Glaciated Coasts, edited by Duncan M. Fitzgerald and Peter S. Rosen, 1987. Academic Press, San Diego. Price $85.00, 364p. ISBN 0-12-257870-8.

This book is a collection of thirteen papers covering aspects of geomorphology, sedimentology and Post-Glacial/Holocene evolution of coastal elements of the North American Continent (one paper is concerned with Iceland), but the majority of contributions relate to the northeast USA coast between Cape Cod and Nova Scotia. This relative parochialism is a direct reflection of the origins of the book in the proceedings of a meeting of the NE Section of the GSA in 1983.

The origins and impulse for this book are laudable in that the development and dynamics of coasts that have been influenced directly by a glacial inheritance have long been neglected in the mainstream of coastal research. It has been something of an uphill struggle for coastal workers in mid- to high-latitude regions to bring to the attention of their lower-latitude colleagues the range and diversity of coastal scenery in these areas. To a large extent the impulses driving research on fine clastic beaches over the last two decades—process models for stratigraphic analogues and the needs of coastal dwellers on eroding beaches—have not had a major impact as yet on coastal research in the upper latitudes. Even now gravel, as a characteristic of mid- and upper-latitude beaches, is still regarded by many coastal investigators as geomorphological oddity: "gravel is big sand" is still a common statement. Therefore I awaited with some interest the arrival of this volume having heard on the grapevine of its gestation.

The papers in this volume have clearly been enhanced beyond the original set of papers from 1983 and this may explain the four-year gap to publication. Each paper has been peer reviewed so that a professional standard has been achieved throughout, however, it is a pertinent question to ask whether the volume achieves an overall coherency which pays more than lip service to a general theme of coastal activity within a glaciated environment.

The principal group of papers are concerned, at a range of local to regional scale perspectives, with the controls on coastal evolution as a function of a Pleistocene glacial inheritance. Such an inheritance can be expressed through the shifting attitude of basement geometry to marine incursions, though most of these papers are more actively concerned with the inheritance aspect as expressed in the reaction of heterogeneous sediment volumes and sources (moraine, drumlins and outwash) to variable wave- or tidal-dominated environments superimposed on postglacial sea-level changes. At the regional scale, two papers by Kelley, and Belknap, Kelley and Ship identify the power of these inheritance and energy dimensions to structure coastal morphosedimentary development along the Maine coast. In the same vein, a paper by Ship, Staples and Ward indicates how littoral development, (at the specific estuary scale), is graded up-estuary by sediment type and supply found at the high energy estuary mouth. The paper by Fitzgerald, Baldwin, Ibrahim and Sands takes a similar inheritance framework to study the development of Massachusetts coastal embayments (ponds) and coastal bayhead barriers. Emphasis on the way in which this development sequence is related to tidal pass dynamics is not unexpected given Fitzgerald's wealth of experience in this field. This is a useful paper as it identifies examples where mixed sand and gravel barriers are capable of being tidally breached as well as where seepage rates in coarser barriers mitigates against tidal breaching. The lack of cross-barrier tidal transport vectors is a salient difference between coarse and fine clastic beaches.

I would have also included in this group of papers the work of Boyd, Bowen and Hall, and Forbes and Taylor. The former identify the elements of a salient model, based on glaciated estuaries of the Eastern Shores, Nova Scotia, which recognises the structural stage and episodic sequence of morphosedimentary development at estuary mouths as shoreface and longshore sources of material are exhausted. As sea-level rises, barrier and beach disintegration is achieved by cannibalisation with mobilised sediment passing up-estuary to reconfigure as a prograding coarsening upward sequence of sublittoral muds, intertidal sands and marsh whorms for new beach systems. Given this process is operating on a contemporary basis, it is important that such heuristic models are more closely studied as the implications for littoral sedimentation posed by the reality of future

rapid sea-level change are virtually unstudied for coarse clastic dominated littoral systems.

The paper by Forbes and Taylor looks at Nova Scotia and Newfoundland beaches and tries to reconstruct from detailed sections the development of a bewildering variety of transgressive and regressive beach systems that can be found under rapidly rising sea-levels (4-5 mm/yr), in what Forbes and Taylor term paraglacial conditions. They identify distinctive littoral sedimentation patterns associated with each paraglacial sediment source type and recognise the dominant control of highly variable sediment supply rate in threshold control of sedimentation on irregular rock dominated shorelines.

Continuing the theme of re-organisation of glacigenic deposits in coastal environments, albeit at the very local scale, are the two papers by Rosen and Leach and Brenninkmeyer and Nwankwo. The former investigates spit sequences associated with drumlin erosion in Boston harbour. The latter paper investigates the origin of coarse clasts found on a small barrier on the Massachusetts coast. Brenninkmayer and Nwankwo advocate that storm generated wave generated bottom currents were sufficient to move clasts from the offshore onto the beach. This is an important, but often neglected, observation given the recent interest in the mechanics of discrete coarse clastic barrier formation. Although these two papers have an appeal they do not sit easily with the rest of the papers given their local scale and closer attention to specific process.

Further expressions of the alteration of glacial deposits theme are given in the papers by the late J.J. Fisher and by Leatherman who both discuss aspects of Cape Cod's development. Fisher develops his earlier model of barrier island formation as a function of headland erosion and spit formation by longshore drift. The eventual reduction of sediment supply to an increasing spit length allows intermittent erosion, sediment cell segmentation and final cross spit breaching to form a barrier island chain from the old spit. This model has been used by Fisher to explain the mid-Atlantic barriers and he takes the view that Cape Cod's longshore morphology is topologically similar to the elements of the mid-Atlantic barriers, and stresses longshore drift as the principal agent of barrier formation. Leatherman uses vibracore stratigraphy and ^{14}C dating to test whether the sand ridge extensions of Provincetown Spit (Northern Cape Cod) show a logical seaward time sequence as argued by Davis (1896) or a more complex sequence of spit development discerned by Zeigler *et al.* (1965) with the latters' explanation accepted as the more likely interpretation.

The remaining papers are those of: Ward, Moslow and Finkelstein who give a regional account of the development of beach systems along part of the south Alaskan coast (Kenai Peninsula) where tectonic control is a major element of rocky shoreline development (let us hope that the after effects of the Exxon oil spill can be discounted as another long term effect); McCann and Kostaschuk who give an account of seismic interpretations of fjord sedimentation, by which stages of glacier retreat from the Pleistocene to present day can be identified in a Northern British Columbian fjord sedimentary sequence; and finally Nummedal, Hine and Boothroyd who examine the historical and contemporary development of the coastline along south central Iceland sandurs where episodic volcanic-induced glacial meltwater outbursts contribute major sediment loads (92%) to coastal systems.

The book's presentation is excellent with a liberal supply of well drawn figures and well printed photoghraphs. Each chapter has its own reference list and there is a seven page index which appears to cover all the sites and name places mentioned, as well as the main geomorphic entities covered in the proceedings. Proofing is very good in that I only found one typographic error and only one figure error (Fig. 12.2). On that basis the editors and contributors are to be warmly congratulated on achieving a high professional standard.

The remaining questions are: who will read this book and who will buy it? The usual strictures about book price seen in most reviews could be repeated here, it is expensive and will only be bought by Libraries and coastal afficionadoes. Clearly there is a strong coastal element who should read it in order to gain a flavour of what *some* mid- to upper-latitude beaches are like. However, although there is a theme in the majority of papers, it has to be teased out. If the book had been reduced by several papers (which could have genuinely appeared in journals without any difficulty), then I believe a tighter and more cohesive vol-

ume would have been obtained, but it would not have been about Glaciated Coasts as such. The use of the term "paraglacial coasts" by Forbes and Taylor probably comes closer to approximating to the common theme of this volume than does the actual title. Not so much glaciated coasts, with the emphasis on glacial processes structuring coastal evolution, but rather the modification of an inheritance from past glacial processes on a coastline in existing non-glacial conditions. This proviso apart, the volume should be a welcome addition to most coastal geomorphology book shelves.

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Annotated Bibliography of Italian Quaternary Shorelines (1970-1984), edited by F.P. Bonadonna, 1987. *Atti della Società Toscana de Scienze Naturali,* Pisa, mem. ser. A, suppl. v. 93 (1986), 458p.

An invaluable source of information about Quaternary shoreline morphology, stratigraphy, paleontology, neotectonics chronology, this volume is primarily oriented on Italy; but also treats with the Mediterranean as a whole. It is comprehensively indexed. References and citations (1724 in all) are complete and provided with 3-6 lines of annotations (in English). Original papers are mainly Italian, but also in German, French and English.

One looks in vain, alas, for any comprehensive review. The Mediterranean contains probably the world's most well-studied traces of shoreline formations covering the last two million years. In stratigraphy, these constitute "type sections," *e.g.*, Calabrian, Sicilian, Selinuntian, Emilian, Milazzian, Tyrrhenian, *etc.*, as well as some discussed terms such as Grimaldian, Monastirian and so on. Hey (1978) gives a valuable appraisal of the discarded theory of altimetric correlation. Miskovski (1970, a Paris doctoral dissertation) provides a comprehensive study of the cave-man stratigraphy and paleoclimatic relationships.

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Mathematical Modelling of Tides and Estuarine Circulation: The Coastal Seas of Southern British Columbia and Washington State, by P.B. Crean, T.S. Murty and J.A. Stronach, 1988. Springer-Verlag, Berlin. DM 88,00. 471p. ISBN 3-540-96897-0.

Subtitled "The Coastal Seas of Southern British Columbia and Washington State", this volume is dedicated to the memory of Norman Heaps, who was a significant figure in the development of computer modelling of the hydrodynamics of coastal seas. His influence was an important factor at the beginning of the project described in the book.

The book is a description of the development of computer models of the Straits of Georgia and Juan de Fuca in British Columbia. In a way it is also a history of development of models of coastal hydrodynamics. It is a retrospective view of work done since 1960 by Pat Crean and co-workers and is presented in historical sequence of increasing complexity. Consequently it can be appreciated at several levels. Since the basic equations, and their finite difference formulations are described, it will also be of use to those starting out in computer modelling, giving them background and perspective of problems. The book is well written and to my mind gives a unique view of the progressive succession and refinement of models. Many of the conclusions are in hindsight rather obvious, and are now part of the accepted framework of modelling, though they were fundamental at the time they were made. However, it is rather unusual to have in one volume the sequence of models, together with their strengths and weaknesses illustrated by intercomparison, and by comparison with field data.

The basic thesis is that it is possible to simulate the large scale motions without detailed treatment of the small scale semi-turbulent motions, the interaction between the two scales being approximated by the use of appropriate parameters. No mention is made of the higher order closure techniques that are becoming more popular these days.

The introduction describes the general oceanographic character of the area and the observations which provide a context for the modell-