ing. The area comprises a double-ended channel system over 300 kilometres long, with a complicated topography containing many inlets, islands and fjords, with basins up to 800 metres deep, and shallow areas with extreme tidal current velocities. One ommission in this chapter concerns statement of the amplitude of the tides. A table of tidal amplitudes and phases along the channel could have been useful. The channel exhibits a stratified estuarine character throughout, especially in the summer, with major inflow from the Fraser river. Strong eddies are obvious around the complicated topography.

The first modelling approach was a one-dimensional barotropic one, modelling the surface tide and the cross-sectional mean currents. The fundamental equations omit Coriolis effects. The results of the model showed errors in phase of 20° to 30°, and errors in amplitude in the inlets which were thought due to the lack of the Coriolis effects. Difficulties were experienced in narrow areas with shallow topography and islands where the friction factor was considered to be an order of magnitude too high.

The next improvement was to go to a combined one-dimensional/two-dimensional model. This was vertically integrated, but with no tidal variation of cross-sectional area. There is a description of how to join together the one-dimensional and two-dimensional models. Inclusion of advection terms leads to an improvement in comparison with the data, but there are still problems associated with the shallow areas. The possibility that internal tides are taking energy from the surface tide leads to the justification for baroclinic models. Fine grid models of the southern part of the Strait of Georgia are described, together with local area models using the boundary conditions of coarser models, and an overall fine grid model which is particularly useful for examining the eddy fields and their relation to topography. Additionally there are models which examine the normal modes, storm surges, and tsunamis.

The first of the baroclinic models was a vertically integrated buoyant spreading upper layer model, which is specifically applied to the discharge of the Fraser River. This model assumes that the pressure gradients in the lower layer are due to the baroclinic tides. Wind effects are considered. The model velocities are substantially less than observed, and this may be the result of the assumption that stratification has no influence on the barotropic tide.

A laterally integrated model is produced, and in this case the surface tide is calculated in the presence of the density field. It is not well specified quite what happens to the vertical eddy viscosity indiffusivity in this case. A rigid lid approach is used and this produces an estuarine-like residual flow in the vertical.

Three-dimensional models are developed for seven layers, plus a thin upper layer. Horizontal and vertical diffusion are omitted, and rather high values of horizontal eddy viscosity are needed to match the surface tides. There is a discussion of the significance of numerical dispersion. Residual circulation is determined and compared with the vertically integrated model.

The various models suggest that the main features of the tide, the flow, and the stratification are reasonably well represented. As a consequence there seems to be adequate justification for using the models in a predictive as well as an exploratory way.

Some pages have only one or two lines of text beneath large figures, which can cause a certain amount of confusion. Some of the figures need a magnifying glass to interpret the magnitudes. However, this is an inherent problem with presenting the results of models for complicated channels. Overall I found this a very interesting and well-produced book, and I am sure that it will be useful to people interested in the development of computer models, to those interested in comparing the hydrodynamics of this area with their own, and I am sure that it will be essential reference material for those embarking on research using models.

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The Morphodynamics of the Wadden Sea, by Jan Ehlers, 1988. Balkema, Rotterdam. 387p. NLF183.—, UK£52.50, ISBN 90-6191-679-8.

Jürgen Ehlers has produced a meticulously researched account of the Wadden Sea barrier

island coastline fronting the Netherlands, West Germany and Denmark. The book is divided into 6 basic sections examining the physiographic background of the coast, barrier island development, recent geomorphic processes, morphodynamic features, historical development, and finally detailed site characteristics. The book is lavishly illustrated with diagrams, more than 200 photographs and 40 colour plates. The quality of all are commendable with hardly a single figure being irrelevant. Overall the calibre of the presentation, and the degree of research and referencing is of the highest standard.

There are several aspects about the book that stand out. First is the degree of historical detail presented on the development of this coastline since the Middle Ages. One cannot help but get the impression that this coastline was much more dynamic in past centuries than it is at present. Second is the use of detailed morphological studies of bedforms, using mainly aerial photography, to derive information on the direction of sediment movement on intertidal morphology. Third is the attention to detail in weaving a complete picture of the development of the present landscape. One could so easily ignore small aeolian ripples or ice-derived morphology in a book of this type; but Ehlers not only describes these features well, but also incorporates them into the overall presentation. Last is the degree of interaction shown between humans and geomorphic process. Early peat cutters, settlers on the Halligen islands, coastal engineers with their protection works, and modern tourists trampling across the dunes have all left their imprint on the modern morphology of this coastline.

I have only 2 criticisms of the textbook. Firstly, being unfamiliar with the Wadden Sea coastline, I sometimes became lost trying to locate place names in the text that never appeared on any map. Secondly, while the book is strong on morphology, it is completely lacking in stratigraphy. The cost of the text may seem prohibitive; however this may be reasonable considering the quality of the book, and the fact that it is written for a specialist audience. If anyone has any interest in barrier island morphology, or the historical interplay of people and landscapes, then this book is certainly worth reading.

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Climatic Change, Rising Sea Level and the British Coast. by Boorman, L.A.; Goss-Custard and McGrorty, S. 1989. NERC: Institute of Terrestrial Ecology Publication No. 1 Her Majesty's Stationary office, London £5.50 24p. ISBN 0-11-701429X.

For the past 15 years, three international organisations, the International Union for Quaternary Research (INQUA), the International Geographical Union (IGU) and the International Geological Correlation Programme (IGCP) have sponsored research through their commissions and projects on sea-level and coastal changes and climatic change throughout the world, and the results of their sea-level activities have been summarized regularly (for example, DEVOY 1987, PIRAZZOLI 1988, and TOOLEY 1987). In addition, many scientists have drawn attention to the impact of sea-level and coastal changes on the sedimentary record and prehistoric occupation of the coastal lowlands of the Earth.

It is to the credit of the Environmental Protection Agency in Washington, D.C., U.S.A. (BARTH and TITUS, 1984) that attention has been drawn to the changing composition of the atmosphere, particularly the concentration of radiatively-active gases such as CO_2 and CH_4, the effects on climate, particularly temperature, and the effects on sea level, through steric changes and the melting high altitude glaciers and land-based high latitude ice caps. The impacts that this will have on the occupation by man of the Earth have been addressed during regional and international conferences during the past 5 years, and intergovernmental protocols have been issued to reduce the emissions of these radiatively-active gases. The effectiveness of these protocols and the accuracy of the predictions of CO_2, temperature and sea-level rise to AD2100 are all in doubt and open to the scrutiny and measured debate. But, there is no doubt that all the world's coastal lowlands are at risk now from storm surges, the present altitude of the local sea surface and the range of