New Data on Ground Temperature in the Upper Kolyma Basin

D. Abramov[1]*, O. Makarieva[2], A. Zemlianskova[2],
A. Ostashov[2], N. Nesterova[2,3], and K. Suzuki[4]

[1]Moscow State University, Moscow, Russia
[2]St. Petersburg State University, St. Petersburg, Russia
[3]State Hydrological Institute, St. Petersburg, Russia
[4]Japan Agency for Marine-Earth Science and Technology, Japan

Upper Kolyma basin is the mountainous, permafrost, hard-to-reach and poorly gauged region. The information about ground temperature and the transformation of permafrost due to climate change impact is practically absent. For year-round monitoring of the permafrost in the upper Kolyma basin nine thermometric wells up to 15 m deep were drilled and equipped in 2021-2022. The wells are located at altitudes from 618 to 1182 m in characteristic mountain landscapes such as rocky talus, mountainous tundra and sparse larch-forest (Figure 1a). One of the wells is located in the talik zone, another well characterizes thermal regime of a giant spring aufeis glade. Continuous 4-hour monitoring of soil temperature at various depths is carried out. Data were obtained on the average annual temperature of ground, the depth of seasonal thawing/freezing, the amplitude of temperatures on the surface of ground, as well as the depth of zero annual amplitudes. Preliminary analysis of the data shows that within the same region, geocryological conditions differ significantly. The depth of seasonal thawing varies from 0.9 to 2.6 m; the temperature at the depth of zero annual amplitudes varies from -0.1 to -3.8°C (Figure 1b). Based on the data obtained, it can be concluded that the optimal depth for thermometric wells in this area is about 15 m, since it allows reliable assessment of the depth of zero annual amplitudes. The results of data analysis will be presented. Further monitoring and development of the network will make it possible to trace the dynamics, identify trends in temperature regime changes, and also make it possible to predict changes in the permafrost zone of the study area. The study is supported by St. Petersburg State University (project id 75295776).
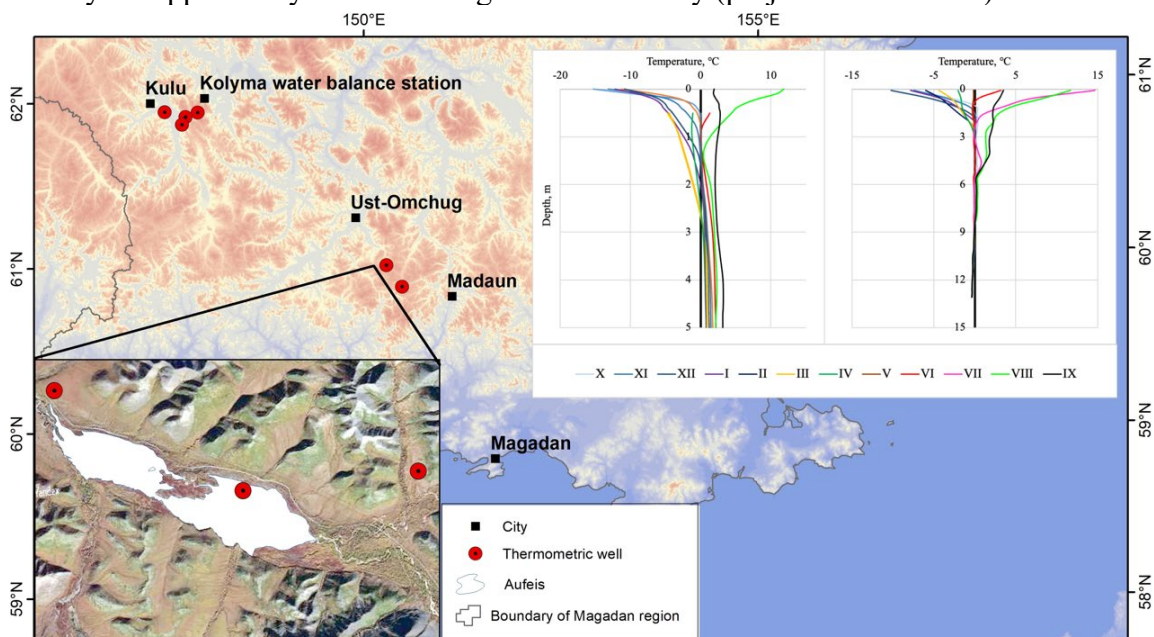

Figure 1. The distribution of monitoring wells with the examples of ground temperature distribution in 2021-2022.