
Glacial and Periglacial Geomorphology, Volume 1 and 2

By Clifford Embleton and Cuchlaine
A. M. King
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Reviewed by D. M. Barnett
*Terrain Sciences Division
Geological Survey of Canada
Department of Energy,
Mines and Resources
601 Booth Street
Ottawa, Ontario K1A 0E8*

These two books are revisions of an original four part book first published in 1968 by the same British authors. The first three parts now comprise Volume 1 and the remainder appears as Volume 2. The four sections remain the same: Basic concepts of glaciation and glacier behaviour; Glacial and Fluvio-glacial erosion; Glacial and Fluvio-glacial deposition and Periglacial geomorphology. Indeed the chapter titles are essentially identical but with chapter order reversed in two instances, and yet judging simply by number of pages, a 21 per cent increase in content is promised to accommodate an enormous expansion of research since 1968. The justification for the separation into two books is based on bulk and a common separation of interest among research workers - neither ground being wholly convincing - one suspects that the price tag on a single volume at more than \$40 would daunt all but the dedicated or affluent. It is interesting to observe a 385 per cent increase in the sterling price from the first edition (the only comparison the reviewer can make accurately) plus an additional considerable difference in the translation into dollars of the present editions (ca. 50% mark up even at a \$2 pound)!

The authors summarize and collate the results of research and they show heavy emphasis for recent references while suggesting older references are admirably covered in the monumental volumes by J. K. Charlesworth and R. F. Flint. Metric units are used throughout the texts.

The probable causes of ice ages are reviewed and the conclusion reached that we still don't really know why these major events occur. Many diverse and ingenious theories have been advanced but several in combination are concluded to be probable: changes in land-mass altitude, solar radiation and long term solar emission. In certain circumstances relatively small climatic changes can have dramatic effect on some of the world's 15 to 16 million km² of ice cover; however 96 per cent of it is locked in the Greenland and Antarctic Ice Sheets which current research assures us are fairly stable.

Surging glaciers caught the public and scientific attention just after the first edition appeared and so now a section is devoted to this topic. Flow rates up to two orders of magnitude greater than normal can occur (up to 130 m/day) and periodicity is characteristic but this timing varies from region to region and is thought to be not directly climatic or earthquake induced but, in part at least, due to increased water at the base of the ice.

The chapter on the indirect effects of glaciation is an interesting review attempting to deal with major and controversial topics succinctly. These are changes in river regimes, pluvial lakes, sealevel change and glacio-isostatic crustal deformation.

Although fiords are generally considered classic glacially sculpted landforms some recent work suggested that some may be raised submarine canyons albeit glacially modified.

The erosive power of temperate glaciers has been demonstrated to be several times that of fluvial erosion but the quantification of this power is still inadequate with sediment transport of glacier streams plus moraine volumes being the most promising fields.

Recent work on till fabrics has shown that they are not a simple tool to establish ice flow direction. Great variability in orientation has been shown in very short distances both horizontally and vertically, and with varying strength depending upon pebble shape. It is still a viable technique but demands many samples to demonstrate the results previously attributed on the basis of a few pits.

The chapter on glacial lakes is curious in omitting mention of Conn and Bieler Lakes - the largest remaining glacial lakes in North America, which are in fact

shown on Figure 2-4 of the volume. This figure is notable as it contains three errors - the spelling of Bieler Lake, the location of Dewar Lakes and the 'submergence' of two islands in McBeth Fiord by sea shading.

The survey of the periglacial environment is a strong opening chapter outlining problems and areas of progress; for example the terms periglacial and permafrost - the former ill-defined but closely related to the latter, which is etymologically unsound but entrenched. The survey of frozen ground features such as pingos and ice wedges is both simple and sound, an achievement not found in some other texts.

The review of mass movement includes a plea to replace solifluction (used in the earlier volume) by gelifluction (probably an uphill battle?) and a survey of rock glaciers which is expanded to include rather disappointing photographs.

Though admitting that tors are controversial features the photograph used must be considered morphologically poor as my colleague was unable to identify the form in several guesses despite considerable arctic experience.

In conclusion the Periglacial volume is perhaps the better value of the two in bringing together new and obviously incomplete answers to the origin of forms and processes operating. The amount of quantification now available indicates the tremendous distances still to go before adequate understanding of processes can be agreed upon. The Glacial volume is certainly fully satisfactory also (despite the occasional typographical error) but the cost will remain a great burden (perhaps an overburden?) to sales.

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