

## Review

HAMBREY, MICHAEL J. 1994. *Glacial environments*. London, UCL Press, 296 pp. ISBN 1-85728-005-9, HB. £14.95.

When I was asked to write this review I must confess I felt some apprehension lest I wander into that territory that has become known as "conflict of interest". With a text of my own of the same title just published, there are those who might suggest a lack of impartiality on my part. On the contrary, this book by Hambrey bears many of the hallmarks of an admirable introduction to glacial studies.

In the Introduction a most interesting *précis* of the historical background of the discipline precedes a major section on glacial terminology, especially sediment types and their genetic classification. This reviewer found this plunge from history to taxonomy somewhat enigmatic since, for example, different till types are discussed before the inexperienced reader has had a chance to even begin to understand glacier dynamics and attendant geomorphic processes. The possibility of misconceptions being implanted so early in the text seems perilous. In the genetic classification of glaciomarine sediments, for example, the term "basal till" is defined as "deposited on the [ice] shelf by grounded glaciers"; such a statement is ambiguous and, within the context of the existing literature, misleading. Likewise, the apparent implicit acceptance of Dreimanis's (1989) statement of till classification must be seen in the temporal framework of a statement of where till classification had reached prior to 1989, and therefore needs updating. The introductory chapter then introduces lithofacies concept and coding, lithofacies associations, and sequence stratigraphy; a further section that perplexes the reader who may have had little prior training in glacial studies. It then quickly discusses other methods of analysis of glacial sediments: clast shape, fabric, morphological appearance under SEM (scanning electron microscopy), geochemistry and so on. Finally, in two short pages the discussion turns to evidence of glaciation in the geological record. As an introductory chapter it seems to pack too much in and brings too much forward that is out of place at this stage in the book.

Chapter 2 deals with glacial dynamics, what might be termed the glacial physics of all aspects of ice masses from the formation of glacier ice to debris transport in ice. In the interests of brevity, I suspect, certain necessary details have been not so much omitted as over-constricted in their discussion. For example, the discussion of subglacial thermal regimes, a fundamental key in any discussion of subglacial ice conditions, debris rheology, basal erosion, etc., is restricted and too unrelated to the rest of the chapter's emphasis. Likewise the section on deformable beds totally fails to indicate their potential importance or sedimentological consequence in both sedimentation and stratigraphic analysis. In the discussion of debris transport in ice, especially on p.78, there is mention of the potential distinction between melt-out and lodgement tills on the basis of clast shape; such a distinction in Pleistocene or earlier glacial diamictons/diamictites is

inappropriate and, in general, misleading.

Chapter 3 centres upon glacial erosion processes and landforms, and, like most predecessors, this book unfortunately emphasizes the landform aspect of glacial erosion rather than discussing the mechanics of erosion. Therefore, work such as Hallet and Boulton's on the abrasion rates and associated mechanics is missing. The work of Harbor on U-shaped valley-form evolution is likewise absent, and all the details of erosive processes, glacial sub-environments and the likely parameters that coexist to cause erosion are left unexamined. To discuss glacial erosion, as does Hambrey, with the aid of superb photographs, from the viewpoint of the end-product is understandable but gets nowhere near the nexus of the too-often mute analysis of how glacial erosion occurs, under what circumstances and in what styles in different parts of the glacial system. Splendid photographs do not compensate, nor do they educate the reader in the processes of glacial erosion. It is also perhaps in this chapter that the North American reader may begin to feel slightly alienated. It is no criticism of the author, but a distinctly British flavour begins to permeate the book. The British examples used are invariably superb, but a wider audience might have been appealed to had other instances of glacial erosional landforms been drawn from a wider geographical range.

The discussion in chapter 4 of terrestrial glacial deposition is long, and covers the main landform examples, but alas, any in-depth discussion of mechanics of deposition of landform genesis is limited. Although some of the best examples of glacial deposition can be seen today in and around modern valley glaciers, there is a need to emphasize the importance of ice-sheet deposition. When discussing such forms as drumlins and Rogen moraines, since these are predominantly known from continental glaciation, discussion of depositional processes in the context of ice sheets is crucial. The distinction between ice-sheet and valley glaciers is too blurred in this chapter, as it is in others. The catalogue of glaciotectonic landforms serves little purpose if the mechanics of the process(es) is left aside.

Chapter 5, on "Glaciofluvial processes and landforms", like its predecessor, hardly comes to grips with glaciofluvial processes, but rather too quickly resorts to a catalogue discussion of landforms placed in only the limited context of glacial environments. The discussion perhaps too quickly reverts to an exposition on glaciofluvial outwash facies, fine as this is.

Chapters 6 and 7, on glaciolacustrine and glaciomarine environments, have a distinctively different plan, one in which much more detailed lithofacies data are introduced and greater detail of sedimentation processes is invoked. It seems as if the writer has now found his *métier*! The glaciomarine chapter, in particular, demonstrates a command of the subject, with details and data hardly touched upon in previous chapters. The use of lithofacies logs and of pre-Pleistocene examples, for instance, provides a "cutting-edge" feel to this chapter that is lacking in other parts of the book. Finally,

Hambrey has provided a most useful glossary to close the book.

Since the object of this text was to provide a palatable introduction to glacial environments, the writer has succeeded. The decided lack of new material in many chapters and the use of older research literature does, I think, detract somewhat from the book's impact, but, brevity being required, this may not be a valid criticism. From personal experience I understand how difficult it is to persuade publishers to use colour photographs, but with so many superb photographs it is regrettable that the text could not have been made even more attractive by the inclusion of a few colour plates, the topic being intrinsically so photogenic. In conclusion it is difficult to

assess this book beyond the fact that for the sake of brevity perhaps too much has been sacrificed or too briefly touched upon, leaving the reader with perhaps a rather incomplete view of glacial environments and too little grasp of the mechanics of glacial processes.

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### Reference

Dreimanis, A. 1989. Tills: their genetic terminology and classification. In Goldthwait, R.P. and C.L. Matsch, eds. *Genetic classification of glacial deposits*. Rotterdam, A. A. Balkema Publishers, 17–83.

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## ERRATUM

Vol. 42, No. 141, pp. 279–291

We apologise for the following errors in the above paper:

(a) Figure 2 was printed in portrait rather than landscape orientation and so the main text should read:

### STUDY AREA

A false-color composite image of the study area is shown in Figure 2. The scene is centered at 46.55° S, 73.67° W and is 50 by 30 km in size. North is towards the top of the scene 42.7° to the left of the top left corner. SIR-C is flying from bottom to top, looking to its right perpendicular to its flight track and illuminating from the left at an angle  $\theta_z = 49^\circ$  below horizontal. Spatial resolution ...

(b) The images for Figures 4 and 5 were exchanged.

(c) Equation (12) should read:

$$\begin{aligned}\dot{\epsilon}_{ij} &= \frac{1}{2}(\partial u_i \partial_j + \partial u_j \partial_i), \{i, j\} \in \{L, T\} \\ \dot{\epsilon}_{zz} &= -(\dot{\epsilon}_{LL} + \dot{\epsilon}_{TT}) \\ \dot{\epsilon}_e^2 &= \frac{1}{2} \dot{\epsilon}_{ij} \dot{\epsilon}_{ij}\end{aligned}\tag{12}$$