

## **Ground Ice from Larsemann Hills Oasis (East Antarctica): Geological Occurrence, Properties and Genesis**

**Belova N.<sup>1</sup>, Verkulich S.R.<sup>2</sup>, Demidov N.<sup>3,4</sup>, Shmelev D.<sup>1,3</sup>**

<sup>1</sup> *Lomonosov Moscow State University, Faculty of Geography, Moscow, Russia nataliya-belova@ya.ru*

<sup>2</sup> *Arctic and Antarctic Research Institute, Saint-Petersburg, Russia*

<sup>3</sup> *Institute of Physicochemical and Biological Problems in Soil Science, Russian Academy of Sciences*

<sup>4</sup> *Vernadsky Institute of Geochemistry and Analytical Chemistry, RAN*

Geological cross-section of quaternary deposits 15 m depth in Larsemann Hills oasis was studied with the use of drilling rig and complex laboratory analyses of cores. Lower stratigraphic unit was interpreted as lacustrine-marine sediments 37820-17860 years BP meaning that relative sea level during MIS3-MIS2 period was at least 30 meters higher than present sea level allowing lagoon-type deposition. Upper stratigraphic unit was interpreted as end moraine which marks the position of last glaciation which moved so far to the north during pre-Antarctic Cold Reversal glaciation 14 Ka BP or some minor Holocene surges.

Two different types of ground ice were observed in these deposits. The upper layer of ground ice is allocated on the contact between moraine and lacustrine-marine deposits or in the upper meters of lacustrine-marine sediments. It is mostly clean transparent ice, sometimes with admixture of gravel and sand. The lower layer of ice lays into lacustrine-marine strata quite close to the aquiclude, which is presented by rock foundation; it is composed by laminated icy sediments with narrow-meshed inclined ice schliers 1-2 cm thick. Both ice layers were found in boreholes near the margin of Lake Reid at the quite close depths interval – 33-37 m a.s.l. for upper layer and 24-26 m for the lower layer.

We present results of complex analysis of the ice core including detailed characterization of ice structure, texture and contacts with host sediments. The isotopic analysis of ice is also currently carried out. This data allow us to make a choice between several theoretical possibilities of ground ice origin including sea or lake ice, glacier, firn snow, injection or segregation ice.

The work has been supported by RFBR, projects No 12-05-31442 mol\_a and 12-05-31125 mol\_a.

## **The Implementation of Cryogenic Weathering Index for Paleopermafrost Reconstruction by Example Late Pleistocene and Holocene Deposits of North-East Yakutia**

**Shmelev D.G.**

*Faculty of Geography, Lomonosov State University Moscow,*

*Institute of Physicochemical and Biological problems in Soil Science, Russian Academy of Sciences, Pushchino*

The investigation of the composition, structure and properties of the Late Pleistocene and Holocene deposits of North East Yakutia has been done. Ice Complex of Late Pleistocene (IC) and Holocene cover layer deposits in Bykovskiy peninsula and Cherskiy (Kolyma region), alasses and IC - cape Chukochoy have been studied. Cryogenic weathering and permafrost acted the great role in the time of deposit sedimentation. For paleopermafrost reconstruction Cryogenic Weathering Index (CWI) has been calculated. It has been found that the least severe permafrost condition was in Kolyma region, for Bykovskiy peninsula and cape Chukochoy it were similar. The increasing of cryogenic weathering over a period of Ice Complex formatting have been shown, the most severe permafrost conditions were in boundary of Late Pleistocene and Holocene (end of IC formatting and cover layer sedimentation). Alasses complex (lake-boggy and taberal thicknesses) formed in the soft condition, thawing and long-term period in thawed state were shown in more small values (<1) of CWI, than for adjacent IC.