



## Book review on: *A Field Guide to Snow*

**Robbie D. C. Mallett**

Centre for Polar Observation and Modelling, University College London, London, UK

**Correspondence:** Robbie D. C. Mallett (robbie.mallett.17@ucl.ac.uk)

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*Sturm, M.: A Field Guide to Snow, University of Alaska Press, ISBN 9781602234147, 192 pp., USD 24.95, 2020.*

Many people experience snow's emergent properties while sliding or shovelling, but the microscopic physics that produce its macroscopic traits often go unconsidered. Snow's disparate nature at these two scales perhaps explains its enigmatic and symbolic portrayals in pop culture.

What decides whether snow falls as Christmas-card crystals or stinging pellets? Why does snow on the ground transform from a light, wind-blown powder to a hard, car-stopping barrier? Are two snowflakes really ever the same? In his book *A Field Guide to Snow*, Professor Matthew Sturm sets out to answer these questions by guiding the reader through the life cycle of snow. While aimed squarely at the scientifically minded layperson, Sturm's interesting and personalised account of snow's birth, life, demise and impact will likely be of interest to the cryospheric scientist.

Matthew Sturm is a professor of geophysics at the University of Alaska Fairbanks, and currently leads its Snow–Ice–Permafrost Group at the Geophysical Institute. In telling the story of snow he therefore draws on his 40-year career in the field. This experience shines through in the makeup of figures (which are frequently the author's own photographs) and in the punctuation of the chapters with personal anecdotes. These anecdotes are well placed to immediately and vividly illustrate technical points and are undoubtedly a strong point of the book. Sturm's academic history is also in evidence in the non-anecdotal examples, which are generally drawn from the behaviour of snow on the ground in North America. In particular, the reader should not expect to find much information on snow that overlies glaciers or sea ice in this 192-page volume. Instead the author understandably focuses on the snow that is most relevant and immediate to his intended audience.

After a brief introduction to Earth's snow cover distribution that also contains some enticing references to snow's cultural and historical aspects, the book begins in earnest with an account of how snow crystals are formed in clouds. This was an enjoyable chapter that provided some succinct explanations of challenging concepts such as the role of vapor diffusion. Sturm then traces the journey and transformation of a snow crystal as it falls to earth, with some particularly interesting photographs.

The book then turns towards the behaviour and evolution of snowpacks and their constituent grains. It is perhaps these two chapters on snow stratigraphy and metamorphism that form the core of the book. Through accessible imagery (sedimentary stratigraphy in the Grand Canyon and metallic melding for grain bonding), Sturm brings the micro-scale processes that dictate snow evolution into human-size focus. A useful guide to digging and interpreting snow pits is given for the reader interested in personal scientific discovery.

The final two chapters are dedicated to the impact of snow and its material properties. The first of these explores the role of snow as part of the climate and then the hydrological system and concludes by exploring the role of snow properties in the regional design and development of snowshoes, skis and snowmobiles. The second focuses on the interactions of snow with flora and fauna. This chapter considers both animal and plant adaptations to the snowy environment, as well as the challenging role of vegetation in understanding snow cover. The chapter (and the book) then finish by reconsidering human interactions with snow in a callback to the introduction. A surprising but enjoyable consideration is given to the role of snow in the human psyche, metaphor and culture. The final note is dedicated to the future of snow under climate change. Rather than a "wake-up" message, this is a nuanced account of the physical changes to come: more consolation than call to action.

While not an academic reference, *A Field Guide to Snow* is a worthy addition to the shelf or library of the cryospheric scientist. The personal nature of the book is such that it will offer an entertaining read for even the most seasoned of snow scientists. More likely however is that the book will broaden the reader's horizons beyond their subdiscipline in an accessible and relaxed way. *A Field Guide to Snow* would also make an excellent introduction for a reader considering snow science from the outside at any level.

*Review statement.* This paper was edited by Chris Derksen.