

## BOOK REVIEW

*Climatic Change and Variability: A Southern Perspective* edited by A.B. Pittock, L.A. Frakes, D. Jeissen, J.A. Petersen, and J.W. Zillman (Cambridge University Press, 1978). \$29.50, xix + 455 pages.

This impressive book arises from a conference on 'Climatic change and variability, with particular reference to the Australian or southern hemisphere region', held at Monash University in December 1975. The conference sought to assemble scientists who collectively possessed the wide range of expertise necessary for the study of climatic change and variation, in an attempt to redress the lack of effective interdisciplinary communication characteristic of much of the research in this field. These aims are pursued further with the publication of this book, which contains edited versions of the invited review papers and a small selection of heavily edited versions or amalgams of contributed papers. The editors have thus sought to produce a volume integrated around the conference theme, rather than a straight conference proceedings, which the publisher hopes (dustjacket) will serve as a text for introductory earth science courses and as a reference for people with responsibilities in economics, agriculture, and environmental planning.

The book contains eight chapters. Only the first chapter, an overview touching on the problem of defining climatic change and variability, the need for study of these phenomena in the southern hemisphere, and the social relevance of such research, is the work of a single author. Chapter 2 describes the physical framework believed to underlie climate, and includes succinct introductory accounts of the nature of the earth's climatic system, the general circulation of the atmosphere, and the climatic role of the oceans. The contributions on the general circulation and the oceans progress from descriptive material (form of the general circulation, oceanic structure and circulation) to a consideration of the underlying processes (atmospheric energy cycle, ocean-atmosphere interaction mechanisms), and then conclude by drawing attention to important contemporary research problems (longitudinal dependence of atmospheric circulation, climatic 'almost-intransitivity', sea surface temperature variability) with particular reference to the southern hemisphere.

Chapters 3 and 4 draw on fourteen separate contributions to document and analyse the climatic record. The extreme breadth of the material presented amply illustrates the current scope of observational studies of climatic change and variability. Chapter 3 deals with the long-term climatic record, examining the Cenozoic climates of Antarctica and the Southern Ocean, the Australian Quaternary, some abrupt events in climatic history, and the problems inherent in the paleoclimatic interpretation of various environmental data. Patterns of shorter-term climatic change and variability are the concern of Chapter 4, which ranges over the nature of the available data, the statistical techniques frequently used in their analysis, some examples of Australian climatic variability and extremes, discussion of global climatic fluctuations during the periods of historical and instrumental record, and examinations of spatial patterns of climatic variability in relation to the general circulation.

A broad-based consideration of climatic change modelling appears in Chapter 5, which contains ten separate contributions. Stimulating background material is provided in opening articles that review the biogeophysical history of planet earth and some theories of Upper Quaternary ice ages. Attention then focuses on the modelling of ice masses and the global climate, with the discussion encompassing the types of models available, their potential applications in the study of climatic change and variability, the parameters and processes the models must accommodate, and the problems involved. Some of the results discussed are from important recent research.

Further widening of the scope of this book is achieved in the final three chapters. The potential for mankind to inadvertently modify climate is treated in Chapter 6 (two articles), with discussion of biosphere-atmosphere interactions capable of altering the atmosphere's gaseous and aerosol composition, radiation budget, and cloud characteristics. Atmospheric carbon dioxide receives particular attention. Chapter 7 contains 8 papers dealing with diverse cultural, economic, historical, and political effects of climatic change and variability on mankind. The final chapter, entitled 'Progress and prospect', includes a review of some approaches to the problem of short-term climatic forecasting; an edited transcript of a panel discussion on future climatic trends, and reflections on climatological research by a climatologist, a geographer, and an applied mathematician. These sections reveal important differences of opinion and emphasis, and provide valuable insight into our understanding of climatic change. The editors' hope that they 'will help readers to assess the whole subject critically and to focus on some of the areas which need to be further explored' will surely be realised.

In the case of a book of such encyclopaedic breadth, few reviewers could authoritatively and objectively single out for special praise or criticism the limited number of individual articles that space would permit. Suffice it to say here that many distinguished scientists have contributed a wide range of valuable and interesting material to the present volume. Excellent editorial work has welded these varied contributions firmly together. First, there has been an appropriate selection and arrangement of papers presented at the original conference. Second, editorial contributions ranging from a paragraph to several pages provide introductions to some chapters and subsections, and links between others, which greatly assist the flow of the book. There is also considerable cross-referencing between individual contributions. The literature referred to throughout the book is assembled into one list of about 800 entries, which must surely constitute one of the best bibliographies available on climatic change and variability. Finally, the technical aspects of the production are excellent.

This book deserves to be strongly recommended. It should serve as an excellent source of material for advanced undergraduates requiring an introduction to climatic change and variability. For such students to use the book to greatest advantage, however, they would need an introductory, non-descriptive, meteorology course as minimum preparation. More advanced meteorology, plus background in oceanography, statistics, and some of the natural sciences, would further help. The publisher's dustjacket claim that the book 'is intended as a university text suitable for introductory courses in the earth sciences' is therefore a little misleading. In view of the vast amount of information contained in this volume, the publisher's hope that the book will be referred to by the likes of economists and environmental planners will probably be realised.

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