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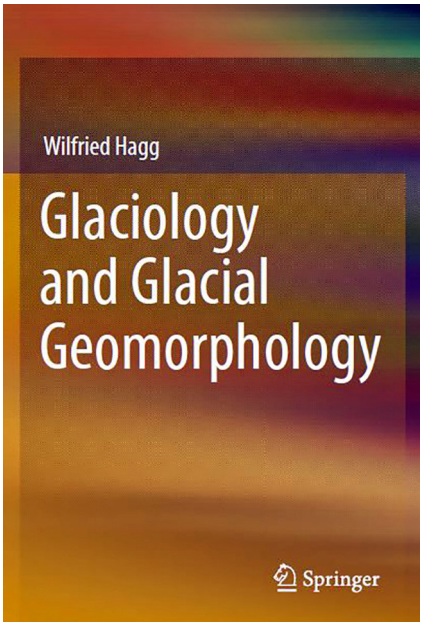
Geologos 29, 3 (2023): 197–198
https://doi.org/10.14746/logos.2023.29.3.19

GEOLOGOS

Book reviews

Glaciology and glacial geomorphology, by Wilfried Hagg, 2022. Springer, Berlin/Heidelberg, 186 pages. Hardcover: price €90.94, e-book: price €71.68; ISBN 978-3-662-64713-4.



There is no need to convince anyone how important water is for life on Earth, for the proper functioning of its natural system and our civilisation developing harmoniously in it. And yet, nature itself is subject to constant changes, to which mankind must also adapt. Apart from the progressive desertification of a large part of the world, much consideration of environmental changes in recent decades has focused on water resources that have accumulated in ice masses of mountainous and polar regions. These are natural reservoirs of fresh water, a retention buffer or a coating that regulates the flow of energy between lithosphere and atmosphere, and a sphere of the Earth in itself, fulfilling many other tasks. In our times, mountain glaciers in particular that are important for the multi-million populations living at their feet, attract our attention. The impact of glaciers and ice caps, under all conditions and in all latitudes, is of great interest, if not sensational. As the author of the present book notes: "…the rapid changes of recent years have led to comparative images of glaciers becoming almost emblematic of climate change". Therefore, not only is it worthwhile to take an interest in media reports about what is happening to our planet's ice masses, but also to present the mechanisms related to them in a professional and accessible way.

Such a compendium of current knowledge about the nature of glaciers and the effects of their impact is the present book by Wilfried Haag, who continues the German school of research on Alpine glaciers, continental glaciations and polar regions. His predecesor was Erich von Drygalski, a Munich-based professor, eminent geographer, geophysicist and researcher of the Arctic and Antarctic.

The present tome comprises three parts that are divided into eleven chapters, each comprehensively discussing issues related to glaciology, understood here as the science of glaciers, although without reference to the broader context of the occurrence of ice in the natural environment, of the shaping of post-glacial relief and of the effects of environmental impact of glaciers. The author touches on these issues in the chapter 1 (Introduction and History of Research), in which he outlines his ideas about the purpose and scope of glaciological research and linguistic complexities associated with it. In addition, he presents an overview of historical discoveries of regularities that govern the world of glaciers, from the earliest mentions during the Renaissance era to the latest achievements of modern science.

This introduction is followed by seven chapters in which particular phenomena relating to issues linked to the functioning of glaciers from the perspective of glaciers themselves are discussed, as well as to processes of glacial ice formation and its physical properties (Origin of Glaciers), through issues of ice dynamics (Ice Movement), mass balance and energy balance of their surfaces (Mass and Energy Balance of Glaciers). Others issues dealt with are the typology and distribution of glaciers across the globe (Glacier Types and Distribution), their relation to climate and hydrological phenomena (Gla-

ciers and Climate, Glaciers and Water), a historical and geological approach (Glacial History), covering ancient glaciations between the Precambrian to Pleistocene, as well as changes during the Holocene and the present, and views on future disappearance of glacier covers along with consequences at various spatial scales.

Chapter 9 (Glacial Hazards), which I here classify as a separate part, touches on a very important issue, i.e., the material threat from glaciers in the form of ice avalanches and glacial lake outburst floods, taking into account the human factor impacted. Nowadays, this has significantly intensified, both by dynamics of glacier-linked phenomena, as well as by a growth of populations living and visiting mountain and foothill regions, thus increasing the likelihood of exposure to human health, life and property. Violent processes caused by the ice itself or by huge amounts of water flowing into its foreground have always been a threat to settlements or other products of our civilisation located in their vicinity, arousing terror. Currently, they allow us to think not so much about opposing them as about assessing the risk and anticipating effects of such phenomena.

In chapters 10 and 11 (Glacial Erosion, Glacial Sedimentation), the author deals with issues of the relationship between glaciers and their surroundings in terms of shaping post-glacial relief, subdivided into bedrock erosion caused by glaciers and ice sheets and the accumulation of sediments deposited by ice and meltwater, discussing some of the processes taking place, the sediments involved in them, as well as a catalogue of forms generated as a result of the above-mentioned actions. These issues are also gaining in importance as the areas released from below the ice surface are expanding and are gradually encroached on by biogenic processes and human activities. They are also analogues to the vast post-glacial regions and traces of former glaciations found in the geological record at various latitudes.

The entire volume has a clear structure, in which each chapter constitutes a coherent whole, forming a separate paper that thoroughly discusses a selected issue based on an extensive list of references cited at the end of it. It is possible to recommend it either to broaden your knowledge of any of the selected topics, to look for answers to uneasy detailed questions, or to read it from cover to cover and enjoy learning about the secrets of the glacial environment in case you are a beginner enthusiast.

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