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THE CASCADING IMPACT OF GLOBAL CLIMATE CHANGE ON PROCESSES
IN THE CRYOLITHOSPHERE AND THE INDUSTRIAL AND SOCIAL
INFRASTRUCTURE THAT DEPENDS ON THEM

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This brief study provides a comprehensive understanding of the impact of global climate change on processes in the cryolithosphere. At the same time, attention is paid to the initial and dependent phenomena and processes, which include solar activity, the degradation of permafrost, and the loosening of buildings and structures that make up the infrastructure. Taking into account specific extreme events arranged according to a cascade scenario, the vulnerability factor of industrial and social infrastructure located in territories affected by exogenous geocryological processes is indicated. The originality of this material is determined by a comprehensive understanding of the consistent mutual connection of exogenous events in nature and the technosphere, which is the environment for the emergence and development of a natural-technogenic emergency. The main conclusion of this study is the proven statement about the need to form an objective understanding of climate processes as part of a comprehensive predictive assessment of the state of social and industrial infrastructure, as a prerequisite for ensuring the sustainable state of a given territory.

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References: Gordienko A.N., Prus M.Yu., et al. Forecasting the Development of Emergencies According to Cascade Scenarios. Innovative, Information and Communication Technologies. Proc. of the XXII Inter. Scientific and Practical Conf. Dedicated to the 80th Anniversary of the President of RTU MIREA, Academician of the RAS, Dct. of Phys. and Math. Sci. Prof. A.S. Sigov. Sochi. Moscow, Zhukovsky Association of Alumni and Staff of VVIA. to Promote the Preservation of the Historical and Scientific Heritage of VVIA named after Prof. N.E. Zhukovsky (2025), 65–70.

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