RESEARCH STATION “VASKINY DACHI” AT CENTRAL YAMAL,
30 YEARS OF STUDY

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The paper presents a review of activities at “Vaskiny Dachi” Research station in Central Yamal over 30 years of existence. Characterized is the history of the station, listed are the main objects and study disciplines. We emphasize the interdisciplinary and international nature of research and its role in the training of future specialists.

Central Yamal, steady-state research, interdisciplinary approach

“Vaskiny Dachi” Geocryological Research station (70°17′ N, 68°54′ E) (Fig. 1) was established in 1988 under an agreement between PNIIS Gosstroy USSR and the State Design and Research Institute “Lengiprotrans”. Until 1992, in the framework of this project, studies of slope processes, thermal erosion and thermal abrasion, physical and mechanical properties of deposits, as well as the main parameters of permafrost: the active-layer depth, ice content, and ground temperature, were carried out. In the difficult for science period from 1993 to 1995, research continued exclusively by enthusiasts with limited funding from the international program CALM (Circumpolar Active Layer Monitoring).

From 1996 to the present, observations and monitoring are carried out by the Earth Cryosphere Institute of the Tyumen Scientific Centre SB RAS. Since 2014, research has been conducted with the support of the Russian Centre for Arctic Development.

The main objects of monitoring are the active-layer depth and ground temperature in boreholes at several monitoring sites [Leibman, 1997, 2001; Leibman et al., 2012a,b, 2015; Khomutov et al., 2016]. Research station serves as a base to study slope cryogenic processes. Thanks to steady-state observations, it was possible to develop a theory of cryogenic landsliding, and to predict a subsequent shift in landsliding mechanism caused by warming which was later approved by observations [Leibman et al., 1993a,b, 1997, 2000, 2003, 2014a; Leibman, 1994, 1995; Leibman and Egorov, 1996; Leibman and Streletskaya, 1997; Leibman and Kizyakov, 2007; Khomutov and Leibman, 2014, 2016; Ukrainsevsk et al., 2014]. Small river draining the territory of Research station served as an example to establish the features of the small river basins of Yamal [Gubarkov and Leibman, 2010], and observe related cryogenic processes.

The Research station has repeatedly served as a key site for landscape-geobotany research, as the basis for permafrost mapping [Rebristaya et al., 1995; Walker et al., 2009, 2010, 2012; Leibman et al., 2011b; Khitun et al., 2015].

The Research station is one of the key areas for the study of geochemical, including isotope, studies of the active-layer deposits and various types of ground ice [Leibman et al., 1993a, 2011a; Leibman, 1996; Leibman and Streletskaya, 1996, 1997; Streletskaya and Leibman, 2000, 2003; Streletskii et al., 2003; Khomutov et al., 2012]. Since 2011, monitoring of the hydrogeochemical composition of lake water has started, specifically in connection to activation of thermal denudation on the lake coasts [Dvornikov et al., 2015b, 2017]. Since 2015, added were observations in April, including additional snow surveying, geochemical sampling of snow cover, lake ice and subsice lake water [Dvornikov et al., 2015a,b, 2018].

In 2010, the Obskaya–Bovanenkovo–Karskaya railway line was laid near the Research station, and the study of the dynamics of natural environment under the local technogenic impact was added to the research framework. The rates of overgrowing of technogenically disturbed areas (erosion landforms and quarries) are studied and compared to already studied natural disturbances (cryogenic landslides and windblown sands) [Rebristaya et al., 1995; Ermokhina and Myalo, 2013; Khomutov and Khitun, 2014, Khitun et al., 2015].

A distinctive feature of all studies implemented at the Research station is their interdisciplinary and international character. At different times at the ex-
Fig. 1. Map of the main objects of monitoring at Research station “Vaskiny Dachi”.
CALM, VD-1,2,3, peat – sites for monitoring active layer depth and ground temperature; TC-1–TC-13 – measured thermodegradation landforms (thermocirques); LK-001–LK-034 – study lakes.

Fig. 2. International research team at “Vaskiny Dachi” (Autumn 2016).
perimental sites, geocryologic, cryolithologic, geomorphologic, hydrologic, geobotany, landscape, geochemical, limnological and other studies have been conducted to this day. Particular attention has recently been paid to the use of remote-sensing methods of mapping and monitoring, the creation of GIS and databases [Trofaijer et al., 2013; Dvornikov et al., 2016, 2018; Bartsch et al., 2017; Widhalm et al., 2017; Bergstedt et al., 2018]. Existence of significant amount of ground truth data used for calibration and validation of remote sensing models is of special importance.

After the discovery of a new natural phenomenon, gas emission craters (GEC-1 and GEC-2) in 2014, 40 km away from the Research station, study in part is located in the GEC area. The array of knowledge gained over many years of interdisciplinary research at the “Vaskiny Dachi” Research station served as the basis for studying the origin of GEC in Yamal within the framework of a complex project that has received support from the Russian Science Foundation in 2016 (grant 16-17-10203) [Leibman et al., 2014b; Kizyakov et al., 2015, 2017, 2018; Arefyev et al., 2017; Streletskaia et al., 2017].

Graduate and PhD students at all times participate in the work of the Research station where they receive experience in conducting fieldwork (Fig. 2). Dozens of diploma, 5 candidate and 1 doctoral dissertations were defended using data obtained at the Research station. Numerous papers, monographs and monograph chapters have been published and listed below.

References
Leibman, M.O., 1996. Results of chemical testing for various types of water and ice, Yamal Peninsula, Russia. Permafrost and Periglacial Processes 7 (3), 287–296.


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