

Title: APLICATION OF A MORPHODINAMIC PROCESS BASED MODEL IN LONG-TERM CLIMATE CHANGE STUDIES

Authors: Selma Gabriel, Flávio Martins

Address: Hidrotec – EST, Universidade do Algarve, Estrada da Penha 8005-139 Faro, Portugal

Email: semhga@yahoo.com.br

Mobile: +351 969342008 **Telephone:** +351 289800900 ext.6520

Bloque: B08 – Variabilidad climática y efectos abióticos

Abstract

Climate changes are foreseen to produce a large impact in the morphology of estuaries and coastal systems. The morphology changes will subsequently drive changes in the biologic compartments of the systems and ultimately in their ecosystems. Sea level rise is one of the main factors controlling these changes. Morphologic changes can be better understood with the use of long term morphodynamic mathematical models.

The work presented reports a first step towards the achievement of a long-term process based morphodynamic evolution model. Traditionally conceptual behaviour-oriented models were used to perform long-term simulations. Recently, new approaches have been developed, using numerical algorithms to solve the physical equations coupled with empirical and semi-empirical equations. These approaches create a possibility to work with a wide range of time and space scales. This approach was used in the work presented. The Mohid modelling system was adapted for this purpose. Mohid is a process based model that simulates explicitly the hydrodynamic, the sand transport and the bottom's morphology. In this case, a schematic bathymetry of an estuary with 50 km in length and 1 km in width was constructed. The tide was imposed at the bathymetry's open boundary and no freshwater input was considered. The simulation was performed for a period of 900 years and then compared with previous works on morphodynamic's modelling. To reduce the computational effort a morphodynamic extrapolation scheme is proposed and tested against standard runs. Results show that the method is able to reduce computational load to one third with losses of accuracy lower than 10 %.

Two scenarios were studied; one only simulates the tide (M2) and the other simulates both tide (M2) and mean water level increasing along time. Comparing the two scenarios it is possible to understand the effect of the water level increase on the morphological evolution of an estuary's bottom.

Caso considerado	Instante considerado (anos)	Volume de água (x106m3)	Volume Total Erodido (x106m3)	Erro relativo prof. relativa (%)	Erro relativo volume total erodido (%)	Erro quadrático médio (m)
Run 100 Interp 200	300	312.08	90.17	8.34	7.49	0.88
	600	326.21	104.30	28.06	2.06	0.85
	900	340.29	118.38	19.87	1.83	0.85
	1200	346.44	124.53	22.18	1.94	0.80
	1500	352.47	130.56	7.63	3.07	0.67
	1800	355.62	133.71	4.35	2.62	0.60
	2100	358.05	136.14	2.93	2.06	0.56

