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Coastal Processes

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Preface

Coastal regions present a complex dynamic web of natural and human related processes. Although coastal zones are narrow areas extending a few kilometres on either side of the shoreline, and occupying small strip of ocean and land, they play a very important role as they account for nearly a quarter of all oceanic biological production, which in turn supplies approximately 80% of the world's fish. About 60% of the human population lives in the coastal zone, and around 70% of big cities are placed in this narrow area. Concomitantly, more than 90% of the pollutants generated by human economic activities end up in the coastal zone.

The unstoppable demand on the coast for recreational and tourism activities has increased the need for shore and beach protection, as well as the construction of artificial beaches, ports and harbours. Most of the coastlines are subjected to the direct impact of wind waves, swell and storm wave activity. As a result, wind waves and wave driven currents are the dominant mechanisms controlling littoral sand transport and determining the nearshore morphology. In addition, many other physical phenomena, such as tides and associated currents, long waves and storm surges, among others, can play a significant role in the dynamic behaviour of the coastal zone.

Due to its great socio-economic importance, the physical aspects of coastal processes have been of concern for decades, but recent advances in a number of areas, including satellite remote sensing, are giving rise to significant progress in this field. In particular, the use of satellite and imaging systems has significantly enhanced the monitoring and understanding of coastal processes. Accordingly, it has become clear that the ocean side of the coastal zone represents a very sensitive and particularly vulnerable sector of the ocean to any kind of man-made action or natural extreme events. Consequently, the problem of environmental protection and conservation takes special relevance in this zone, and any decision concerning its viability must be preceded by a forecast of its consequences. Their adequate prediction is only possible on the basis of a clear understanding and careful analysis of the fundamental dynamic processes occurring in such areas.

A greater knowledge of sediment transport mechanisms at beaches may permit to avoid some common mistakes of the past, consisting in uncontrolled development of groin fields and seawalls, dam constructions on rivers that reduce sand supply to the coast, hydrocarbon and groundwater extraction inducing local ground subsidence and associated inundation and erosion of coastal areas.

In order to reach satisfactory solutions for the demands imposed on the coastal areas and the protection of its environment, one needs to understand very different aspects and their interaction. The problems are essentially interdisciplinary and scientists need to be able to exchange ideas with colleagues from other disciplines with a variety of different experiences. Thus, an acceleration of research is needed to improve the quality of the coastal processes prediction, together with an adequate level of scepticism about the model results and a continuous comparison with well-documented case studies and field experiments.

This is the reason why, after the successful experience of the first Conference in Malta, the Wessex Institute of Technology, the University Parthenope of Naples and the University of Las Palmas, Gran Canaria decided to convene a second International Conference in Coastal Processes. This book comprises the edited papers of that meeting grouped into the following topics:

- Coastal Management
- Coastal Processes and GIS
- Coastal Geomorphology
- Extreme Events and Sea Level Rise
- Coastal Processes and Navigation
- Sediment Transport and Erosion
- Interaction between Coastal Defences and Processes
- Pollution and dispersion
- Hydrodynamics

The Editors are grateful to all the authors for their excellent contributions as well as to the members of the International Scientific Advisory Committee for the review of both the abstracts and the papers included in this book. The quality of the material makes this volume a most valuable and up-to-date tool for professionals, scientists and managers to appreciate the state-of-the-art in this important field of knowledge.

The Editors
Naples 2011

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