

Stability of relic methane hydrates at climatic changes in the Holocene

Arzhanov M.M., Malakhova V.V., Mokhov I.I., Parfenova M.R.

Main research directions:

- Modeling of the thermal regime of the soil;
- Analysis of the dynamics of permafrost under climate changes in the Holocene;
- Analysis of the gas hydrates stability.

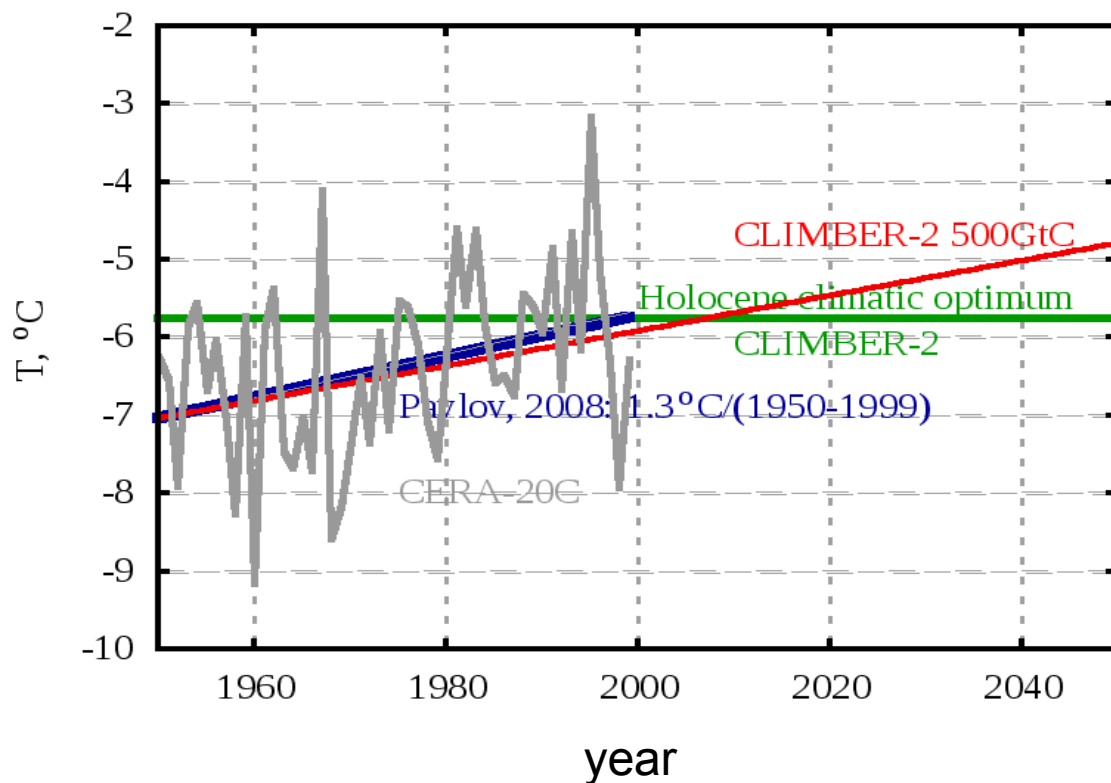
In recent years, new geophysical phenomena have been observed in the high-latitude permafrost regions of Western Siberia.



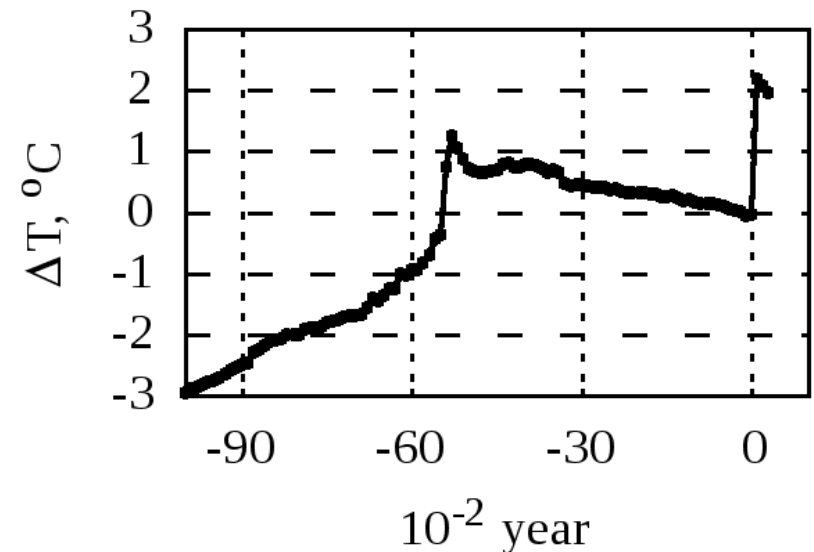
Numerical experiments

- Model of thermal processes in the soil [Malakhova and Eliseev, 2017]
- External atmospheric forcing based on Global climate model CLIMBER-2 [Ganopolski et al., 2010]
- Heat flux 0.06 W m^{-2} [Davies, 2013]

Air temperature in Yamal region

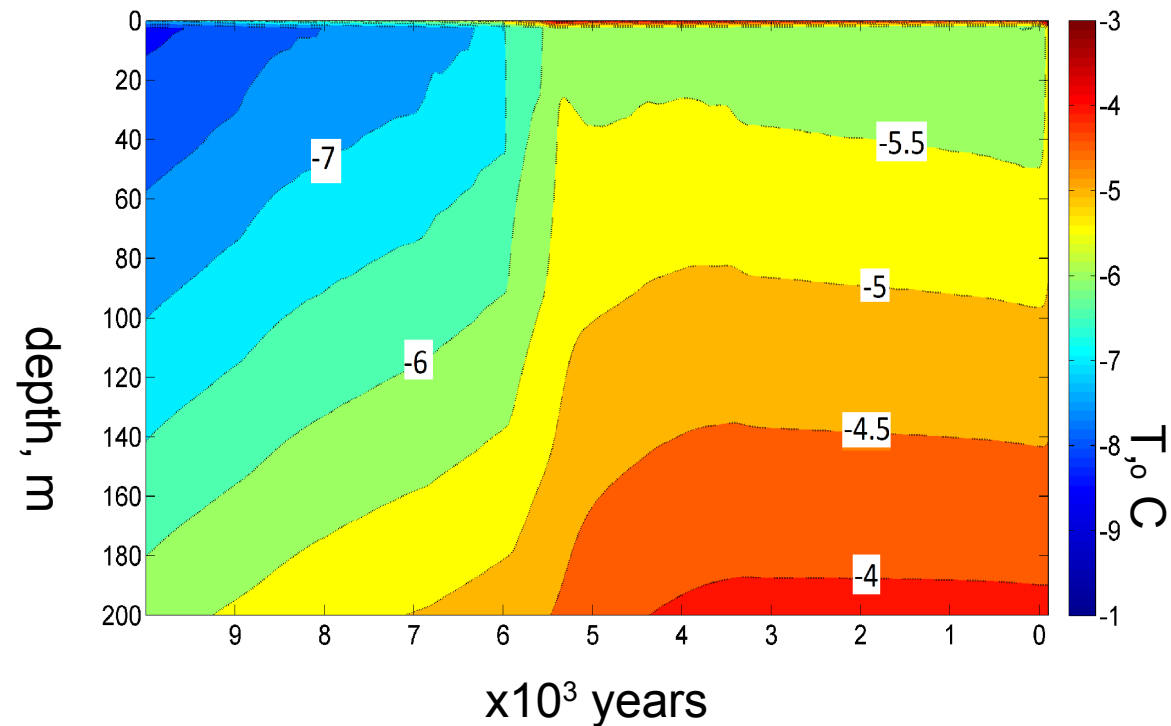
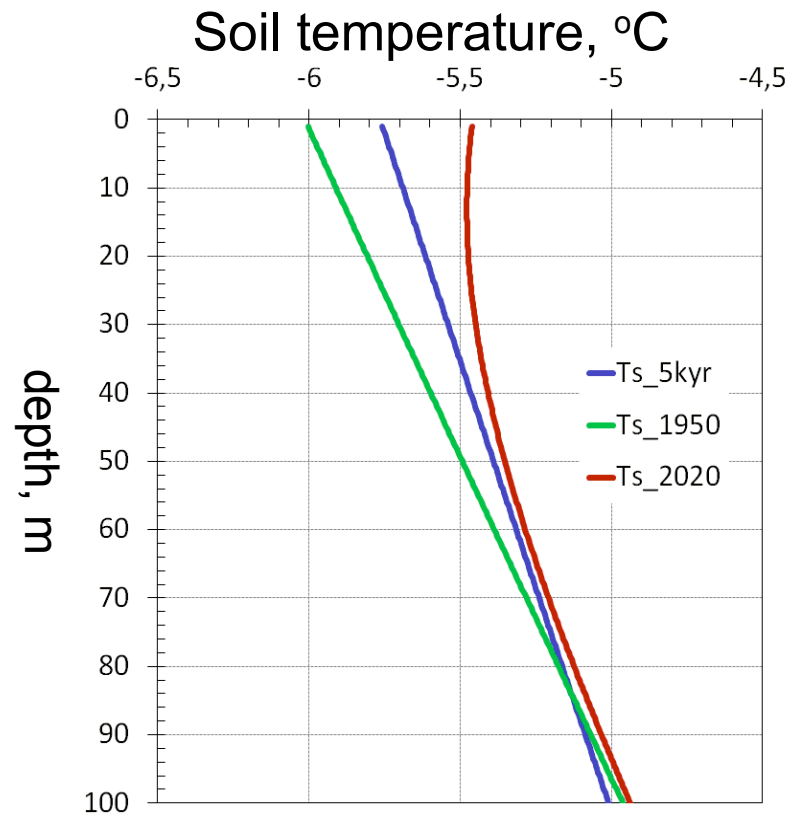


Air temperature anomalies in Yamal region
[Ganopolski et al., 2010]



Current regional warming may exceed the magnitude of the Holocene optimum warming.

Modeling of the thermal regime of the soil



The results obtained indicate that at present time, stable and relict methanhydrates might have persisted at negative temperatures below -7°C for the last 10 thousand years, including the optimum Holocene preiod, and still might exist in the frozen soil of Yamal at depths of up to 150 m, which is above the modern boundary of the stability zone. The disruption of their stability might be a consequence of ongoing climate change.