

PATERSON, W. S. B. 1994. *The physics of glaciers*. 3rd edition. Oxford, etc., Pergamon, 480 pp. ISBN 0-08037945 1, Hardback. £70; 0-08037944 3, Flexicover. £25.

A REVIEW of a third edition of a book might seem somewhat redundant. However, in this case, it is important to state that this is no minor revision of the previous editions. The first edition was published in 1969 and was a slim volume of 250 pages in a smaller format. In itself it was an important book as it provided an introduction and summary of the major developments that took place in our understanding of glaciers in the years following World War II. It had 12 chapters and cited 211 references, 67% of which were to papers published in the previous 10 years. My hearty recommendation of it, when reviewing it for *Nature*, is quoted on the back of both subsequent editions. The second edition appeared 12 years later in 1981; it had a larger format and 380 pages. The contents and presentation had been completely rethought; of its 15 chapters only nine had the same titles as in the first edition and these were not in the same order. The developments that had occurred since the first edition were reflected in the fact that it cited 215 references, of which nearly 62% had been published since the first edition. Now, a further 13 years later, another complete revision has been undertaken; the page size has again increased, the typography is more dense (the second edition had a typewritten appearance) and it now runs to 480 pages. Its 810 references include over 47% published since the second edition and 79% since the first edition, and yet it still has the same number of references (though not the identical references) dating from before the first edition was published.

Thus, whereas I referred to the first edition as "a little book", this would be quite inappropriate for the present volume a quarter of a century later. What we now have is a most useful and important textbook on glacier theory that has been thoroughly reworked. There are again 15 chapters and, while ten of these have similar titles to the previous edition, they have again been re-arranged and restructured to

make a good, logical treatment of the subject in its present state. After a brief introduction, there follow chapters on the transformation of snow into ice, mass balance, heat balance and climatology, and structure and deformation of ice. The former chapter on the hydrology of glaciers, which used to be placed after those on glacier flow, is now renamed hydraulics of glaciers and placed at this point to be followed by a chapter on glacier sliding and a completely new chapter on the deformation of subglacial till. There follow the chapters on structures and fabrics in glaciers and ice sheets, distribution of temperature in glaciers and ice sheets, and steady flow of glaciers and ice sheets. A new chapter on the flow of ice shelves and ice streams is followed by ones on non-steady flow of glaciers and ice sheets, surging and tide-water glaciers, and ice-core studies. There is no longer a chapter on glacier-measurement techniques, eliminated to save space. There are two new appendices, the first on the basics of stress and strain, and the second on the location of stations in polar regions; the latter replaces the former geographical index. The reference list doubles as an author index, as each reference, following the useful precedent set by P.V. Hobbs (1974) in his book *Ice physics*, lists the pages on which it is cited. Finally, there is a well-constructed subject index.

The earlier editions of this book established its position as a primary text for glacier physics and the present edition fully lives up to the standards of its predecessors. It is likely to be the best reference to suggest to anyone who wishes to get a solid grounding in the science underlying the behaviour of glaciers, and is likely to retain its usefulness for at least the next decade, since it has so manifestly been brought right up-to-date at the time of its publication.

J.W. GLEN

REFERENCE

Hobbs, P.V. 1974. *Ice physics*. Oxford, Clarendon Press.