

The Geomorphology of Canada: An Introduction

By Alan S. Trenhaile
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Reviewed by T.F. Morris
Ontario Geological Survey
933 Ramsey Lake Road
Sudbury, Ontario P3E 6B5

Much research has been published concerning geomorphic process and landform in Canada. Unfortunately, a great deal of this work has gone unrecognized in standard geomorphic texts. The usual result is that many excellent examples of Canadian geomorphic landform and process are overlooked in geomorphic courses both abroad and in Canada.

The Geomorphology of Canada: An Introduction is an excellent step toward providing the instructor in geomorphology with a textbook wherein geomorphic landform and process are tied directly to Canadian examples. The author set out to provide a basis for junior undergraduates in geomorphology, and a continuing reference for senior undergraduates and postgraduates. Many Canadian examples are used to illustrate geomorphic process and landform.

The textbook consists of ten chapters: 1) The Physical Background (of Canada), 2) Weathering, 3) Mass Movement, 4) Glaciers and Ice Ages, 5) The Glaciation of Canada, 6) Glacial Sediments and Landforms, 7) Periglaciation, 8) Rivers, 9) Coastal Processes and Landforms, and 10) Karst. At the end of the book are a glossary, a section on the SI units of measurement, references and an index.

The price of this text is very reasonable. Many new terms introduced are highlighted in bold print and defined in the fairly extensive glossary. Most references are from reasonably popular journals and are usually recent. A wide margin on each page allows the reader to make notes.

The subsections on mountain building, mass movement (particularly debris avalanches), and coastal processes (where spits, barriers and beach forms are discussed) deliver what I had hoped the book would provide: a decent review or explanation of a geomorphic process followed by an excellent Canadian example.

Some chapters and sections within chapters are particularly well written. The very clear and simple explanations of geomorphic process allow the junior undergraduate to easily understand the geomorphic process under discussion, at the same time providing easily understood references for the senior

undergraduate and postgraduate. The introduction to the chapter on weathering, the section on Froude and Reynolds numbers in Chapter 8 (Rivers), and the chapter on Karst are all examples of this.

Despite these important, positive aspects, there are a number of negative aspects that detract from the textbook's potential. First, the diagrams are simple and printed in black and white. Although this, in itself, is not bad and likely kept the cost of the book down, there are cases where the diagrams are poor. As an example, Figure 1.8 (p. 15) attempts to depict three different prairie levels. However, the boundaries of these prairie levels are not clearly defined; a series of dashed lines would have clarified these limits.

Landforms caused by geomorphic process are included in diagrams, but not discussed. Figure 6.9 (p. 109) illustrates truncated spur, scree, valley trains, and ground moraine. These are not discussed in the text. In other cases, diagrams could have been used to better explain processes, such as in the section on flutes, drumlins and crag and tails.

Third, there are processes discussed that are not given Canadian examples. Areas where sedimentary rock overlies the Canadian Shield rock are mentioned, however their locations are not given (p. 6). Similarly, the text points out that areas of Canada have not been glaciated, but fails to mention or make reference to work that defines the location of some of these areas (p. 69).

Important references that would provide a better or more detailed description, definition or alternative interpretation of a geomorphic process are missed. For example, there is neither reference to, nor use of, the INQUA definition of till (p. 59). Given that the International Quaternary Association (INQUA) definition will probably become an accepted definition for till by most geomorphologists, not providing this reference is a gross oversight. In addition, a key reference, Karrow (1969), is not included in the discussion of the Sangamonian biota of the Don Beds in Toronto (p. 71).

Several important geomorphic landform and related processes are not discussed: Canadian Shield-type lateral and medial moraines are overlooked.

There are many examples where a much more thorough explanation of a geomorphic process should have been given. Within the section on ice movement (p. 57), icestreams are not defined, nor are the mechanisms of icestream development and controls discussed. This is important, as the location of icestreams is discussed later (p. 79).

The seventh and greatest problem with this book is the organization of chapters 4, 5 and 6. Chapter 4 introduces a number of basic concepts related to glacial flow. For example, the mechanics of glacial erosion are introduced on p. 58, yet related landform, such as drumlins, striations and whalebacks,

are not discussed until p. 100. Much continuity is lost between the process and resulting landform by the separation of chapters 4 and 6 by chapter 5.

An overview of the glaciation of Canada (chapter 5), using selected references, does not seem to tie in well with the purpose of the book. Perhaps the authors should have explained how geomorphology was used to develop an understanding of the glaciation of Canada, and reviewed some of the problems that occur in the understanding of the glacial history, based on different interpretation of geomorphic process (see Dyke and Prest (1987) regarding the Quaternary geology of Banks Island, or England (1976) regarding the Quaternary geology of northern Ellesmere Island).

There are better summaries of the Quaternary geology of Canada (Dyke and Prest, 1987; Fulton, 1989). The junior undergraduate would have some difficulty understanding this summary, given that the glacial erosional and depositional processes and resulting landform are not even fully explained before the glaciation of Canada is given.

As stated earlier, this text provides a good explanation of geomorphic landform and process and links these to Canadian examples. However, a second edition, devoting more space to explanations of geomorphic process and landform with Canadian examples, would meet the original intention of this textbook. Meanwhile, this edition will likely have to be used selectively, and in conjunction with another basic textbook.

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