International Conference

Solving the puzzles from Cryosphere

Pushchino, Russia, April 15-18, 2019

Russian Academy of Science
Institute of Physicochemical and Biological Problems in Soil Science RAS
“Okabiolab” Ltd.

International Conference
‘‘Solving the puzzles from Cryosphere’’

PROGRAM
ABSTRACTS

Pushchino, Russia, April 15-18, 2019

The International conference «Solving the puzzles from cryosphere» organized by: Institute of Physicochemical and Biological Problems in Soil Science RAS and “Okabiolab” Ltd.

Conference Committees.

Chair of the Organizing Committe: Andrey Alekseev (Corresponding member of RAS, Director of IPCBPSS RAS)
Chairs of the Programm Committee: Vladimir Melnikov (Full member of RAS), Marat Sadurtdinov (Director ECI Tyumen Scientific Centre SB RAS), Mikhail Zhelezniak (Director MPI SB RAS), Elizaveta Rivkina (Head of Soil Cryology Laboratory, IPCBPSS RAS)
Programm Committee: Andrey Abramov, Dmitry Drozdov, Vladimir Tumskoy, Olga Makarieva, Felix Rivkin, Stanislav Kutuzov, Alexey Lupachev

Chair of the local Organizing Committee: Andrey Abramov (Soil Cryology Laboratory, IPCBPSS RAS)

Local Committee: Svetlana Chudinova, Elena Spirina, Victor Sorokovikov, Tatiana Vorobyova

Technical group: Aleksandra Veremeeva, Anastasya Shatilovich, Lyubov Pasnitskaya, Lidia Gulyaeva, Larisa Kondakova, Ekaterina Sokolova, Stanislav Malavin

Partners
Earth’s Cryosphere Institute, Tyumen Scientific Centre SB RAS (Tyumen)
Melnikov permafrost institute SB RAS (Yakutsk)
PYRN-Russia

of the hillocks are practically bluff. Peat began to accumulate approximately 8600 radiocarbon years ago.

That is, the preserved frozen peat islands in the form of peat bogs with bluff ledges breaking off in to the vast depressions of bizarre outlines, "float" among the melt ground. Their preservation seems to be determined by the thickness of peat - the more it is, the more likely it is to be frozen. But there are exceptions.

For example, in the Strelna area on a flat polygonal bog at a height of about 30 m, the thickness of peat also reaches 4 m, but no permafrost was found there. The bog is covered with destroyed hilly-polygonal relief. The peat started to accumulate about 9000 radiocarbon years ago, around the same time as the Pyalitsa bog.

Thus, small islands of frozen rocks can be found on the Tersky coast only on the surfaces covered with thick peat. Their formation is associated with the cold stages of the late glacial period - the early Holocene or the small glacial period. The preserved and undiscovered permafrost is located in almost the same natural conditions. Practically everywhere there are traces of its degradation in the form of hilly-polygonal relief.

The works were carried out on the theme of the state assignment AAAA-A16-116032810089-5 "Evolution of the natural environment, topography dynamics and geomorphological safety of nature use" with the support of the RFBR (project № 18-05-60221).

Dynamics of local conditions of peat accumulation in the Holocene of the southern tundra of the Pur-Taz interfluve

Anna Kuznetsova[1], Afonin A.S.[2], Tikhonravova Ya.V.[1], Slagoda E.A.[1,3,4]

[1]Institute of Earth Cryosphere SB RAS, Tyumen, Russia

[2]Institute of Problems of Development of the North SB RAS, Tyumen, Russia

[3]Tyumen State University, Tyumen, Russia

[4]Tyumen Industrial University, Tyumen, Russia

mouse132008@gmail.com

The dynamics of plant communities of peat in the Holocene are used to reconstruct the natural environment in areas of peat decomposition, including climatic and hydrological conditions and processes. The age and botanical composition of the selected layers, the degree of decomposition, ash content, and peat types were determined. The change of peat types represents the dynamics of the waterlogging tundra conditions during the formation of a peat.

In 2017, in the area of the village of Gaz-Sale, a polygonal peat bog located in the southern tundra of the Pur-Taz interfluves was studied. The polygonal relief of the peatland in a drained lake valley is formed by large polygons with subsidence in the center of the polygon and bulging platens at the edges. The

polygons are separated by wide, flat, moistened, drained interpolygonal depressions above the ice veins. Modern vegetation is presented: within subsidence in the center of the polygon - Eriophorum medium, Sphagnum capilifolium, Carex sp. and etc.; on the bulging platens - Cetraria sp., Cladonia sp.; in the interpoligonal depressions, the vegetation is more varied: Sphagnum sp., Ledum decumbens, Rubus chamaemorus, Betula nana, Carex rostrata, Andromeda polifolia and lichens.

In the section of the drained lake valley, opened peat with by 2.3 m visible thick. From the stratification peat were selected: in the seasonally thawed layer - 7 samples; in frozen peat - 3 samples. The botanical composition of peat is determined by microscopy using special atlases-guides and collection of micropreparations of plants. Peat of the seasonally thawed layer is characterized by a decrease in the moss of Shpagnum sp. and an increase in Carex sp., this is associated with local drainage within the platens. Also fluctuations of content of residues of mosses, shrubs and herbaceous plants are revealed in frozen peat. The composition and content of peat-forming plants in the studied peat characterizes the change of conditions: flooding and burial of woody vegetation; overgrowing and gradual draining of the surface.

The accumulation of the studied peat began at the end of the boreal period of the Holocene. The main part of the peat horizon was formed in the warm and humid Atlantic period. The accumulation of upper layers occurred from the end of the subboreal period to the present day. Modern vegetation is characteristic of the drier local conditions of the southern tundra.

The reported study was funded by RFBR according to the research projects № 18-05-60222 and 18-55-11005.

The Influence of Winter Seasonal Temperature Conditions, Snowfalls and Snow Cover Thickness Accumulation Variations on Ground Freezing Depth

Denis Frolov

Department of Geography, Lomonosov Moscow State University, Moscow, Russia
denisfrolovm@mail.ru

The ground freezing intensity and depth depend on ground internal physical properties (moisture containment, heat conductivity, etc.) as well as on winter seasonal temperature conditions (sum of acting negative temperature-days) and on snow cover thickness accumulation regime variation and snow cover insulating properties. For characterization of influence of external conditions on ground freezing intensity (of warming and cooling action of snow cover on the ground depending on snow cover accumulation regime and its duration) V.A. Kudriavcev suggested an equation including snow cover thickness, its thermal properties and amplitude of yearly air temperature oscillations. We suggest