

REVIEWS

HELMUT SCHROEDER-LANZ, ed. *Late- and postglacial oscillations of glaciers: glacial and periglacial forms.* Rotterdam, A.A. Balkema, 1983. xix, 409 p. £19.80.

In late 1979 Hans Kinzl died after a lifetime's work on glacier oscillations in both the European Alps and Peru. In the 1930s he was a pioneer of systematic research into historical alpine glacier oscillations. This volume brings together the results of a colloquium on the topic held in Trier in 1980 and is dedicated to the memory of Hans Kinzl. It is a fine book with several significant papers.

In all there are 26 papers, mostly dealing with glacier fluctuations in the last 15 000 years. A few go back further and discuss glacier fluctuations earlier in the Würm/Wisconsin. Three papers deal with periglacial features, such as rock glaciers, lobes, palsas, and thurfurs, while two papers deal with chronological techniques, namely oak-tree rings and lichenometry. A wide variety of environments is discussed. Ten papers deal with the Alps, three each with Norway and the Pyrenees, and two with the Massif Central. In addition, there are single papers on Mexico, northern Ellesmere Island, West Greenland, the San Juan Mountains of Colorado, and West Antarctica.

Many of the papers dealing with glacial and post-glacial fluctuations rely on a geographical approach whereby former glacier positions and levels of periglacial activity are established on the basis of geomorphological mapping of landforms, supplemented by sedimentary analysis. Dating and further insight into environmental reconstruction comes from pollen and diatom analyses, and radiocarbon dating. A distinctive paper by Anundsen and Fjedskaar links glacier fluctuations in west Norway to changing sea-levels. It is particularly interesting to see how a well-dated sea-level curve can be used to predict former glacier fluctuations and vice versa. This paper is based on recent advances in the understanding of glacio-isostasy and glacio-eustasy, and is an illuminating example of the use of a significant new tool in glacial geomorphology. Throughout many of the papers in the volume there is an attempt to link former glacier extent with former equilibrium-line altitudes and thereby with palaeoclimate. Such an approach reveals several good examples of how glaciers of different morphology and on different sides of a mountain range respond distinctively to climatic change.

One of the main impressions gained from reading this book is the wealth of information now available on glacier fluctuations in the Alps. Here there are dozens of glaciers for which a multitude of methods, e.g. historical records, paintings, photographs, archaeological findings, dendrochronology, lichenometry, vegetation and soil studies, and radiocarbon dating, have allowed a detailed reconstruction of glacier oscillations over the last few thousand years. The number and sequence of oscillations produces a complex picture but, bearing in mind the response of particular types of glacier, it is now possible to contrast the nature of climatic change in different parts of the Alps. In contrast, there are large areas of the world where reconstructions lean heavily on a few pieces of evidence.

An important issue raised by the book is the way in which the full Alpine record has been little appreciated in the English-speaking world. Lorenz King writes feelingly "Some studies in the English language commonly correlate glacier fluctuations all over the world but totally disregard studies carried out in the Alps" (p. 314). The charge is true to the loss of the

subject as a whole. This book makes an important contribution towards solution of the problem. The papers are written in German, French or English, but the abstracts and figure captions are in all three languages. Since there is correct use of photographs and figures with full captions, a single-language reader can follow all the contributions. Certainly, the English-speaking reader is shown the key Alpine literature with its great scope for constraining and testing theories about the ways glaciers respond to climate.

All in all, this is a fine thought-provoking book. We must all be grateful to Hellmut Schroeder-Lanz for his painstaking effort in making multi-lingual literature on glacier fluctuations widely accessible.

DAVID SUGDEN

STEFAN HASTENRATH. *The glaciers of equatorial east Africa.* Dordrecht, etc., D. Reidel Publishing Co., 1984. xxiv, 353 p. Guilders 195, \$72.50

"I endeavoured to explain to my people the nature of that 'white thing', for which no name exists even in the language of Jagga itself. ... It made a singular impression on my mind in the view of the beautiful snow mountain so near to the Equator..."

— Johannes Rebmann, 1849

To most people, the occurrence of glaciers in equatorial regions of the World is unexpected, and an apparent anomaly of Nature. In fact, glaciers near the Equator are found in only three regions of the World: the Ecuadorian Andes, the cordilleras of New Guinea, and the high mountains of East Africa. For this very reason, equatorial glaciers are of particular interest to the glaciologist.

In 1981, Stefan Hastenrath published an exciting monograph on the glaciation of the Ecuadorian Andes since the Pleistocene. The existence of snow and ice in the equatorial Andes had been known since the 1500s and there are excellent historical accounts available to the researcher. Hastenrath has now transported himself from South America to Africa to deal with a similar problem. The 5000–6000 m glaciated mountains of East Africa were only discovered in 1848 by Rebmann. His claimed observations of snow on Mount Kilimanjaro and Mount Kenya were met at that time with total scepticism. However, since then many explorers and scientists have studied this region's snow and ice cover, and today there is an abundance of sound scientific information.

One must say at the outset that this book is *not* for the casual reader but for the serious-minded scientist. Its careful description and detailed referencing, backed up by numerous maps, diagrams and photographs, are quite sufficient evidence that the author has researched his topic thoroughly. In a book of this nature, it is surprising to find so much intricate detail: on one page there are diagrams, illustrating "surface resultant wind directions and speeds", contrasting with "annual rainfall" and even photographs of stone stripes, earth ribbons, and stone polygons several pages later. The whole environmental setting is well described and places the reader in the correct frame of mind to digest later chapters.

It is quite clear that the history of glaciation in East Africa extended back in time to the Pleistocene, but the evidence presented by various authors is somewhat tenuous and really needs much more critical evaluation. The sequences of moraines have led to the establishment of a

time-scale which could be modified substantially on the basis of more detailed correlation. However, it is even clearer that in Recent times there has been marked deglaciation and retreat of most glaciers. The Recent glaciation's extent is well documented and illustrated both with historical maps and photographs.

Perhaps it is not surprising to discover that almost half the book is devoted to Lewis Glacier on Mount Kenya. Easy of access for the University expedition, much useful work has been done on this glacier and its documentation is unparalleled as far as equatorial glaciers are concerned. Certainly, every conceivable glaciological parameter has been documented and experiments recorded in the minutest of

detail. It is encouraging to note the extent of knowledge available for this glacier.

The author has shown his concern for the reader in providing an extensive bibliography, both author and subject indexes, and end maps. The appendices, citing lists of topographic maps, air photographs and satellite imagery, historical photographs and drawings, and data for the world glacier inventory, give the newly recruited researcher an unparalleled advantage. This book is a masterly compendium for those glaciologists seeking knowledge slightly outside their own specific fields of research.

Perhaps Stefan Hastenrath will now voyage to the cordilleras of New Guinea and complete the trilogy!

R.J. ADIE