

Review

DOVGALUK, Yu.A. and T.A. PERSHINA. 2005. *Atlas snezhinok (snezhnykh kristallov) [Atlas of snowflakes (snow crystals)]*. St Petersburg, Gidrometeoizdat. 139pp., paperback, RR200. (In Russian with an English translation by A.A. Sinkevich.)

When seeing the book's title, most readers will probably expect to find photographs of amazing snow crystals such as those provided by Bentley and Humphreys (1962) for example. They will not be disappointed in the variety of crystals shown. Many of us will also be reminded of Nakaya's (1954) book *Snow crystals: natural and artificial*, which presents not only many delightful pictures but also relevant facts and data on snow crystals and their formation.

According to its authors, the purpose of the *Atlas of snowflakes* is 'to save numerous snowflakes photos (collected and systematized by scientists of the Main Geophysical Observatory (MGO) Cloud Physics and Cloud Seeding Department) and [to answer] the demand in [the form of an] educational book for students and scientists, investigating different forms of natural crystals and the conditions of their formation in the Earth's atmosphere'. As such, the atlas is a compilation both of monographs, mainly by Russian scientists, and of photographs from an unpublished album of snowflakes prepared by Galina Mikhailovna Bashkirova and Tamara Aleksandrovna Pershina (see also Bashkirova and Pershina, 1956, 1964). It is directed primarily at observers of hydrometeorological stations and specialists in cloud physics, everyone who wants to read 'the letter from the sky', as Nakaya used to say. What makes it even more worth reading is the parallel English translation by A.A. Sinkevich, which retains a Russian flavour but gives most of us a first glimpse of investigations done in the former USSR on this topic. Note that 'snow crystals' and 'snowflakes' bear the same meaning in this monograph.

The material is arranged in two parts, the first presenting available data on snow crystals, the second showing over 500 photographs of snowflakes. Chapter 1, 'Morphologic ice crystals classification (cloud crystals and snowflakes)', considers various available morphological classifications of snow crystals, including the most widely known (Schaefer and others, 1954; Magono and Lee, 1966) as well as those developed in Russia since 1910. It also addresses the aspects of morphological vs genetic classifications, the complexity of classifications as well as the extent to which these classifications could improve in the future.

Chapter 2, 'Microphysical characteristics of ice crystals', presents data on crystal size and mass, fall velocity, density and concentration. The material is mainly based on data collected by Bashkirova and Pershina (1956, 1964) and substantiated by data from non-Russian scientists, chiefly from the work of Nakaya.

Chapter 3, 'Relationship between form of ice crystals and temperature-humidity characteristics of different forms of clouds', provides the necessary basis to decipher the cloud-reflecting 'characters' of snowflakes, as B.P. Veinberg proposed in the 1930s (Veinberg, 1940). Again, data from both Russian and non-Russian scientists are presented. The authors also stress the importance laboratory experiments have had in developing our understanding of snow-crystal formation, and point to the possibility of mapping the distribution of snow-crystal forms on a geographical basis.

Concluding this part, the authors declare that our knowledge of snow crystals is still incomplete but that novel techniques will certainly help yield 'new data on the unknown structure and form of atmospheric crystals'.

A short introduction to the work of Bashkirova and Pershina leads to the second part of the book, the 'Album of snowflakes'. On 81 pages, the album displays over 500 photographs, mostly of snowflakes but also of rimed crystals, sleet and hail, taken by these two Russian scientists in the northwest of Russia, Siberia and other regions of the former USSR. The pictures are presented on a greenish-greyish frosted background. Each page shows up to eight shots at a magnification of 56 times, usually surrounding one picture magnified 120 times. The photographs by no means show the most beautiful crystals but the ones that are most commonly observed in the field, underlining the practical and educational purpose of the atlas. In addition, basic information on the H₂O molecule, as well as on the phases of water, enriches this otherwise purely pictorial part.

The book gives a concise presentation of older and more recent Russian studies, making poorly available publications known to a much wider public. Also including material from non-Russian scientists, it nicely shows similar developments in the understanding of snow-crystal formation around the world, but it does not provide fundamentally new insights into the secrets of snowflakes. Although the authors deliberately did not want to present an up-to-date treatise of the topic, I would have expected the partly outdated English terminology found in Nakaya's book to have been adapted to today's usage. I also missed mentions in the bibliography of the Russian monographs available in English – there are some. Nevertheless, as it is of a practical and educational nature, I think the atlas will be a very valuable tool for all those observing solid precipitation on the ground, provided the book in its handy format is made available outside of Russia.

REFERENCES

- Bashkirova G.M. and T.A. Pershina. 1956. Nekotorye dannye nablyudenii za formami snezhinok [Some data on snowflakes forms observations]. *Trudy GGO*, 57(119), 19–34. [In Russian.]
- Bashkirova, G.M. and T.A. Pershina. 1964. O masse snezhinok i skorosti ikh padeniya [On the mass of snow crystals and their fall velocity]. *Trudy GGO*, 156, 83–101. [In Russian.]
- Bentley, W.A. and W.J. Humphreys. 1962. *Snow crystals*. New York, Dover Publications Inc.
- Magono, C. and C.W. Lee. 1966. Meteorological classification of natural snow crystals. *J. Fac. Sci., Hokkaido Univ., Ser. VII*, 2(4), 321–335.
- Nakaya, U. 1954. *Snow crystals: natural and artificial*. Cambridge, MA, Harvard University Press.
- Schaefer, V.J., G.J. Klein, and M.R. de Quervain. 1954. *The international classification for snow (with special reference to snow on the ground)*. Ottawa, National Research Council. Associate Committee on Soil and Snow Mechanics. (NRC Tech. Memo. No. 31.)
- Veinberg, B.P. 1940. *Led; svoistva, vzniknovenie i ischeznoenie l'da [Ice; properties, formation and disappearance of ice]*. Moscow/Leningrad, Gostekhizdat.

WSL Swiss Federal Institute
for Snow and Avalanche Research SLF
Flüelastrasse 11,
CH-7260 Davos-Dorf, Switzerland
E-mail: fierz@slf.ch

Charles FIERZ