

Review

ALEAN J and HAMBREY M (2013) *Gletscher der Welt*. Haupt Verlag, Berne. 296pp. ISBN 978-3-258-07803-8; paperback, €34.90

This is an unusual book. Its authors, Jürg Alean and Michael Hambrey, have already written several well-circulated books on glaciology (Hambrey, 1994; Hambrey and Alean, 2004; Alean, 2006, 2010). At first glance, the 296 pages of *Gletscher der Welt*, bound in a 25 cm (width) by 30 cm (height) format, give the impression of a photograph album. Indeed, the book contains 350 magnificent photographs of glaciers and related objects from the major glacierized regions of the world, of which 315 were taken by the authors. On further inspection, however, one discovers other strengths to the book that make it a unique glaciological publication. Its condensed descriptions of important glacier characteristics, including the history of glaciations, the relationships between climate and glaciers, the mechanisms of glacier movement, and the hydrological and social role of glaciers, are of interest to readers about to make their first contact with glaciers, as well as those with substantial experience of glaciers, whether as scientists or mountaineers. In fact the value of the book is doubled by its professional descriptions of multiple phenomena which accompany the photographs. In addition, the book serves as a wide-ranging travel guide to the world's glaciers (the only glacial areas missing from it are those of Equatorial Africa, New Guinea, southeast Russia and northwest China (i.e. the Caucasus, Pamir and Tien Shan) and the Russian Arctic islands). Glacier descriptions make up the main part of the first chapter, and also reappear in each chapter in a more detailed manner, where themes match the photographs.

An introductory explanation of glaciers and their main features is followed by 11 further chapters providing regional presentations of glaciers covering most of the major glacierized regions of the world. The pleasantly readable chapter 1 can be regarded an introduction to glaciers and glaciology, similar to Sharp (1960), an outstanding introductory textbook in glaciology. This chapter includes well-selected photographs and figures, helping to make this volume an excellent introductory glaciology textbook for undergraduates. In the subsequent chapters, some regions are also illustrated with imagery and photographs taken from space, for rapid geographical comprehension.

Chapter 2 is on glaciers in Iceland, and neatly summarizes the interaction between glaciers and volcanoes. It begins with the most magnificent picture of Öraefajökull and its classic ogives, followed by a discussion of jökulhlaups, which are widely witnessed and intensely studied in Iceland. A detailed and well-documented description is given of the explosive eruption of Eyjafjallajökull in April 2010, which is fresh in the memory of many, owing to the consequent disruption of air traffic over the Atlantic and in Europe.

Chapter 3, on Scandinavia, includes a bird's-eye view and in situ photos of Jostedalbreen. A concise description of the Quaternary and the history of the Fennoscandian ice sheet, including a qualitative explanation of isostasy, follows. Chapter 4 concerns Svalbard, which the authors compare to middle Europe of the ice ages. The chapter presents the features of polythermal glaciers, with a rare

photograph of a subglacial channel surfacing near the margin, and summarizes the history of Svalbard.

Chapter 5 is on Greenland, including many calving glaciers, with the emphasis on Petermann Glacier and Jakobshavn Isbræ. One section documents the calving of Petermann Glacier into Nares Channel in 2010, and the iceberg's journey ending in its total disintegration a year later in the Labrador Sea. One can also find here a brief history of the discovery of Greenland, and its fate in the medieval period. Anyone who thought that Greenland was discovered by Erik Thorvaldsson (Eric the Red) will be surprised to learn that Gunnbjörn Ulfsson reached Greenland more than 100 years earlier. Although the discovery of Greenland and glaciers are of course not directly related, this section is an example of how well researched and neatly summarized are the descriptions accompanying the photographs of glaciers and their environment.

Chapter 6 is reserved for Axel Heiberg Island, Canadian Arctic, the smallest area chosen as a chapter in this book. There is a justifiable reason for devoting a chapter to this tiny island instead of the entire Queen Elizabeth Islands. Many glaciologists, including the authors of this book, have been educated and trained on Axel Heiberg Island. The late Fritz Müller initiated McGill University's long-term scientific programme here. The concept of a polythermal glacier was also created here. The picture of many polythermal glaciers descending from Müller and Steacie Ice Caps and forming remarkable ice lobes is just one of the impressive photographs in this chapter. Many of these can be compared with photographs taken in earlier years, offering irrefutable evidence of climate warming in the Arctic during the past half-century.

Chapter 7 concerns Alaska and the Yukon, the major ice-covered region of North America. It features photographs of noted glaciers in the Alaska Range, around Mount McKinley, and in the Brooks Range. A discussion of the contrasting mass-balance regimes of maritime and continental glaciers is well presented, and there is also an apt presentation of surges.

The book then departs the Northern Hemisphere for the Andes (chapter 8). This chapter is especially notable for presenting breathtaking shots of the hanging glaciers on Nevado Huascarán, Peru, and Glaciar Perito Moreno descending from the southern ice cap of Patagonia. The former is known for causing many ice-debris floods, while the latter is the most visited South American glacier because of its calving attraction. The chapter documents in detail the 1970 Huascarán catastrophe, caused by an earthquake–glacier-collapse–ice/debris-flow chain reaction, that claimed more than 18 000 lives.

Antarctica (chapter 9) is a difficult theme for photographers, due to its vast size and immense regional differences. The authors succeed in unifying views of Antarctica by choosing photogenic scenes (e.g. the front of an ice shelf, crevasse-ridden ice streams, tabular icebergs, glaciers in the Dry Valleys and historical objects at the Scott base camp). The chapter summarizes the geological history of the Antarctic continent since the Eocene, and includes an account of Scott's last expedition which is powerfully imprinted on British minds.

Chapter 10 takes the reader to New Zealand, which, along with the west coasts of Norway and Alaska, has the heaviest

snowfalls in the world. The authors' contact with this region may be relatively infrequent and their personal experiences take up too many pages in this chapter. However, the images of the famous Tasman and Fox Glaciers, with Mount Cook in the background, are well portrayed. Chain reactions, starting with large precipitation leading to high mass balance, which combines with the steep gradient to cause active dynamics visible in dense crevassed surfaces, are captured very well photographically. Chapter 11 returns us to the Northern Hemisphere, and to the Himalaya and Karakoram. The photographic highlights are the scenes of Baltoro, Khumbu and Imja glaciers. This chapter also includes stunning pictures of the south wall of Lhotse, the west cliff of Nuptse and Gasherbrunn. The main scientific themes here are debris covers on glaciers and moraine-dammed lakes. Their formations are well explained.

The authors reserve the last chapter (chapter 12) for their home territory, the European Alps. Modern glaciology was developed here. The Alps is also the type locality of Quaternary geology. The episodes related to these themes are very clearly presented, together with attractive pictures of the glaciers. The authors obviously had the luxury of selecting their best pictures from their best collections for this chapter. Hence the reader finds carefully taken scenes of Aletsch glacier, the largest in the European Alps; Unter Grindelwald glacier where the lateral wall recently collapsed as a result of climate warming; Rhone glacier, which, due to its recession, recently acquired a proglacial lake; Oberaar glacier, a diminishing water source for hydro-electric power generation; the retreat of Stein Glacier over the last 20 years, documented in four pictures; Morteratsch glacier, captured in a pair of photographs taken in 1900 and 2012; and the heavily debris-covered and difficult-to-access Oberaletsch glacier. Both aspects of glaciers, their attraction and danger, are presented with several examples.

A prominent case well documented in this chapter is the 1965 ice avalanche of Allalin glacier which caused 88 fatalities at a dam construction site. This accident led to a diplomatic incident and lengthy legal conflict between Italy and Switzerland. However, it also stimulated research into the stability of steep glaciers. The trip to glaciers – as the authors call it in the introduction – ends here.

Gletscher der Welt is both an attractive picture book, a well-formulated introductory textbook on glaciology and a useful travel guide. It is easy to read and contains some refined and beautiful prose. It is organized in such a way that one does not need to start at the beginning but instead can easily jump into the desired or requisite chapter. The authors are to be congratulated on accomplishing an enormous and accessible work rich in content. The book is written in German, and this reviewer very much hopes that an English translation will appear soon, as the authors intend.

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