

## REVIEW

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**ABOUT THE BOOK BY V.R. ALEXEEV  
“THE ATTRACTION OF FROZEN GROUND”  
(Novosibirsk, Academic Publishing House “Geo”, 2016, 538 pp.)**

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The book consists of four parts. In the first part, the author introduces the reader to the “underground realm of eternal cold”, where the temperature of the rocks is below 0 °C. In the second part, the author considers the icing, a phenomenal cryogenic formation accounting for the icing hazard, which is particularly dangerous for road functioning and maintenance. In the third part, the author explains in a clear and easy manner what the cryogenic hazard is. Questions are discussed as to why snow and ice constitute our wealth and why meltwater is believed to be a treasure of the cryosphere. In the fourth part, the author introduces the reader to the biographies and works of scientists who laid down the cornerstones of the new permafrost science. Of special interest is the new well-illustrated information about M.I. Sumgin, the founder of geocryology, a new science in the family of the Earth sciences.

*Cryogenic processes and formations, icings, cryogenic hazard, geocryology*

I keep reading and rereading the new popular science book by Vladimir Alexeev “The Attraction of Frozen Ground”, which was published in 2016 by the Geo academic publishing house. First I skimmed the book, just to get acquainted with its content. Next I started to read the book attentively, stopping and rereading individual fragments of this wonderful work. I liked the title of the monograph: it could be invented only by a person who personally and fully experienced this attraction from the very beginning of his scientific work. It seems this is what happened to the author of the book, Vladimir Alexeev, as I experienced the magic of permafrost attraction in the remote year of 1951, when, being an undergraduate of the Moscow Geological Prospecting Institute, I first came to Yakutsk as a member of the Yakutsk railway project expedition of the Ministry of the Interior of USSR. I am still feeling the attraction of the frozen world of permafrost I experienced then.

The book's author is Professor Vladimir Romanovich Alexeev, doctor of geology and mineralogy, an honored member of the Russian Geographical Society. His research in the area of geocryology, glaciology, and geography is well-known to this scientific community, especially to those scientists who have worked or are working in the regions of Siberia, Transbaikalia, and the Russian Far East. Vladimir Alexeev started his scientific career in 1959 in the settlement of Chulman (southern Yakutia). In 1959, Vladimir Alexeev, a juni-

or researcher of the Aldan permafrost research station of the Permafrost Institute of the Soviet Academy of Sciences, was first commissioned to investigate the icing hazard for the Amur-Yakutsk railway route. It seems it was the time when Vladimir Alexeev became interested in the phenomenal cryogenic formation, which he has been studying ever since. Years passed. When in 1964 the Aldan research station was liquidated, for a good reason, though not in the right time, Vladimir Alexeev was asked to summarize the materials of the ten years' research, he composed a brilliant work, which became the foundation for his candidate's thesis he defended in 1966.

Alexeev investigated icings and geocryological conditions in many regions of Siberia and of the Russian Far East. The results of these studies were presented in such publications as *Terrain Indication of Icing Phenomena* (2005), *Icing Studies* (2007), and *The Cryology of Siberia. Selected Works* (2008). In these books, the author investigates the fundamental and applied issues of geocryology and substantiates the necessity of indicating and developing a new fundamental science of icing studies as a study of icings and icing processes. The foundations of this new area of science had been previously laid down by Vladimir Alexeev in his doctorate thesis *Icing as a Form of Glaciation*, which he successfully defended in 1982 and the materials of which he published in 1987 in his Icing monograph.

Professor Alexeev has had more than 400 papers and 10 voluminous monographs published. When I look through the list of his works, a question comes to my mind: can one person carry out such gigantic work? Or maybe, he, just like Alexander Dumas, hired a team of researchers to achieve his goal? No, these are really the works by one man, Vladimir Romanovich Alexeev, an outstanding scientist and a hard worker, a person dedicated to his work, a man who combines a talent of a scientist and the gift of a wonderful writer. The geocryologists, glaciologists and geographers who know well his scientific works are less familiar with his popular science essays, articles and monographs. In these works, he revealed his talent of a born explorer of the severe and uniquely beautiful nature of Siberia, Transbaikalia, and the Russian Far East, who is also endowed with an ability to present difficult scientific problems in a simple literary form, which can be understood by the readers of different levels of knowledge.

This is not surprising, as the literary activities of Doctor Alexeev started in his college years 50 years ago. He started with brief publications and small articles in newspapers. Later there appeared large popular science essays in such periodicals as “Kholod’OK”, “Science and Technology in Yakutia” and other journals. After careful structuring and editing, the pieces of information turned into a complete popular science book “In the Country of Eternal Cold”, Vladimir Alexeev provides a beautiful description of nature, writing about the attractions, the challenges and hazards an explorer encounters during long expeditions in this untrod land. He informs the reader of the historic events which happened in these mysterious territories and about the pioneers of the early 17<sup>th</sup> century who explored them. The highly informative materials he uses are often unpublished, little known to modern scientists, as they are stored in the reserves of the local natural history museums or of some research institutions of the Russian Academy of Sciences. It was in those resources in which Alexeev meticulously searched for and found the materials he needed and then published in his popular science essays.

The monograph “The Attraction of Frozen Ground”, more than 46 printer’s sheets, consists of four parts. Each part consists of five essays consistently disclosing the contents of each part.

*Part 1. Frozen land, known and unknown:* 1. We live on permafrost; 2. The geometry of the permafrost zone; 3. Permafrost volcanoes and the mystery of the Patomsky crater; 4. Cryopegs, or liquid permafrost; 5. Pay homage to the trees! The intriguing titles of each essay will undoubtedly interest the curious reader willing to get acquainted with the underground realm of eternal cold, the temperature of which is always below 0 °C. It occupies two-thirds of Russia’s territory, while the negative temperature of the rocks has been recorded at the depths of 1000 m

and deeper. Vladimir Alexeev emphasizes the necessity of thorough investigation of the cryogenic processes and formations (icings, palsas, solifluction, ice wedges up to 50 m high, and massive ice formations several kilometers long and up to 30 m and more thick), as they present a special cryogenic hazard for economic and industrial development of any region in the permafrost zone.

*Part 2. In the country of springs and icings:* 1. Giant icings in the north of Chukotka; 2. The impact of icings on the development of the river channel network; 3. Icings and hydrothermal movement of ground; 4. Lasting variability of spring icings (taryns); 5. Mapping of the icing hazard; icings, especially giant icings, reaching the length of several kilometers and up to 6 m thick, had been considered mysterious formations for centuries, as an opinion dominated in those years that “in the underground realm of eternal cold”, under the thick lay of permafrost all the ground waters were completely frozen. Vladimir Alexeev introduces the reader to giant icings (taryns), typical of the north-eastern landscapes of Russia, and convincingly demonstrates the vast occurrence of icings in the other regions of the country, evaluating them as a reliable indicator of the underground water basins, which can be used for water supply. The author provides interesting information about the role of icings, especially of large icings, in the formation and change of the shape of river valleys. Considering the enormous icing hazard (especially for linear highways), Vladimir Romanovich explains the specifics of their mapping on maps of different scales – from general maps (scale less than 1:2 500 000) to large-scale maps (scale larger than 1:100 000).

*Part 3. Cryogenic resources and the fate of civilization:* 1. What are “cryogenic resources”? 2. Snow and ice, our riches; 3. Thawed water, the treasure of the cryosphere; 4. Cryogenic construction materials; 5. Gas hydrates, the fuel of the future. In this part, Vladimir Alexeev again intrigues the reader by the unusual titles of each essay and appeals to the reader to learn the little known scientific terms and notions. As always, he simply and clearly explains what the “cryogenic hazard” is. He makes it clear why snow and ice are our riches. He provides proofs that thawed water is the treasure of the cryosphere. The reader will be interested to read about cryogenic construction materials and gas hydrates as the fuel of the future.

*Part 4. Science, an eternal search for ideas and hard work:* 1. M.I. Sumgin. Attraction of the frozen land; 2. Reminiscences of an unwritten book; 3. Snow cover, an indicator of the Earth’s pollution; 4. Underground waters above permafrost; a fundamental study of the permafrost zone; 5. Rock glaciers of the world: a new look. In this part of the book, Vladimir Alexeev, based on the huge arrays of facts rummaged in the reserves of the local natural history museums, in ar-

ticles or in monographs published at the turn of the previous century, introduces the reader to the biographies and the scientific ideas of the people who studied the nature and the permafrost of Priamurye (Amur region). Those were the people who laid the cornerstones of the new science of permafrost. Analysis of the obtained material convinced Vladimir Alexeev that Priamurye, just like Yakutia, should be considered the cradle of the modern science of geocryology. Of special interest, even for the permafrost scientists of the older generation, is the new previously unpublished information about the life and scientific contribution of Mikhail Ivanovich Sumgin, the founder of the new fundamental Earth science, geocryology (the permafrost science).

The book "The Attraction of Frozen Ground", just like the author's previous books, contains a rich collection of color and black-and-white photographs, unique for what they show and highly artistic for

their quality. Some photos have a historic value, as they were found in archives or reserves where modern scientists rarely work. Especially impressive are sixty photos of cryogenic landscapes from the Appendix.

Having read the book, I wish to thank Vladimir Romanovich for the pleasure I have derived. He has been able to demonstrate that Siberia, Transbaikalia and the Russian Far East are not the "prison of the peoples" and "the place of exile and salt-mine works". He has proven "the attraction of frozen ground". He has been able to fully disclose the beauty of the nature of the "underground realm of the eternal cold". He has been able to tell the readers in a simple and clear way about many solved and unsolved mysteries and whims of the "Russian Sphinx". Only a man who is so hard-working and persistent, a man who is so devoted to his motherland and to his profession, could have written such a book.