

Lynch, D.R. and Davies, A.M., (eds.), 1995. **Quantitative Skill Assessment for Coastal Ocean Models**, Coastal and Estuarine Studies, Washington, D.C.: American Geophysical Union, Volume 47, 510 p. \$70.00.

This book addresses one of the fundamental difficulties associated with the numerical modeling of complex coastal ocean processes, that of demonstrating that model results are acceptably descriptive of the physical system for which they were formulated to simulate. Acceptability is stressed because model accuracy or skill is a function of the intended use of model results. For example, some applications require only a qualitative representation of the flow regime in order to demonstrate how a specific modification to a flow domain may impact surface elevations, currents, contaminant transport, or some other flow related variable. Other applications require more accurate estimates of flow variables. Examples include storm surge elevation and duration estimates required for input to storm protection design criteria. In all applications however, the modeler must establish some degree of model skill by demonstrating the ability of the numerical model to represent the physical system.

The validation of a computational model requires some measure of comparison of model results to comparable prototype data. This validation process is accomplished through application of techniques ranging from qualitative to quantitative. This range of approaches is due to not only the purpose of the computational study but also to the fact that prototype data are usually neither spatially nor temporally adequate for a rigorous validation effort. Therefore, no definitive criteria or procedure is available to demonstrate the skill of a given model. Each application is different and comparisons vary from application to application.

The goal of this book is to address the subject of skill assessment of coastal and ocean model simulations. The goal was effectively accomplished by presenting a variety of approaches used to demonstrate skill through a wide range of computational model applications. The book does not attempt to impose or define some "standard skill procedure" which should be required of all models but presents a variety of examples reflecting different approaches to skill analysis. The result is a compendium of computational model applications of coastal and ocean process models in which a variety of techniques used by the various authors are presented to demonstrate that their model/models realistically represent the physical system/systems for which they are intended to simulate.

Editors Daniel Lynch and Alan Davies present a well balanced selection of contributions by recognized international modelers representing the broad interests of government, academia, engineering, and research. The book contains 19 chapters describing detailed applications involving many topics relevant to the coastal and open ocean modeling community. Subjects include case studies involving grid resolution applications and requirements, boundary condition considerations, transport modeling, tidal and wind driven circulation, storm surge propagation, air-sea interaction, and barotropic and baroclinic flow fields. All chapters presented in this book have been prepared by modelers who have a sub-

stantial amount of experience in the modeling of their representative topics. As such, each chapter represents a state-of-the-art application of computational models to important coastal and ocean problems. A comprehensive list of references follows each chapter.

Skill testing of computational models is a difficult and time consuming problem which is essential if the results of a particular model are to be accepted by both peers and clients. The separate chapters of this book describe skill testing procedures which have been successfully used to demonstrate the ability of each model to represent the process or processes of interest. Skill assessment techniques range from time series comparisons to domain pattern analysis. Drawbacks and strengths of different procedures are discussed in detail in the various chapters. For the coastal and ocean modeler, relevant sections of this book provide excellent sources of skill approaches which can be used to demonstrate skill of their models.

The editors have succeeded in providing a cross section of modeling examples from which all coastal and ocean modeling applications can benefit. They have stressed the strengths and weaknesses of computational models as a whole but place each type of model in its proper perspective, *i.e.*, "(1) every simulation has some intrinsic value, and (2) every simulation has serious drawbacks". Therefore, useful information can be gleaned from all properly formulated models, however, the limitations of the model need to be recognized. Relevant computational model theory, implementation, and skill testing procedures defined in the chapters of this book provide the reader with a means of identifying the values and drawbacks of models in general and may be used to better present the strengths and weaknesses of their own applications.

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Viles, H. and Spencer, T., 1995. **Coastal Problems: Geomorphology, Ecology, and Society at the Coast**, London: Edward Arnold, 350p. \$31.95. ISBN 0-340-53197-5 (paper).

The dynamic environment of the coastline, which is shaped by the interplay among geomorphological, biological, and marine processes, is increasingly affected by anthropogenic activities, as growing populations occupy the coastal zone. *Coastal Problems: Geomorphology, Ecology, and Society at the Coast*, by H. Viles and T. Spencer examines changes induced by both natural forces and human exploitation of the coastal environment. The book is organized into several sections. The first two chapters provide an overview of the formative biogeophysical processes of the coastal zone: the plate tectonic setting, wave action, tides, storms and storm surges, natural climate variability (e.g. El Nino-Southern Oscillation [ENSO] events), sea level rise, and the role of coastal ecosystems. Chapters 3-7 cover different coastal environments, such as

sandy shores, rocky and cliffed coasts, coastal wetlands, coral reefs, and cold coasts that are influenced by the presence of ice. Problems unique to specific coastal environments, including several detailed case studies, are described at the end of each chapter. The last chapter (Chapter 8) discusses coastal management, with examples from Bangladesh, Bay of Bengal, and the Mediterranean Sea.

A major problem affecting over 2/3 of the world's sandy coastlines (Chapter 3) is erosion. Global sea level rise is only one of many contributing factors. Other causes include activities, such as dredging, mining, upstream damming, which curtails fluvial deposition, and disruption of longshore sediment transport by construction of piers, jetties, and breakwaters. The contribution of "hard" engineering structures to erosion is documented (in some cases, however, groins have proven successful), and the "soft" option of beach nourishment is evaluated as an alternative strategy. Likely responses of barrier islands and dunes to present and future sea-level rise are also considered.

Cliff failure (Chapter 4) is produced by the interaction of wave attack at the base and water loading changes within the cliff profile. Both of these are affected by human interventions that alter patterns of littoral drift or groundwater flow.

Coastal wetlands (Chapter 5) function both as important sinks of global carbon and as providers of nutrients that sustain the productivity of estuarine and other coastal ecosystems. Coastal wetlands occur in diverse environments, including back barriers, estuaries, river deltas, and along open coasts with abundant sediments and low wave energies. Their survival depends on a delicate balance among sea-level variations, tidal regime, wave climates, and vertical accretion rates. This balance can be upset by natural forces, such as cyclones, neotectonic movements, and also by the clearance of mangroves, salt marshes, reduced sediment inputs due to upstream damming, and water pollution.

Coral reef ecosystems (Chapter 6) have a high gross primary productivity. They show sensitivity to light, water temperatures, changes in tidal levels, and tropical cyclones. Recent episodes of widespread coral bleaching have been attributed to positive sea surface temperature anomalies, partly associated with recent ENSO events, although this temperature-bleaching linkage has been questioned. Additional threats to coral reefs come from blasting, dredging, mining, tourist-related land development, oil pollution, and military activities (e.g. the Persian Gulf War; also nuclear testing). Sharp differences of opinion surrounding the robustness or fragility of reef systems may depend on differences in the spatial and temporal scales under consideration. A viewpoint of reef fragility is perhaps more applicable to small-scale biological processes, whereas a view of reef robustness is more appropriate over longer, geological time-scales. However, the geological record may be "too smoothed" to determine the effects of individual events.

High latitude coasts (Chapter 7) are strongly affected by ice, ranging from glaciation, both recent and past, and the presence of permafrost. Because of the rigorous climate, there has been less human impact here than in other coastal en-

vironments. Yet pollution and oil spills (e.g. the Exxon Valdez oil spill, Alaska) are potential hazards.

Relationships between natural and socio-economic factors (Chapter 8) are illustrated by case studies from contrasting developed and developing regions (e.g. the Mediterranean Sea and Bangladesh). In the latter area, the major hazard is the location of large populations on the Meghna River delta, which is especially vulnerable to high storm surges. The Mediterranean Sea is affected by rapid coastal population growth and development. Several response strategies are reviewed.

This book provides a good general overview of the interplay between coastal geomorphology and ecosystems, as well as the role played by increasing levels of human development of the coastal zone. It can therefore serve as an adjunct text in courses on coastal geomorphology, physical geography, and environmental science, as well as provide a biogeophysical framework for coastal managers and planners. Since predictions of global sea-level rise have been scaled down somewhat recently, local ecological and geomorphological effects will dominate. Therefore, the case-studies are useful in illustrating a range of possible responses. Another useful feature of the book is the lengthy reference section (31p). Several minor shortcomings include lack of more recent citations on post-glacial crustal adjustments (p. 21–23; e.g. see recent papers by Peltier and Tushingham in *Science* and the *Journal of Geophysical Research*); no reference to reports on impacts of climate change in the coastal zone in reports sponsored by the Intergovernment Panel on Climate Change. Also, too much credence is given to Sahagian *et al.*, 1994 paper in *Nature* (p. 57; see alternate viewpoints expressed in subsequent *Letters to Nature*), and terms in Tables 6.1 a–c (p.210–211) have not been defined.

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The Prehistory of Sri Lanka: An Ecological Perspective, S.U. Deraniyagala, 1992. Department of Archaeological Survey (Sri Lanka), Memoir, vol. 8 (in two parts, xxvi + 1–366; 367–813). ISBN 955-9159-003.

The book is divided into 7 chapters, 1–5 in part I; 6–7 plus several appendices in part II. The author has attempted to set down the whole work on established geochronological foundations, and he has taken great pains to lay out the "textbook" underpinnings of the geoarchaeology, so that reference to other works on geography, geology and climate are essentially superfluous.

This comprehensive monograph deals with the archaeology of an island country covering more than 25,000 square miles, straddling the meridian 80°E at latitudes 5°55'N to 9°50'N, and occupying a major maritime crossroads in the Indian Ocean. It has a written history in Brahmin literature that goes back more than two millennia, its old name being *Lanka*, which the author uses for brevity. Greeks and Romans called it *Taprobane* and to Arab sailors it was *Serendip*. It is the last name that provides a link with the English language