The first is a method to produce a global measuring network of a ground station. The development of absolute gravity uses signals transmitted by satellites to calculate the position change from tide-gauge records. Apart from a global rise in sea-level, the effects include land and water movements (glacio-isostatic and neotectonic being the most important), coupled atmospheric and oceanographic effects (wind, waves, ocean temperature and salinity), anthropogenic effects (water, gas and oil withdrawal). The geographical distribution of tide-gauge stations is strongly biased towards the coasts. Apart from a global rise in sea-level at a location and that therefore interfere with the eustatic signal.

Some of the factors that influence relative sea-level at a location are: vertical land movements (glacio-isostatic adjustments and neotectonics being the most important), coupled atmospheric and oceanographic effects (wind, waves, ocean temperature and salinity), anthropogenic effects (water, gas and oil withdrawal). The geographical distribution of tide-gauge stations is strongly biased towards the Northern Hemisphere, which are also the areas most likely to be influenced by glacio-isostatic crustal movements.

In order to deal with these problems different researchers have used a variety of strategies and analysis techniques. Such as only using stations from geologically stable areas; filtering out the long-wavelength crustal motion through the use of paleo sea-level indicators; and using glacio-isostatic rebound models to correct for the ongoing uplift in parts of the Northern Hemisphere.

The accuracy of tide-gauge data in measuring the global sea-level signal is likely to improve in the near future as advances in geodetic techniques make it possible to extract vertical land movement from the tide-gauge records. Good results are expected from the Very Long Baseline Interferometry (VLBI) and the phase-differenced observations of satellites within a Global Positioning System (GPS). The first is a method to produce a global measuring network using widely spaced radio telescopes, the second system will use signals transmitted by satellites to calculate the position of a ground station. The development of absolute gravity meters provides a relatively cheap method to check the results of these techniques.

The second part of the book deals with the assessment of future rise in concentration of greenhouse gases on global climate and its subsequent effect on the factors contributing to sea-level change. Namely, the dynamics of the Antarctic and Greenland ice-sheets and smaller ice-caps and glaciers, and the density changes of oceanic water due to changes in temperature and salinity. This assessment has to deal with many uncertainties and unknowns. How exactly will the greenhouse gas concentration vary in the near future? Are the climatic changes solely man induced or do they also have natural causes? How sensitive is the earth climate to these changes and are there negative feedbacks in the atmospheric-oceanic system that may dampen the effects of the increase in greenhouse gases?

Chapter 12 describes the results of a doubling of the CO₂ concentration on the earth equilibrium climate using a global atmospheric mode. The author finds an increase in the range of 0.5–4.2°C, which shows pronounced differences in geographic distributions. The warming is minimal in the tropics both during winter and summer seasons and increases towards the winter poles. In Chapter 7, the authors use best-estimate relationships between changes of greenhouse gases concentration and radiative forcing, to calculate the time-dependent global mean temperature changes. This is done for several different greenhouse-gas scenarios over the next century.

Over the past century small glaciers have contributed between 20 and 50 per cent to sea-level rise. Using a 1°C warming scenario over the next 100 years they may contribute 20 cm over the next century. Chapter 9 discusses the contributions of Antarctica and Greenland based on the effect climatic warming might have on their mass balances. For the Greenland ice-sheet ablation accounts for about half of the ice discharge. A climatic warming is likely to cause an increase in overall melting and therefore an increase in sea-level rise. For the Antarctic ice-sheet, however, ablation hardly plays a role and climatic warming may actually result in an increased snowfall over Antarctica and a lowering of sea-level. The uncertainty of the predictions is strongly increased by the possibility that those parts of the Antarctic ice-sheet that are grounded below sea-level may be very sensitive to sea-level rise or increased melting rates.

The third section of the book is a collection of case studies from coastal areas that may be influenced by ongoing sea-level change. The studies are from the Mississippi Delta, the east coast of South America, Great Britain, the Netherlands, Egypt, Bangladesh and Hong Kong. The studies reflect the wide variety of issues that are likely to be influenced by a rise in sea-level. Physical effects include land loss through erosion or inundation; flooding through an increase in frequency and severity of storms and/or surges; and salt-water intrusion in ground-water aquifers. Socio-economic effects that are likely to occur are loss of land available for agriculture, housing, industry and tourism; loss of capital; damage to the infrastructure, and pollution of coastal areas.
water supplies. Apart from assessing the impact, several studies also address the problem of what measures could be taken to minimize these effects and the physical and economical viability of these measures.

In Chapter 14 a numerical model is used to study the effects of a sea-level change on tides and surges and their combined effects in the Gulf of Bengal. For a sea-level change of 2 m, the tidal amplitude increased in the NE of the Gulf while amplitudes decreased in the NW. Both changes were about 10 per cent of total tidal amplitude. For surges an overall reduction was found with a maximum of over 10 per cent for the shallowest water. A study of the impact of a 1 m sea-level rise on the coastal defences of the Netherlands predicts a small increase in tidal motion and wave heights. Furthermore, it predicts a retreat of the coastal dunes by 80–150 m and an increased salt-water infiltration.

The last three papers of the book provide a summary and recommendations for future studies on sea-level change, tropical storms and regional effects of sea-level rise respectively.

This book gives an overview of the current state of ideas on global sea-level changes and the impact they may have on society. Many of the authors contributing to this book are among the leading scientists in their field and the result is a comprehensive account of recent publications on the analysis of past sea-level records, the prediction of sea-level changes this coming century, and the possible physical and socio-economic effects on coastal areas. This book is highly recommended to anyone, students as well as more advanced researchers, who want to get a broad understanding of the sometimes complex and wide ranging topics, that are related to the study of sea-level change.

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