HISTORY OF RUSSIAN RESEARCH OF ICING

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Icing and formations of an icing attracted the attention of researchers at the earliest stages of the development of Siberia. In the literature, the first information about river icing in permafrost regions appeared in the middle of the 19th century [3]. At this time, comprehensive geographical studies of Siberia and the Far East were widely developed in connection with the agricultural and industrial development of the region, resettlement movement, and the construction of roads and highways.

The first scientific descriptions of icing were made by F.P. Wrangel (1841) and A.F. Middendorf (1862). F.P. Wrangel considered the products of freezing water in the river valleys of North-Eastern Yakutia and used the Yakut term "taryn". He also called part of the vast ice massifs «cover ice». In his works A.F. Middendorf called icing "strata accumulated during layer-by-layer freezing of water".

A more active study of icing in permafrost regions began in the late 19th - early 20th centuries in connection with the construction of the Trans-Siberian Railway, when the builders first encountered the need to account for icing phenomena. At the same time, the key role of climate in the formation of ice was revealed.

In the 1930s, interest in icing increased even more, coinciding with the period of formation of domestic permafrost science, when the most interesting information about the patterns of development and distribution of permafrost and related phenomena was analyzed and summarized [1].

However, the views of researchers on the nature of icing formations differed significantly. So, one group of researchers (N.I. Tolstikhin, O.N. Tolstikhin, I.Ya. Baranov, N.N. Romanovsky, F.N. Milkov, etc.) traditionally began to consider icing as a product of freezing of the outflowing water; another group (M.I.Sumgin, S.G. Parkhomenko, P.K.V.K. Arseniev, V. Sedov, and others) as water on ice, and the third (A.M. Chekotillo, A.A. Tsvid, V.A. Rymsha, etc.) – as a complex of physical and mechanical processes caused by the release of river or groundwater to the surface [1].

As a result, icing began to be considered as a special form of glaciation of the Earth. In 1968, in a report at the IV All-Union Glaciological Symposium, V.R. Alekseev made a proposal to understand icing as the products of layer-by-layer freezing of water on a solid foundation, regardless of its belonging to a particular sphere of the Earth and the method of entering the freezing plane [1].

The issue of expanding the content of the concept of "icing" was discussed at the All-Union meeting in Chita in April 1973. Some researchers recognized the introduction of new classification elements as timely and necessary, while others spoke out against them.

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Subsequently, the theory of icing processes was developed in the studies of V.R. Alekseev. As a result of many years of research, he summarized extensive materials on the patterns of manifestation of icing processes in various regions of the globe, assessed their spatio-temporal variability and role in the development of elements of the geographical environment, and also considered methods for studying and mapping the icing hazard and issues of using icing in the national economy [2].

An analysis of the scientific literature published in the second half of the twentieth century allows us to conclude that a new scientific direction was born and began to stabilize in glaciology, the subject of which is the study of the physics of layer-by-layer freezing of water on a solid foundation. To date, the conditions and patterns of formation of an icing are covered in the hydrological literature in sufficient detail, catalogs and schematic maps of icing have been compiled. According to modern concepts, icing is an indicator of a complex relationship between surface and ground waters in the context of widespread permafrost. At the same time, there are still serious contradictions in the science of icing. In particular, there is no unity in the definition of the basic concepts and terms, there is no generally accepted classification of icing, the principle of regionalization of the territory has not been developed, the methods of managing icy processes need to be improved, etc [2].

References:

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