

Introduction to the Special Issue “Coastal Morphodynamics: Processes and Modelling”

The morphological behaviour of sandy coasts has fascinated people for a long time, not least because these dynamic systems were intended to keep the sea from taking lives, homes, and livelihoods. Numerous floods have shown that this risk is far from imaginary.

The wish to improve the safety situation and to foresee the impacts of the ever growing human interference with the system has created a need for reliable predictions of coastal behaviour. The attention for the environmental and socio-economical functions of the coast has increased this need.

Coastal behaviour is the result of a complex interaction of a number of constituent physical processes (wave motion, currents, sediment transport) and the topographical changes which they produce. In recent years, the improved understanding of this dynamic system, along with the increased capabilities of computers and software, has led to a variety of mathematical and numerical models. They are claimed to give quantitative descriptions of a range of coastal morphological phenomena. On the other hand, there remain important knowledge gaps, which concern not only the constituent processes and their dynamic interactions with the topography, but also the utilization of the models in real-life situations.

This Special Issue attempts to give an overview of recent advances in this field, with special attention for progress made in the research project “G6 Coastal Morphodynamics”, which was carried out from 1990 till 1992 under the EC-sponsored research programme “Marine Science and Technology”. All authors have been engaged in this project, and they address topics which have been investigated there. Yet the Issue is meant to be more than a scientific report on this project: it is supposed to give a state-of-the-art review on the topics which form the principal knowledge gaps in coastal morphodynamics and its predictive modelling.

Three of the eight papers in this Issue address the principal constituent processes, viz. waves, currents and non-cohesive sediment transport. The topics they discuss were selected for their relevance to the understanding and the modelling of coastal morphodynamics.

Two other papers concern cohesive sediments. Although cohesives are probably not all that important to exposed sandy beaches, they certainly are for more sheltered areas, such as estuaries and bays. The environmental as-

pects involved (pollutants, nutrients) enhance this importance. As the behaviour of cohesive sediments is far more complicated than that of sand, one of the papers focuses on a list of parameters to characterize cohesive sediments.

Two papers concern the integration of process knowledge into morphodynamic models, in one (cross-shore) or two horizontal dimensions. The conceptual validation of these models is an important issue.

The last paper gives a review of long-term modelling approaches for coastal morphology. These are meant for predictions at time scales much larger than the inherent time scales of the water and sediment motion.

As a guest editor of this Special Issue, I would like to thank all authors of the papers, and all those who have contributed to the underlying discussions, for their efforts. Besides, I would like to acknowledge the timely, adequate and constructive comments from the reviewers, which have led to a number of important improvements of the papers.

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