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Geochemical sensitivity of lacustrine ecosystems of Yamal Peninsula (Russian Arctic) to climate change

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Object of study:

Russian Arctic
Yamal Peninsula

Lakes on river and
marine terraces

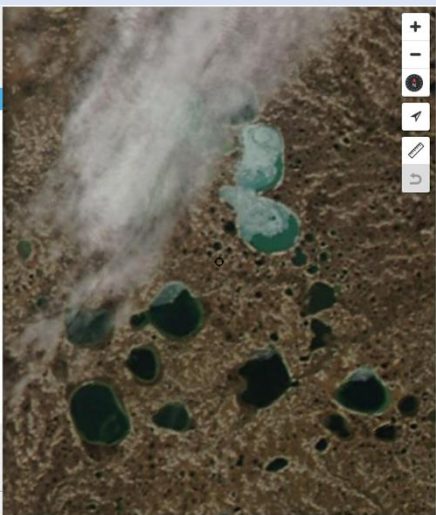
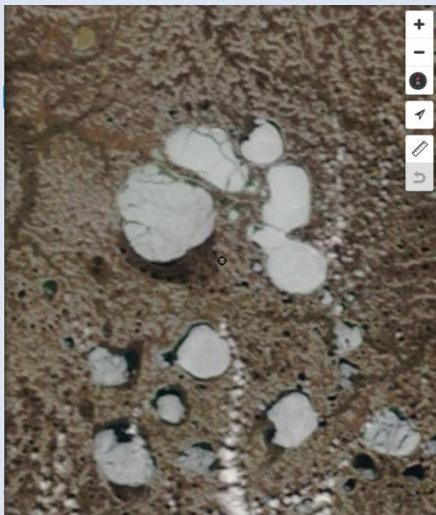


River terraces of
The Yuribey river,
The Erkuta river,
The Pysedeiyakha river,
marine terraces of
central Yamal
(Neitinskie Lakes),
Laek on Beliy island

End of ice period: mid-June

13 June 2020

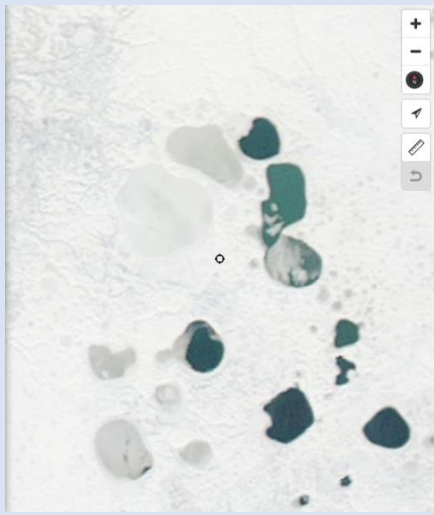
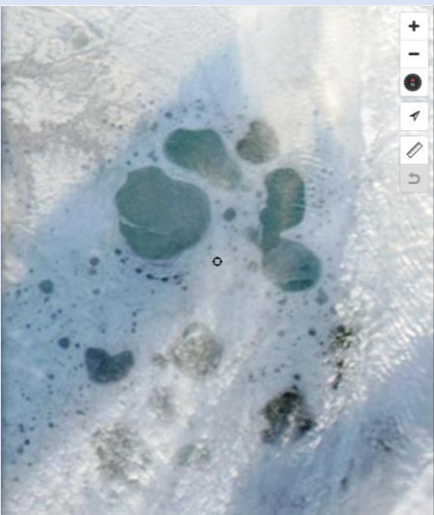
20 June 2020



Start of ice period: mid-October

23 October 2020

27 October 2020



GHG
CH4
Seeps

Ice regime
of Yamal's
Lakes

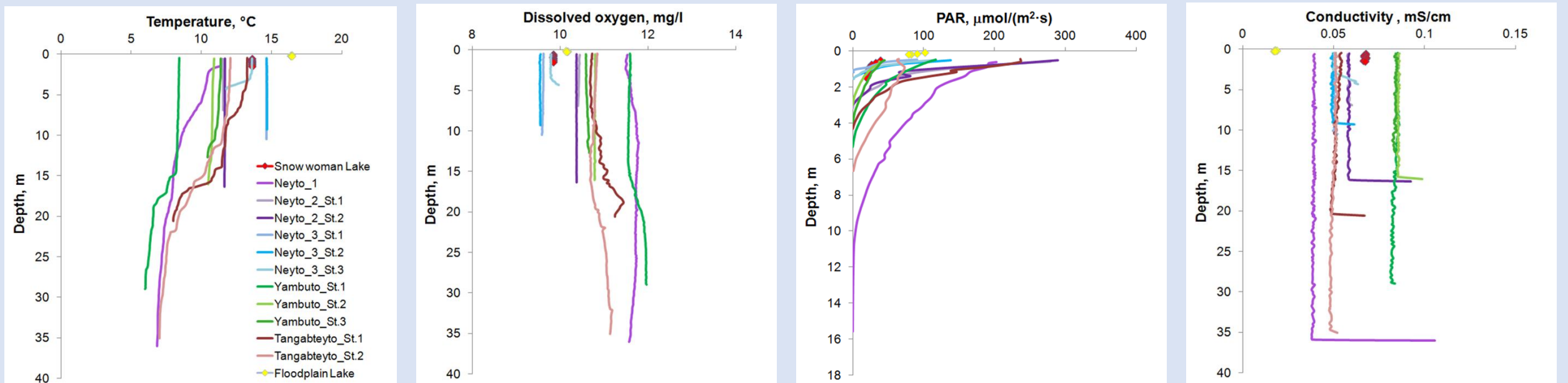
<https://multimaps.ru/@69.932053,430.711877,8,nasa,aqua,0,2020-10-27>

Open water ~ four months; Ice period ~ eight months

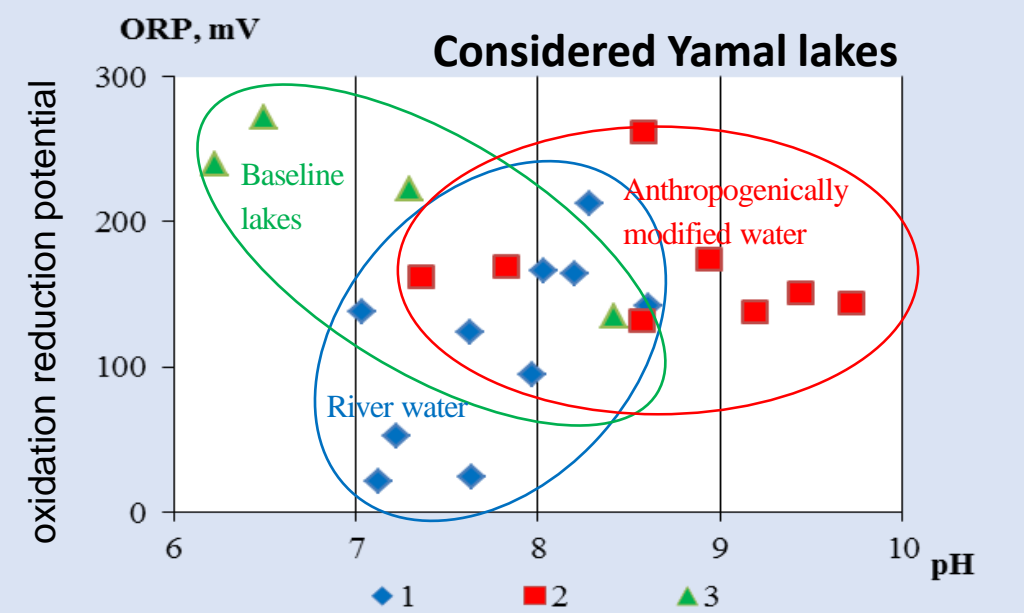
Hydrophysical properties of Neitinskie lakes

24 July-1 August 2020

Neitinskie lakes – central part of Yamal peninsula. Marine terrace. Lake floor in the deepest part – below the sea level.




The Shaytanka River and Teploye lake in Salekhard city

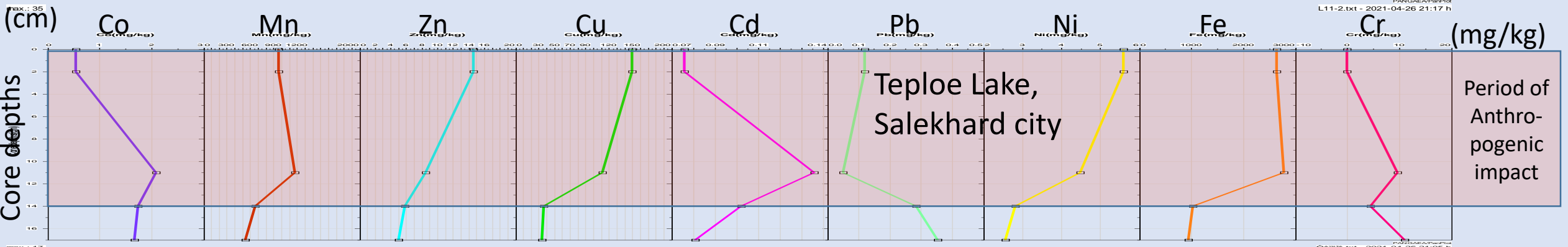
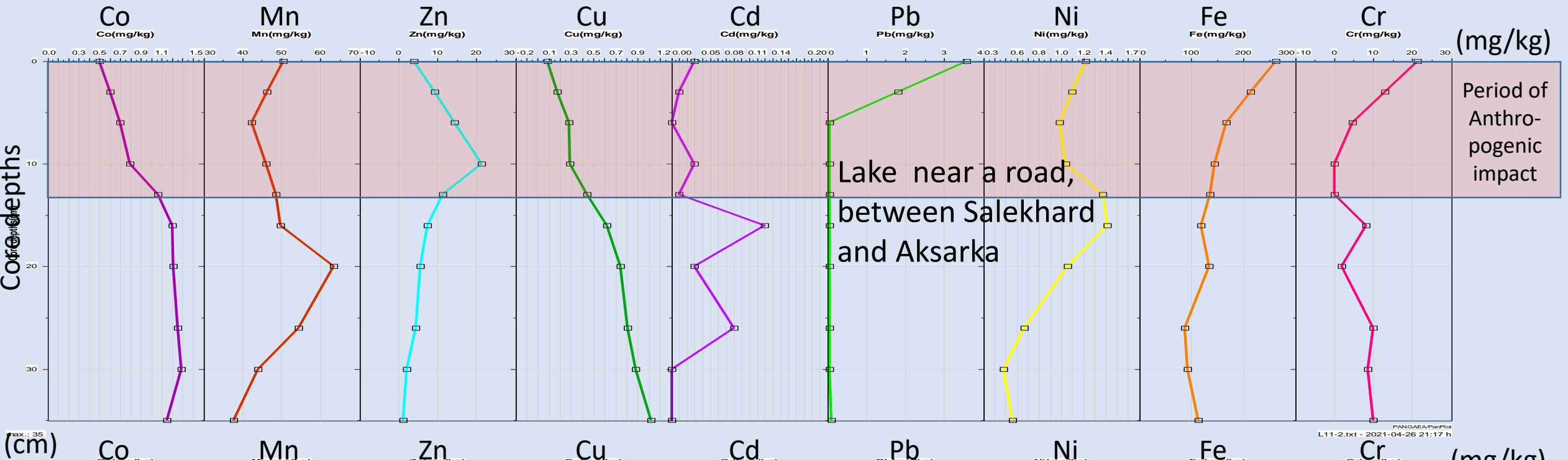


Mobile trace elements in sediment cores

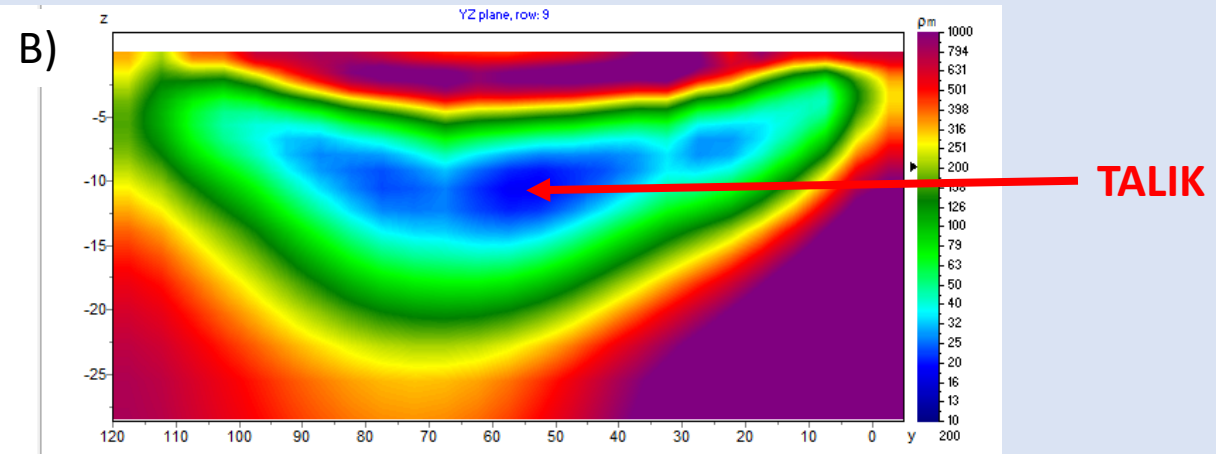
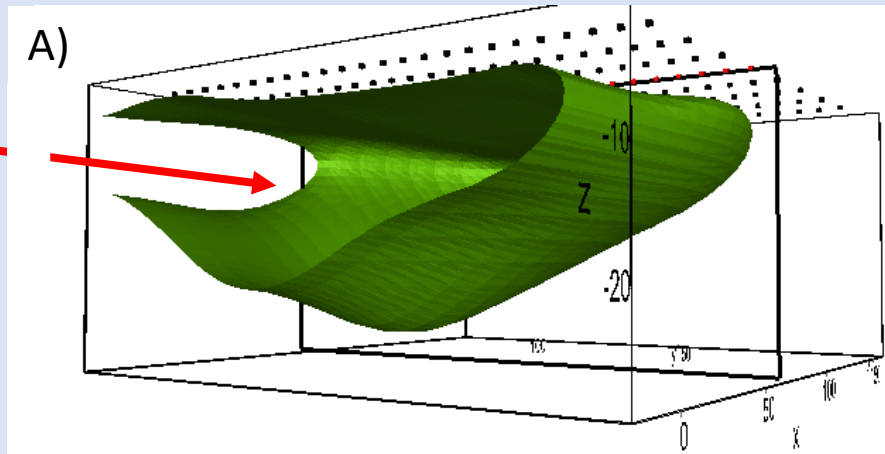
Lakes near the road and in the Salekhard road



**atomic absorption
spectrophotometry
using ammonium acetate
buffer (pH 4.8)**



Sublake Talik



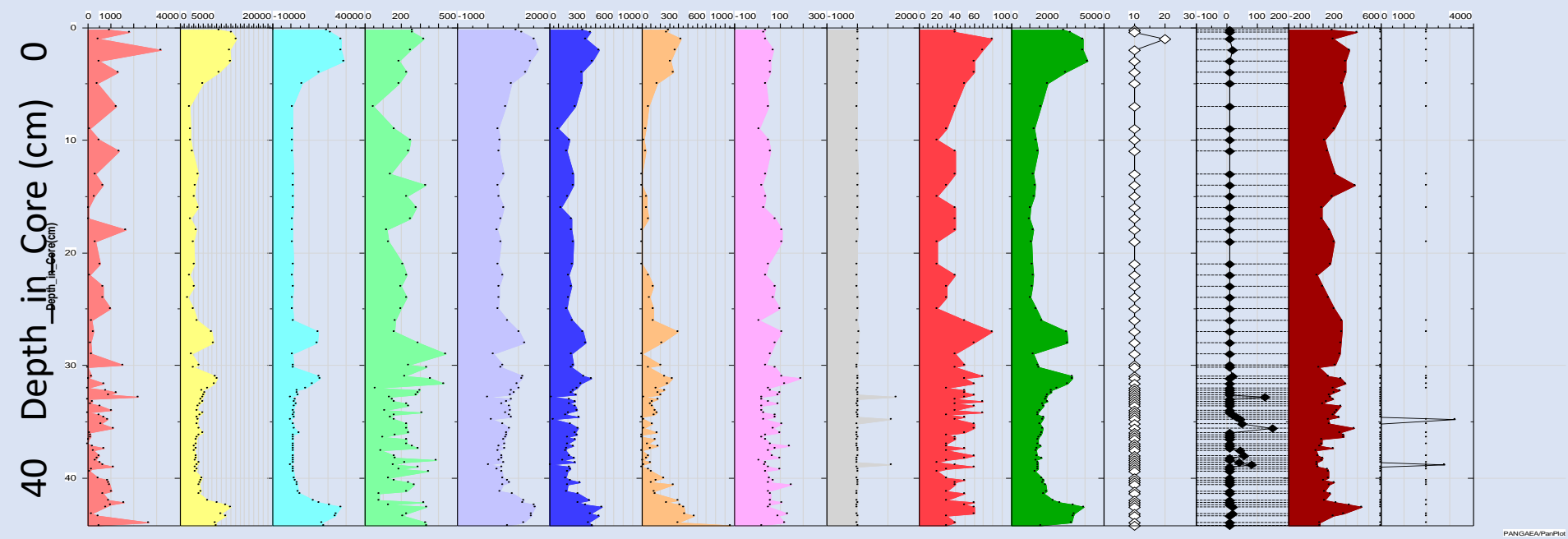
Results of 3D inversion of Electrical resistivity tomography (ERT) data on a lake on Yamal peninsula (Erkuta river terrace):

A) the CES iso-surface corresponding to 200 Ohmm - approximation of the form of the suspect table; geoelectric model (Bobrov, 2020).

MSCL logging and XRF scanning of Neito-3 Lake (Neitinskie Lakes)

XRF Oxides (ppm) MgO Al2O3 SiO2 SO3 K2O CaO TiO2 V2O5 Cr2O3 Mn2O3 Fe2O3 ZnO SrO2 BaO UO2 Parameter 43

Core Photo and photo with UV spectrum



Conclusion



- Yamal Peninsula is one of the significant region which terrestrial and aquatic landscapes are sensitive to the climate change. Presented studies include analyse of lakes from different parts of Yamal Peninsula: lakes on river terraces of the Yuribey, Erkuta, Pysedeyakha rivers, marine terraces of central Yamal (Neitinskie Lakes), and a lake from Beliy island (North part of Yamal).
- Water samples and sediment cores were taken and analyzed. Geochemical processes in lakes can show impact of climate variability on hydrochemical and biological specific, trophic and ecological status.
- Spreading of hydro- and geochemical data is wide and cover Yamal coastal zone and central part of the peninsula including several anthropogenic change ecosystems especially in the cities and near highways.
- Anthropogenic period (last 50-80 years) give increasing of Pb, Cr, Cu, and Mn in different lakes. Fe inclination has a natural volume under wetland conditions.
- Sublake taliks can reach 25 m under a lake floor. Talik saves geochemical and biogeochemical processes activity during the year, under ice-covering. It can be the reason of high GHG emission before the ice-covering as well.
- Dissolving oxygen is quite high (10-12 mg/l) rather in deep lakes; thermo- and halocline can be noticed in lakes on a marine terraces.
- Reconstruction of recent environmental and ecological changes on Yamal will be enriched according to MSCL logging and half-core XRF scanning for cores from Neitinskie Lakes (central part of Yamal). Dating and geochemical analyses of cores are in process.

Thank you for your attention!

Studies supported by RFBR grant 18-05-60291.

Mobile trace elements in sediment cores had been analyzed at Recourse Center on Chemistry of SPBU.

MSCL logging and XRF scanning had been done in Shirshov Institute of Oceanology of RAS by Geotek MSCL-XYZ instrument using.

