# Review

JONES, H. G., J.W. POMEROY, D. A. WALKER and R.W. HOHAM (eds.), 2001. *Snow ecology: an interdisciplinary examination of snow-covered ecosystems*. Cambridge, Cambridge University Press. 378 pp. ISBN 0-521-58483-3, hardback. £50/US$80.

When most readers of this journal think of snow, they probably think of its physical properties, the geophysical processes that give snow its character, or the electromagnetic emanations produced by snow that can be used to advantage in remote sensing. But there is another side to snow and it is the focus of this book. Snow is home to a wide variety of plants and animals, and when present, determines the environmental conditions that these plants and animals must adapt to and live with. Here, in one volume, a diverse group of authors have brought together an impressive amount of information on snow ecology, the study of the relationship between living organisms and their snow environment. By definition, snow ecology is an inter-disciplinary subject, combining physical and biological studies, so the diversity of the book's author list comes as no surprise. The seven chapters have been written by physical scientists familiar to *Journal of Glaciology* readers (e.g. E. Brun, J. Pomeroy, M. Tranter) and by biological scientists (e.g. R. Hoham, C. Aitchison, D. Duval) who are not. With whole-system studies and Earth-system modeling currently gaining in importance, the book is a timely addition to the library of anyone interested in snow.

The book grew out of meetings held by the Snow Ecology Working Group of the International Commission on Snow and Ice of the International Association of Hydrological Sciences, which brought together physical and biological researchers interested in snow. The first three chapters contain information that for many *Journal* readers will be something of a review. Chapter 1, by P. Groisman and T. Davies, covers snow distribution (mainly seasonal snow, not the perennial snow on glaciers) at the hemispheric scale, describing the network of observing stations and remote-sensing satellites that are used to delineate large-scale patterns of snow distribution. Much of the chapter is taken up with descriptions of how snow cover is related to climate, and how through feedback processes the snow affects the climate itself. The chapter ends with a cursory review of climate change and snow cover. Chapter 2, by J. Pomeroy and E. Brun, provides a comprehensive review of the physical properties of snow. The authors separate wind-blown snow properties and processes from those of canopy-affected snowpacks, a natural division when considering snow ecology for prairie, tundra and forested regions. They cover wind transport of snow, and canopy interception processes. Optical and thermal properties follow, then a review of the surface energy balance of snow cover and snowmelt, and a brief description of wet- and dry-snow metamorphism. It is a tall order to condense so much into a single chapter, but the authors do a good job and provide an extensive reference list including all of the classic works. For a novice, this chapter might be a little dense, but for readers with some experience in snow it is a useful compilation of information and sources. The last chapter on physical process, chapter 3, by M. Tranter and H. G. Jones, covers snow chemistry and nutrient cycling. There has been explosive progress in this area in recent years, in part because of efforts to interpret ice cores for paleoclimate, so to cover this topic in one chapter and slant that chapter toward snow ecology is an overwhelming task. The authors review deposition processes, examine chemical processes in both dry and wet snowpacks, and end by tracing nutrient fluxes through the snow. Again, a solid review is presented, and a vast reference list is provided for the reader to follow up specific aspects in more detail.

The next four chapters were my favorites because they cover topics about which I know very little and relate directly to life in the snow. Chapter 4, by R. Hoham and B. Duval, covers microbiology and snow algae, and makes clear what an amazing assemblage of micro-organisms live in the snow. I am not sure if I will ever drink snowmelt water again, even though the authors indicate there have been no proven deleterious effects from these algal and micro-organic blooms. This chapter was a little too rich in biological terms and algae species names for my taste, but a glossary at the end of the book makes it considerably more accessible to the non-biologist. Chapter 5, by C. Aitchison, covers animals and insects that live in and under the snow. It follows the classic works by Formozov and Pruitt and is equally fascinating. Here for the first time I finally learned why vole tracks in the boreal forests near my home are always on top of ski and snowmobile tracks (they cannot dig through compacted snow). The food-web diagram that closes the chapter really catches the complexity of the ecology of animals and snow, and shows that besides being an interesting geophysical material, snow is truly home to a wide range of living things. Chapter 6, by D. Walker, W. D. Billings, and J. De Molenaar, covers snow–vegetation interactions in tundra environments, where the snow has its primary effects through the control of temperature and light. It was at first puzzling why the authors confined themselves to snow–tundra interactions, rather than exploring the wider topic of snow and vegetation in general, but as chapter 7, by Y. Bégin and S. Boivin, covers some of the critical interactions of snow and trees, the overall coverage of snow and vegetation in the book is reasonably complete. The topic dealt with in chapter 6 is again so broad that it is difficult to do it justice in a single chapter, but the authors do a good job of reviewing the state of the art, and continue the trend of providing a prodigious reference list. The coverage in chapter 7, on tree-ring dating and past snow regimes, is more detailed because the scope is narrower, and this chapter brings the reader full circle back to snow and climate, giving the book some degree of closure.

Serious gaps and cursory coverage of important topics will inevitably exist in any book on a subject as broad as snow ecology. Here, the authors have done a fine job of choosing what to cover, and have covered it well. All of the critical information a reader might need in order to get started in snow ecology, or to delve more deeply into the field, is here, along with enough discussion to tie the various topics together. This is the sort of reference book no one involved in snow-ecology studies should be without.

*Alaska Projects Office* MATTHEW STURM
*Cold Regions Research and Engineering Laboratory*
*Building 4070, Fort Wainwright*
*Alaska 99703-0170, U.S.A.*



https://doi.org/10.3189/172756501781832368 Published online by Cambridge University Press