysis highlight changes in the geometry of the Magra River mouth, of the coastal profile and bottom features primarily due to variations of the sedimentary budget and secondarily to wave dynamics. This behaviour is characterized by evident river mouth and coastal retreat, beach erosion and sediment bars decay and net accretion under periods of high river sediment discharge and elongate bar formation during relatively fair conditions. In the last century the main change is constituted by the disappearance of the typical constructive seabed delta morphology and the transformation into the current small estuary, with microtidal condition. This small estuary has an upper sector where river processes, sediments and bedforms dominate, a lower sector near the mouth, where wave and tidal processes and marine sediments dominate, and a middle sector, where tidal currents dominate and both river and marine sediments are present.