

## Reviews

KOTLYKOV, V.M., *ed.-in-chief*. 2007. *Oledenenie severnoi evrazii v nedavnem proshlom i blizhaishem budushchem [Glaciation in North Eurasia in the recent past and immediate future]*. Moscow, Nauka, 366pp., hardback. (In Russian with English summary.)

This work presents the results of recent investigations by the Institute of Geography, Russian Academy of Sciences, (IGRAS) into the glacierization of northern Eurasia and some other parts of Russia. The editor-in-chief is Academician Vladimir Kotlyakov who was assisted by numerous members of the IGRAS research staff.

There are six chapters, and a valuable 15-page summary of the work in English, together with an extensive bibliography and an annex of tabular information. There is no index, but a detailed table of contents is given in Russian and English. The figure captions are also helpfully given in both languages.

Chapter 1 (54 pages and 19 illustrations) addresses the influence of snow cover on the heat balance of the underlying surface. The spatio-temporal variability of snow density and other thermophysical parameters are presented and there is a detailed examination of the influence of the snow cover on ground freezing and thawing and on permafrost characteristics. Two scenarios are used to investigate the effects of climate change on ground freezing and thawing. It is estimated that by the middle of this century the area of permafrost may be reduced by 12–15%.

Chapter 2 (75 pages and 19 illustrations) describes the hydrothermal state and regime of glaciers. Direct and indirect methods to examine the hydrothermal state are presented. The direct methods include borehole temperatures, stratigraphy in pits and ice cores, and mass-balance data. Indirect methods involve remote-sensing measurements. The bulk of the chapter deals with the radio-physical properties of glaciers and radio-echo sounding of their structure. There is a section on glacier types in Svalbard. The final part addresses liquid water on the surface and within glaciers, internal drainage systems and the role of water in the glacier regime. Figures show the evolution of drainage channels on the Greenland ice sheet and types of glacier-dammed lakes. Schematic longitudinal sections illustrate the internal drainage system of glaciers.

Chapter 3 (33 pages and 13 illustrations) is titled 'Ice cores as a source of palaeoclimatic information'. It discusses deep ice cores from the Eurasian Arctic islands and cores from mountain glaciers in central Asia, providing new insight into the climate of these areas.

The main climatic events of the last 500–800 years are documented for the Arctic, but older ice has not been successfully analyzed. The discussion includes results of L. Thompson for Tibetan ice caps and Greenland and Antarctic cores.

Chapter 4 (59 pages and 21 illustrations) examines glaciers in the Holocene in northern Eurasia but also the central Caucasus, Altai and Kamchatka. Relative to the present, the climatic snowline rose 100–400 m during the

Holocene maximum. There are graphs comparing the Holocene fluctuations of glaciers in Eurasia and in other mountain ranges around the world. It is suggested that a physical mechanism that accounts for the glacier fluctuations during the Holocene is solar variability.

Chapter 5 (35 pages and 2 illustrations) describes Geographic Information System (GIS) modeling of glaciers. IGRAS has developed an electronic version of the World Atlas of Snow and Ice Resources (Kotlyakov, 1997; not included in the bibliography). Its contents are global, regional and local maps, tables, and air and space images. The main software is ArcInfo. There are also electronic tables of the USSR Glacier Inventory (contained in the World Glacier Inventory). GIS technology is also used for the study of snow cover and its water storage in Eurasia, but there are no illustrative maps included.

Chapter 6 (49 pages and 15 illustrations) presents a picture of glaciation and snow cover in North Eurasia in the near future (the next 50–100 years). It treats the Arctic archipelagos, northeast Siberia and Kamchatka, and presents procedures to estimate change in this century, and projected changes in snow storage. Glacier changes on Rudolf Island in the Franz Josef Archipelago are detailed as an example. Graphs are shown of the relation between snow accumulation and mean air temperature and precipitation for the East European Plains and Kazakhstan.

The annex contains tables documenting the Eurasian ice cores. The oldest ice is over 20 000 years old from a core on Vavilova ice cap, Severnaya Zemlya, but most cores from Spitsbergen, Svalbard, span 300–700 years and those from Severnaya Zemlya 3000–8000 years. A table details the analyses performed on 23 cores. Another table lists average accumulation and ablation in 200 m height intervals for glaciers in northeast Siberia and Kamchatka and projected changes in these glaciers for AD 2040–69.

The book is a timely overview of the extensive Russian glaciological research in Eurasia that includes many references to other glacierized regions and results. It is well documented and illustrated. There are a few 'Russlish' words – notably 'chionosphere' (the altitudinal zone in the troposphere where long-term snowpatches and glaciers persist), 'glaciosphere' and 'snowiness' – but the English summary is readily readable. It should be noted that the book had a very limited print run of only 300 copies, so libraries should submit their orders for a copy promptly!

### REFERENCE

Kotlyakov, V.M., *ed.* 1997. *Atlas snezhno-ledovykh resursa mira [World atlas of snow and ice resources]*. Moscow, Russian Academy of Sciences. Institute of Geography.

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