New Russian polar station at Severnaya Zemlya - potential member of BSRN Network

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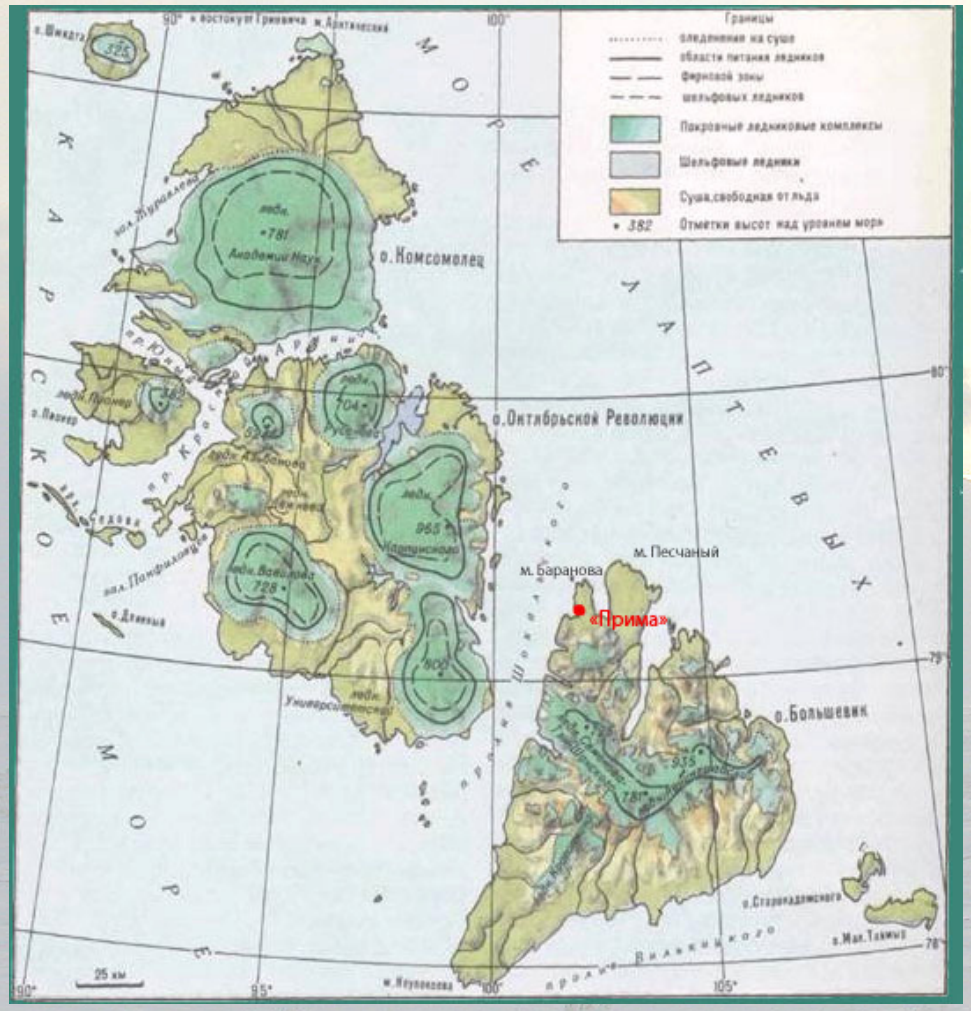
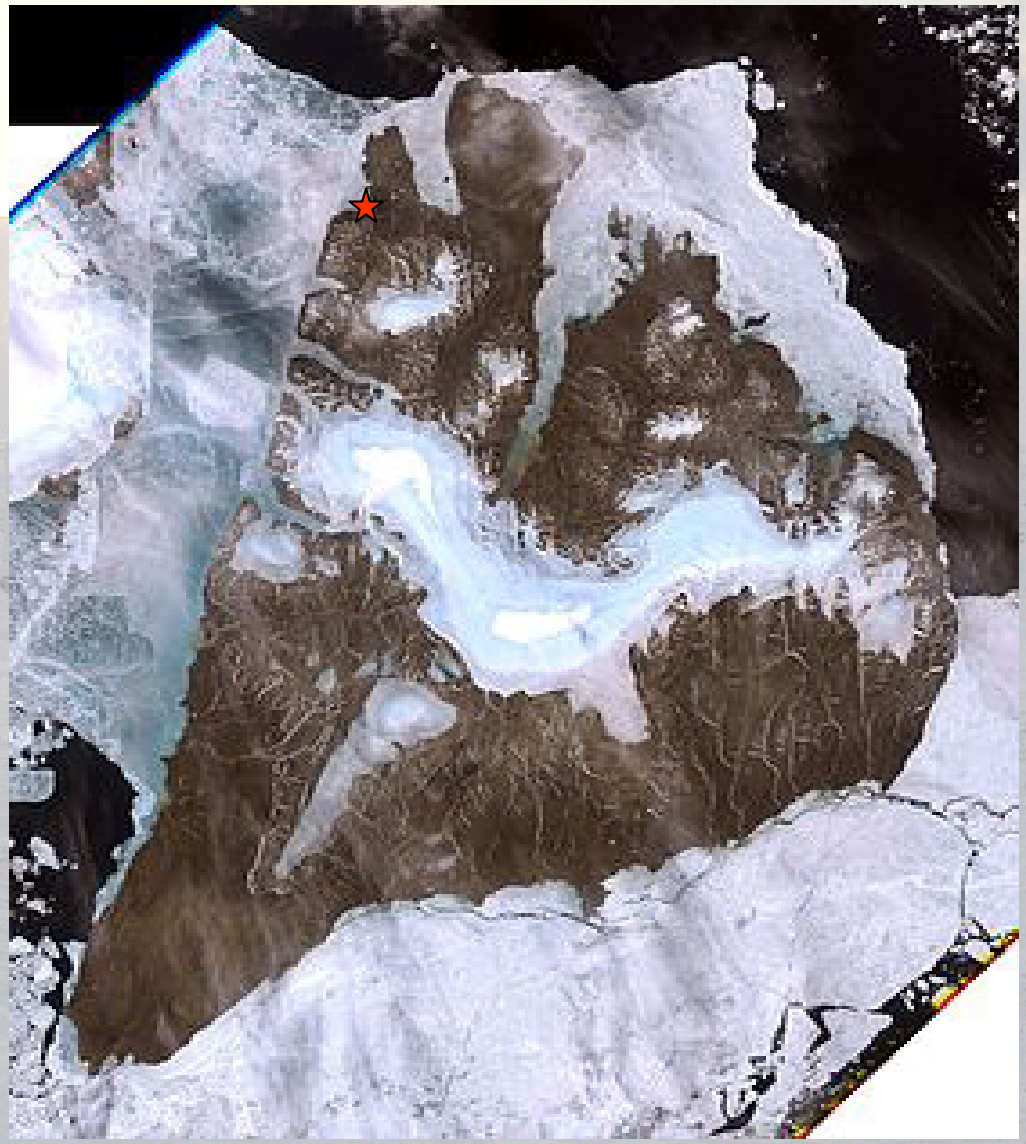
Russia

Main goal of establishment Observatory "Ice Base Cape Baranova" is to identify the causes and consequences of climate change in the Arctic with special attention to the comprehensive studies of interrelated components of the Arctic climate system:

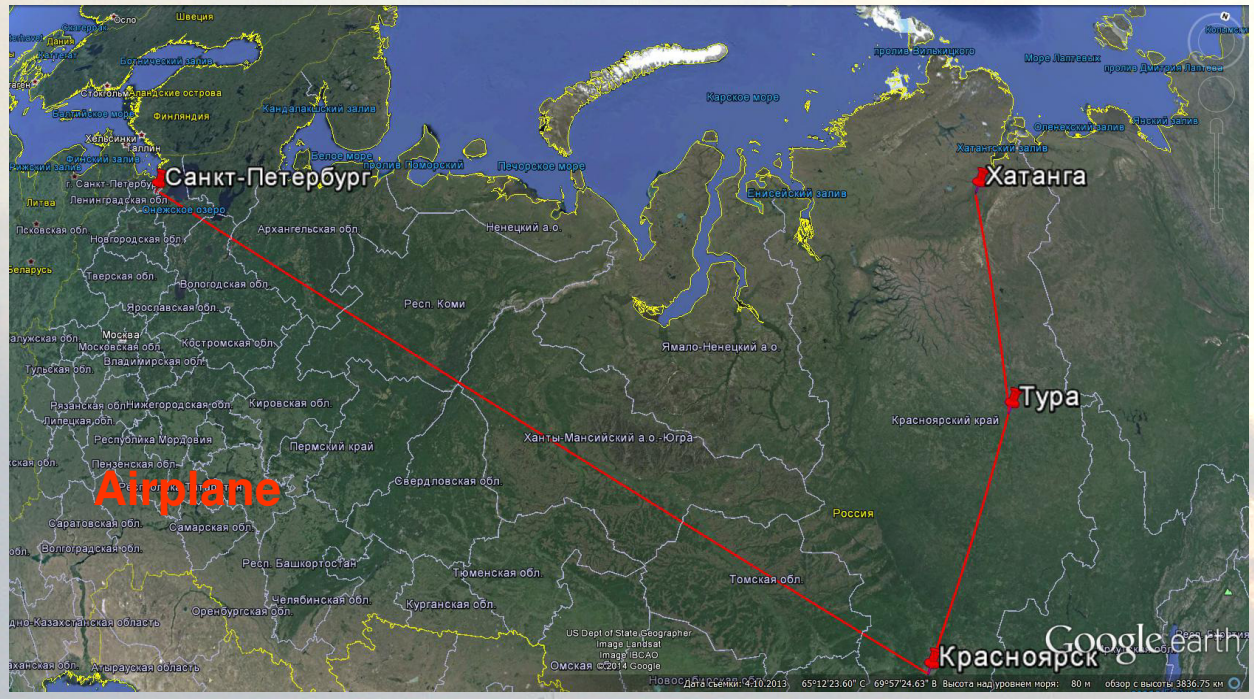
- surface heat and radiation balance;
- cloudiness and aerosol components of the atmosphere;
- processes of gas - and mass transfer;
- chemical composition of atmosphere and hydrosphere;
- melting of permafrost;
-study of drifting, fast and lake ice;
- characteristics of hydrological regime of the Shokalski Strait and western Laptev Sea
-dynamics of glaciers.

The map of Archipelago Severnaya Zemlya and view of the Bolshevik Island from space





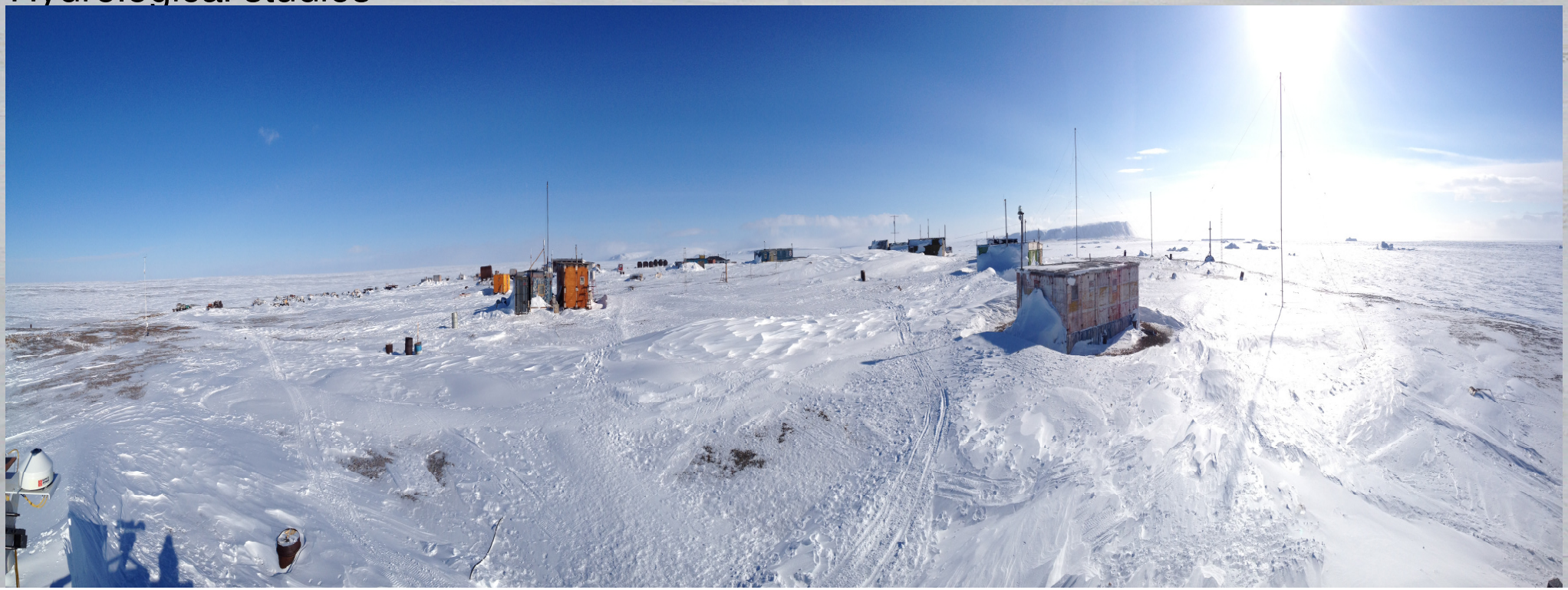
The route from Sankt Petersburg to “Ice Base Cape Baranova”



Observatory "Ice Base Cape Baranova“ from height 500 m

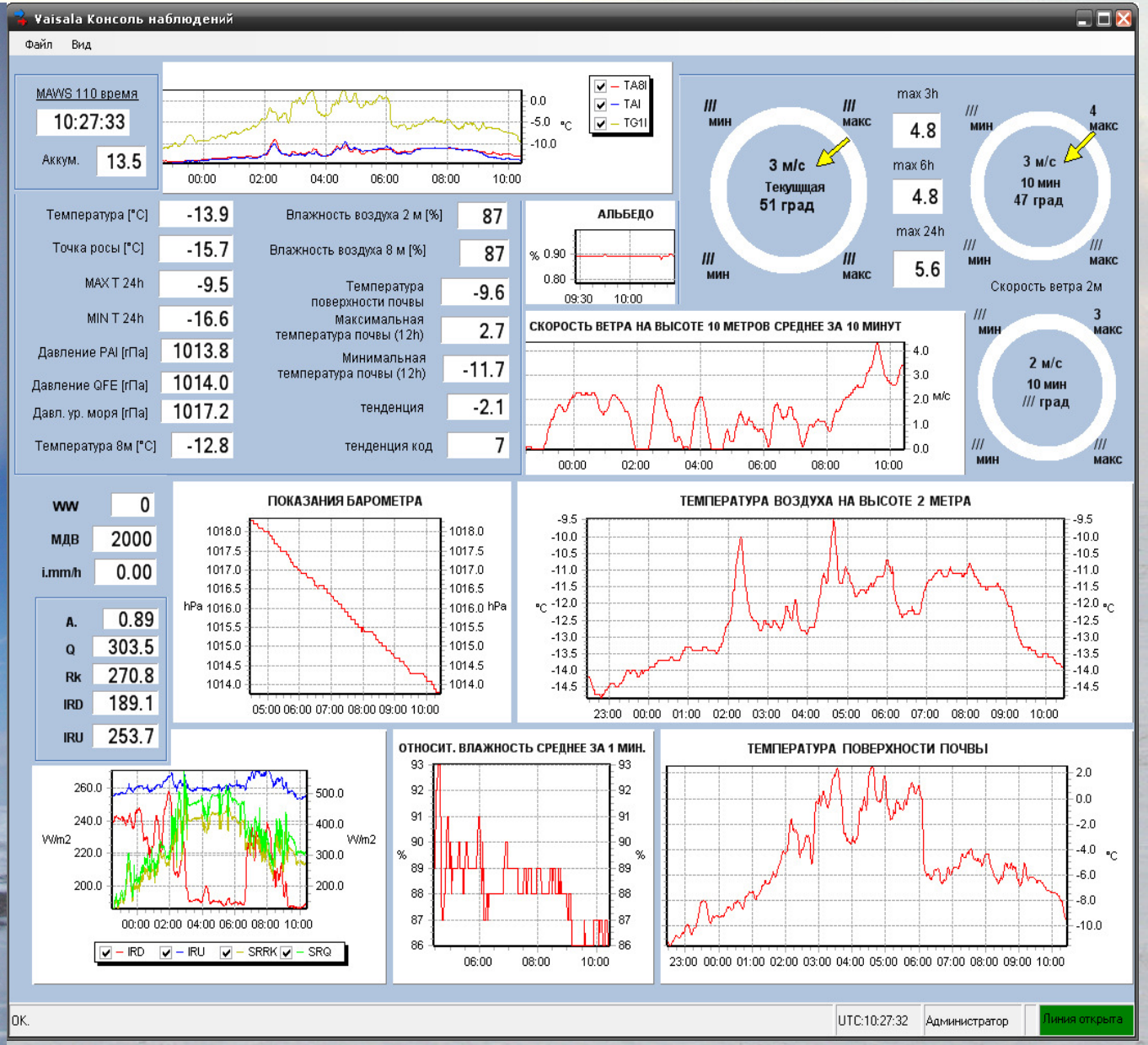
Observations and studies beginning May 2014

Standard meteorological observations
Standard actinometrical observations
Radiation monitoring in framework of BSRN
Route surveys of spectral albedo
Upper-air observations
Monitoring of greenhouse gases
Heat balance observations
Studies of physical - mechanical properties of fast ice
Testing of new devices for measurements of freshwater and sea ice thickness
Oceanographic investigations in the Shokalski Strait
Organization of polygon for glaciological investigations at the glacier Mushketov
Hydrological studies

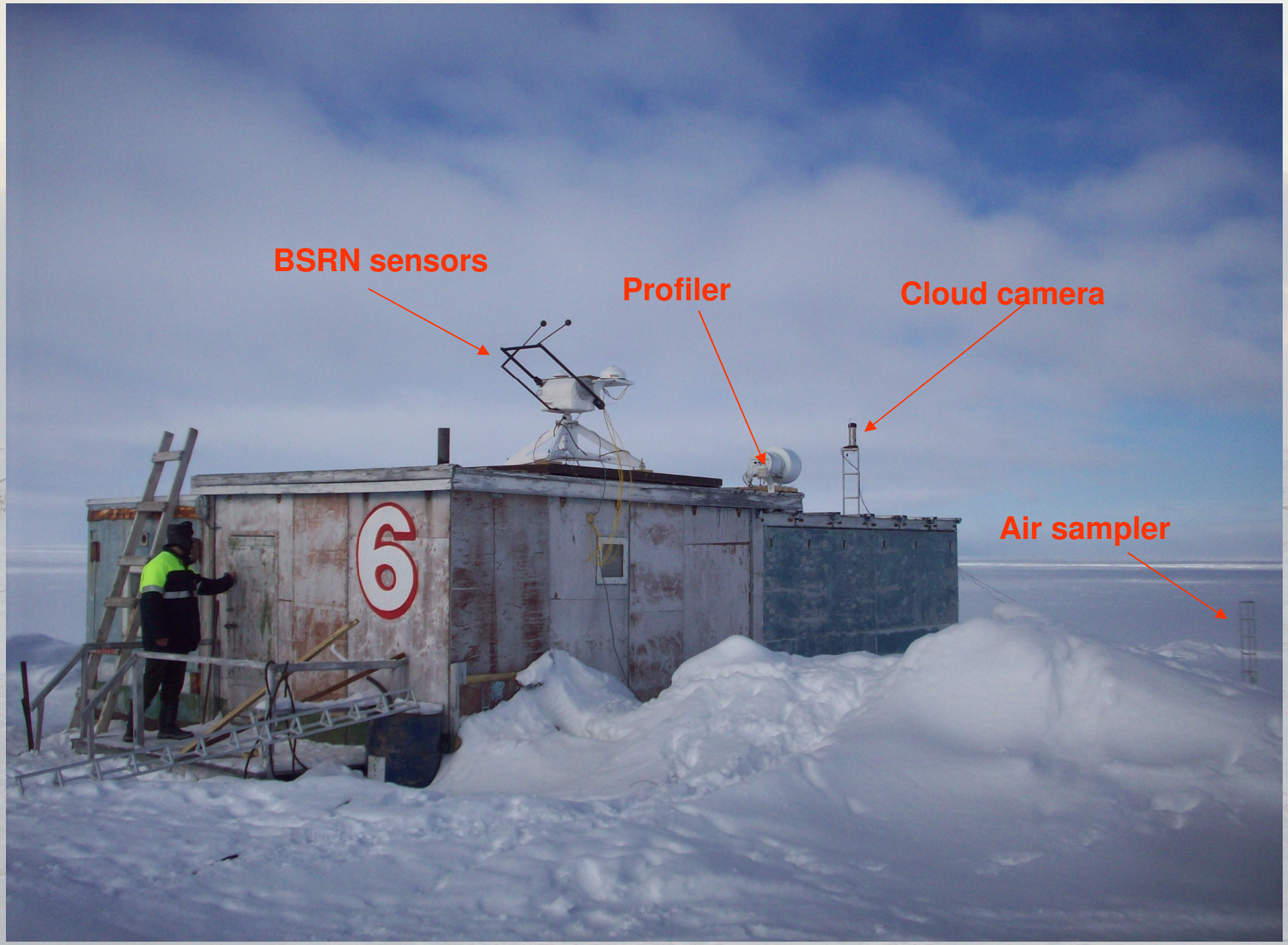



Standard and special meteorological observations

Standard meteorological observations with automatic station MAWS – 110



Instruments for special meteorological observations

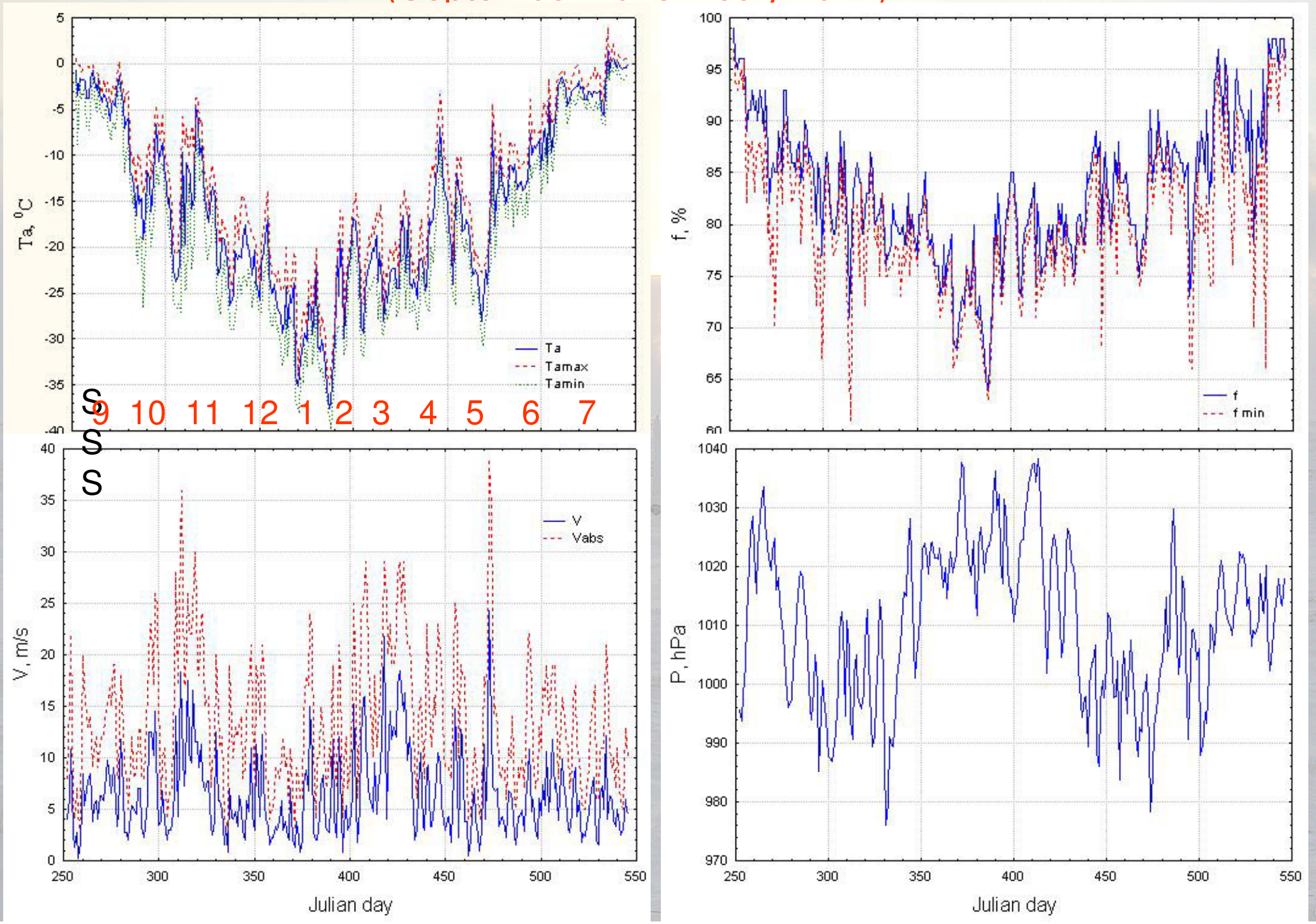


Installations for spectral albedo, turbulent fluxes and reflected short and longwave radiation

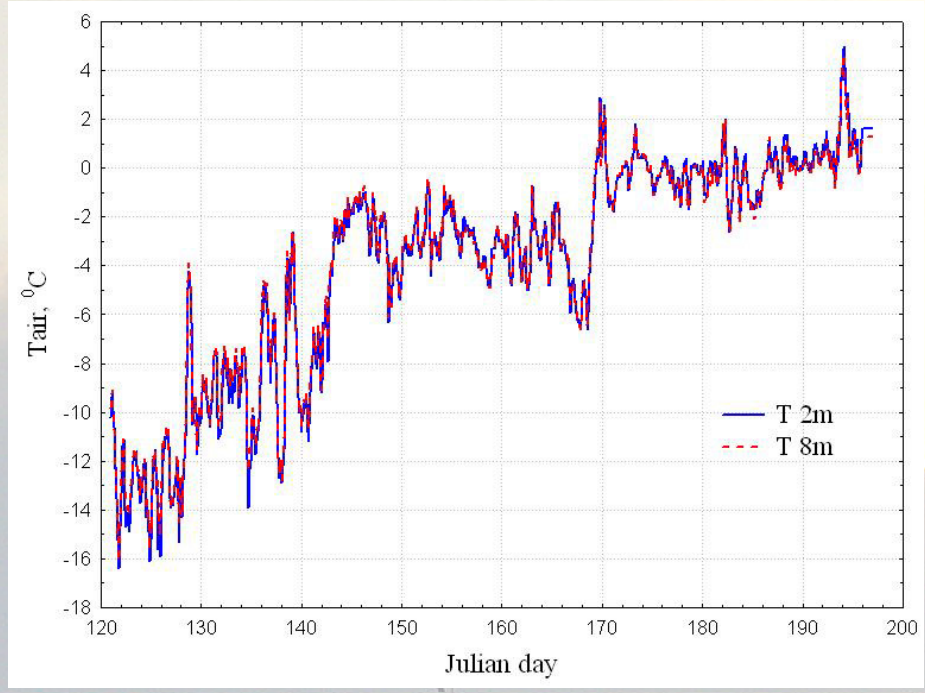
Sensors for radiation measurements in frame of BSRN program

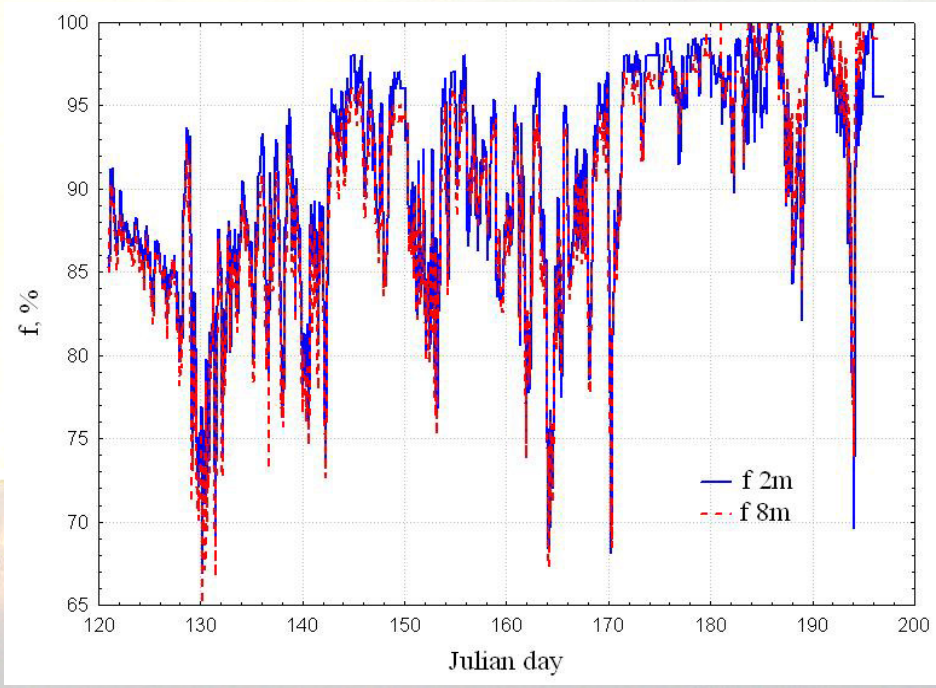
Parameter	Range and accuracy
Direct solar radiation: Kipp&Zonen CHP1	Spectral range: 200 – 4000 nm, range of measurements: 0 – 1200 W/m^2, accuracy: 2 % or ±3 W/m^2 (major value)
Total, reflected and diffuse solar radiation: Kipp&Zonen CMP21	Spectral range: 200 – 4000 nm, range of measurements: 0 – 4000 W/m^2, accuracy: ±9 W/m^2
Incoming and outgoing longwave radiation : Kipp&Zonen CGR4	Spectral range: 5 – 42 mkm, range of measurements: 0 – 4000 W/m^2, accuracy: ±10 W/m^2

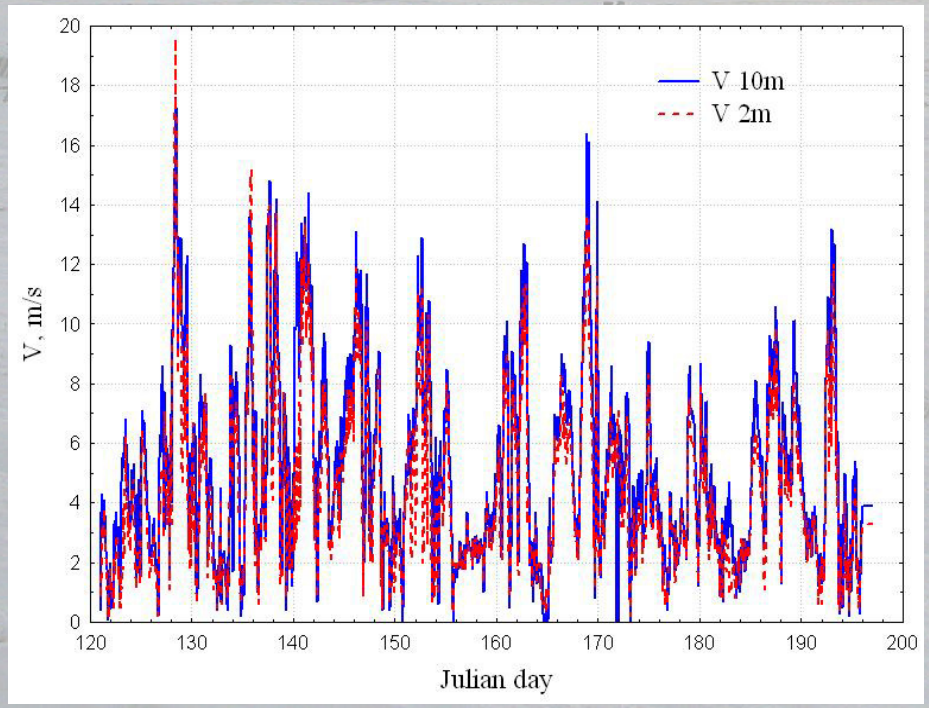
Data of each 3 hours standard meteorological observations (September 2013 – July 2014)

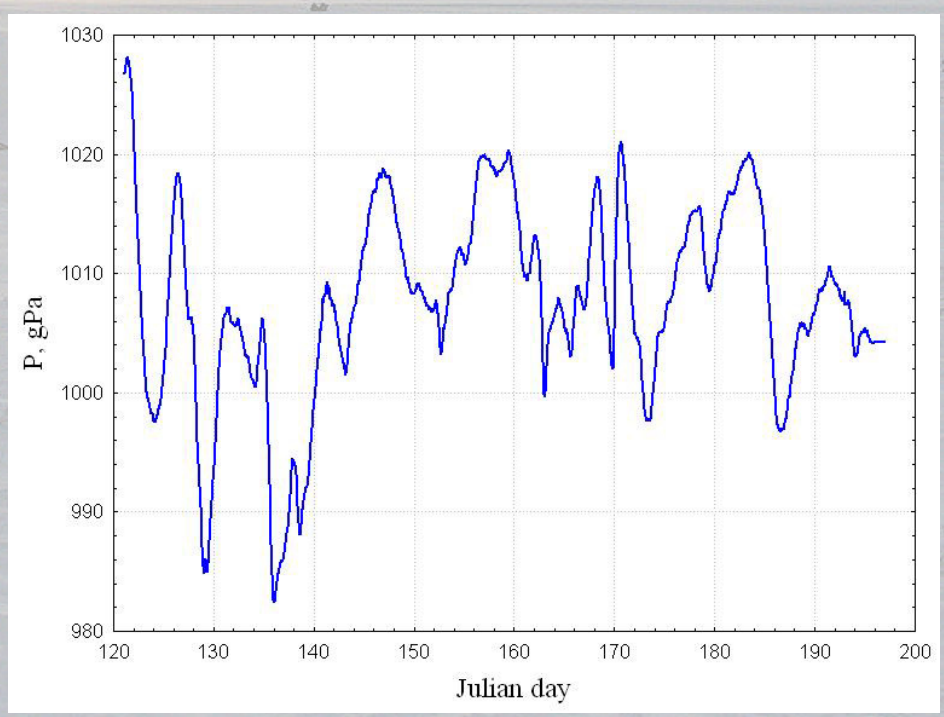


Data of hourly averaged gradient measurements in May – July 2014

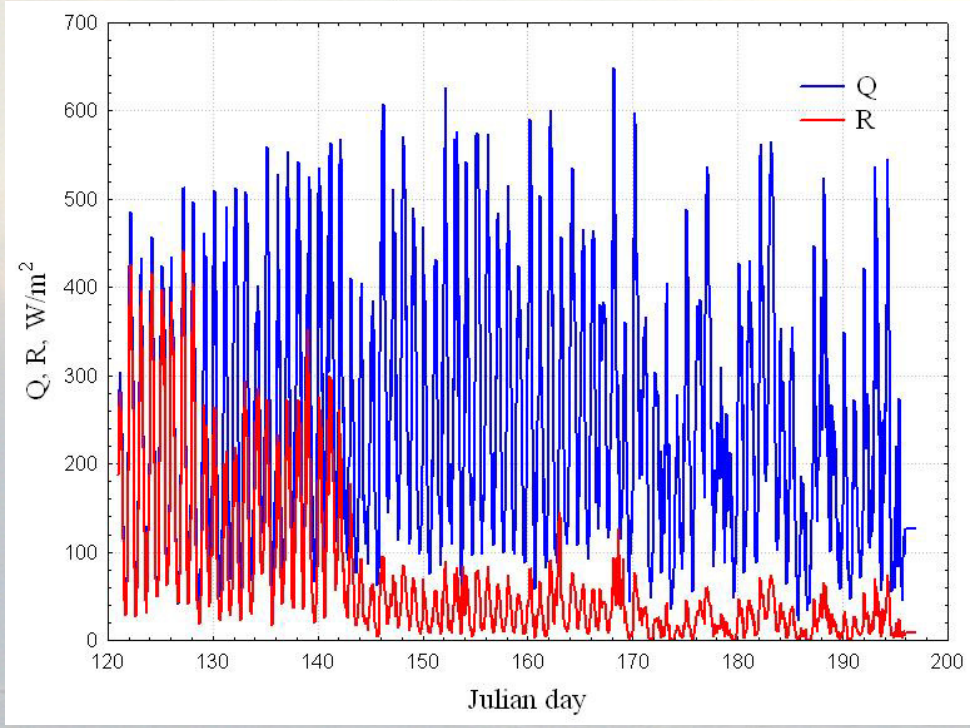


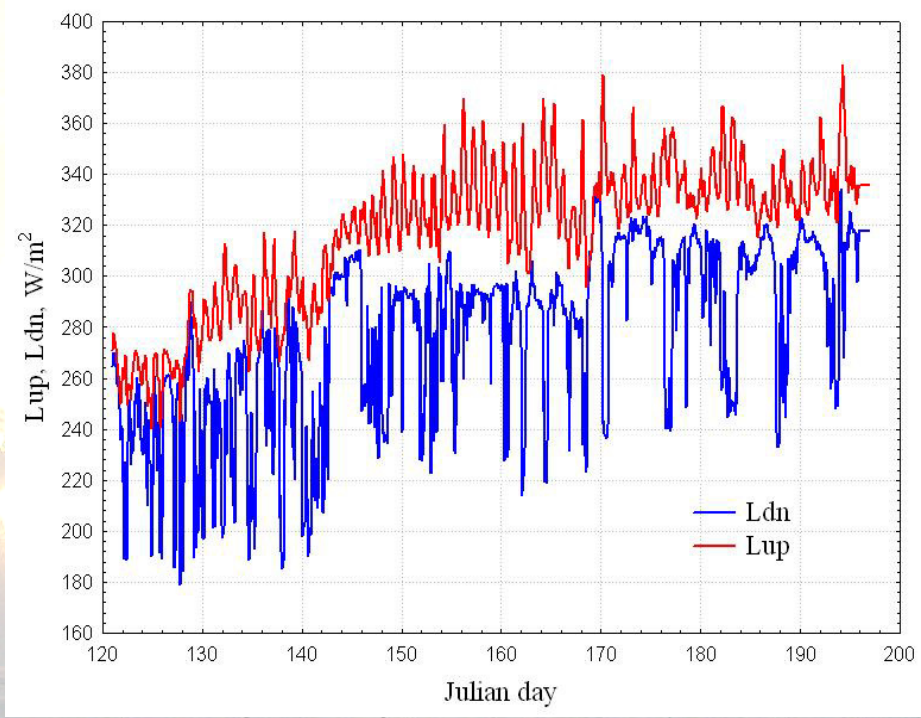


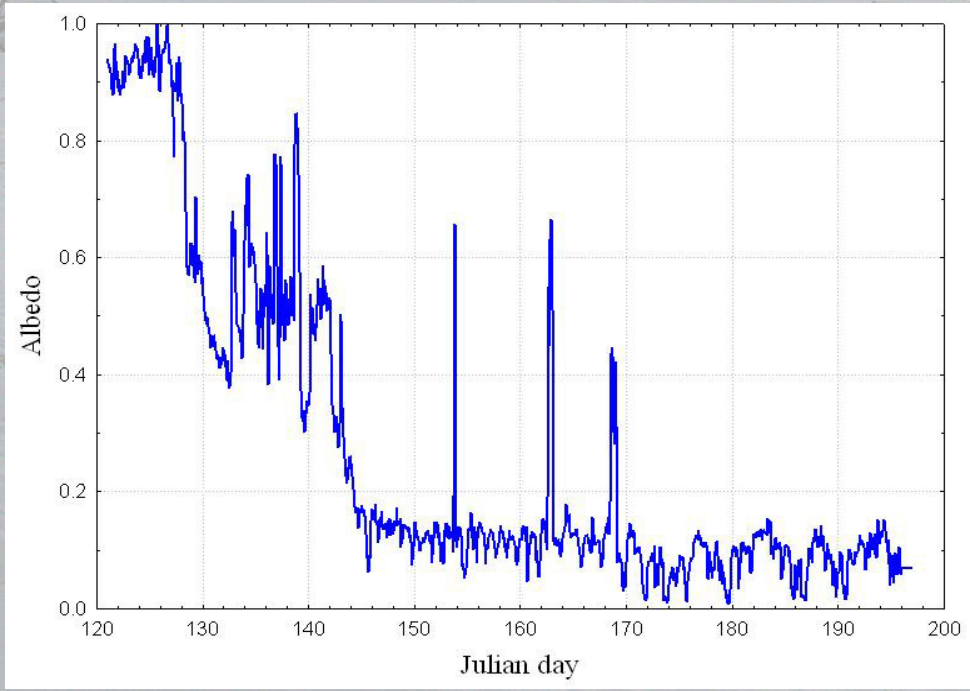


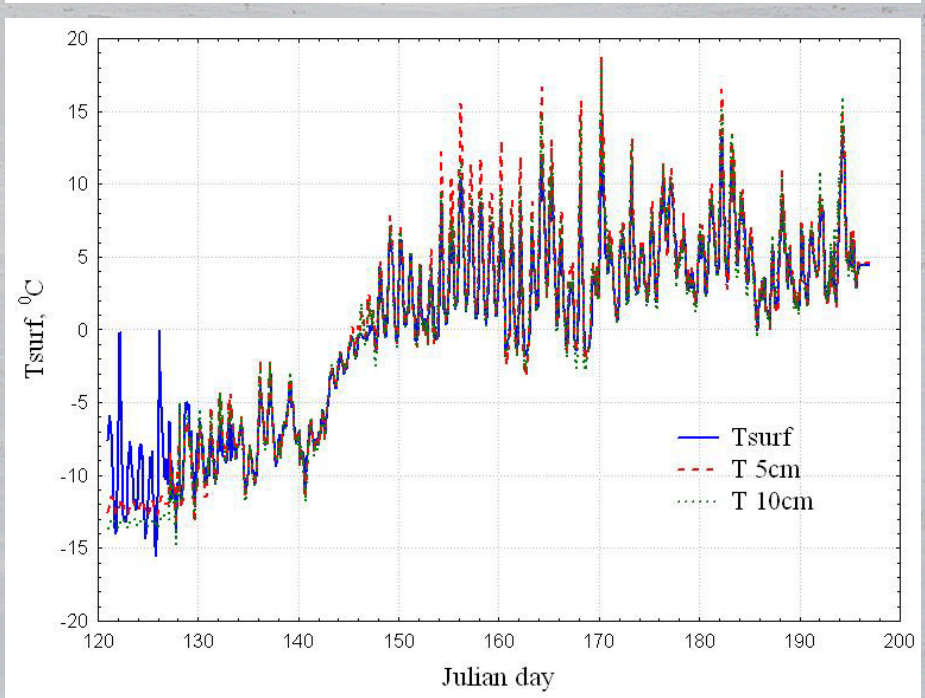


Radiation fluxes, albedo and surface temperature in May – July 2014

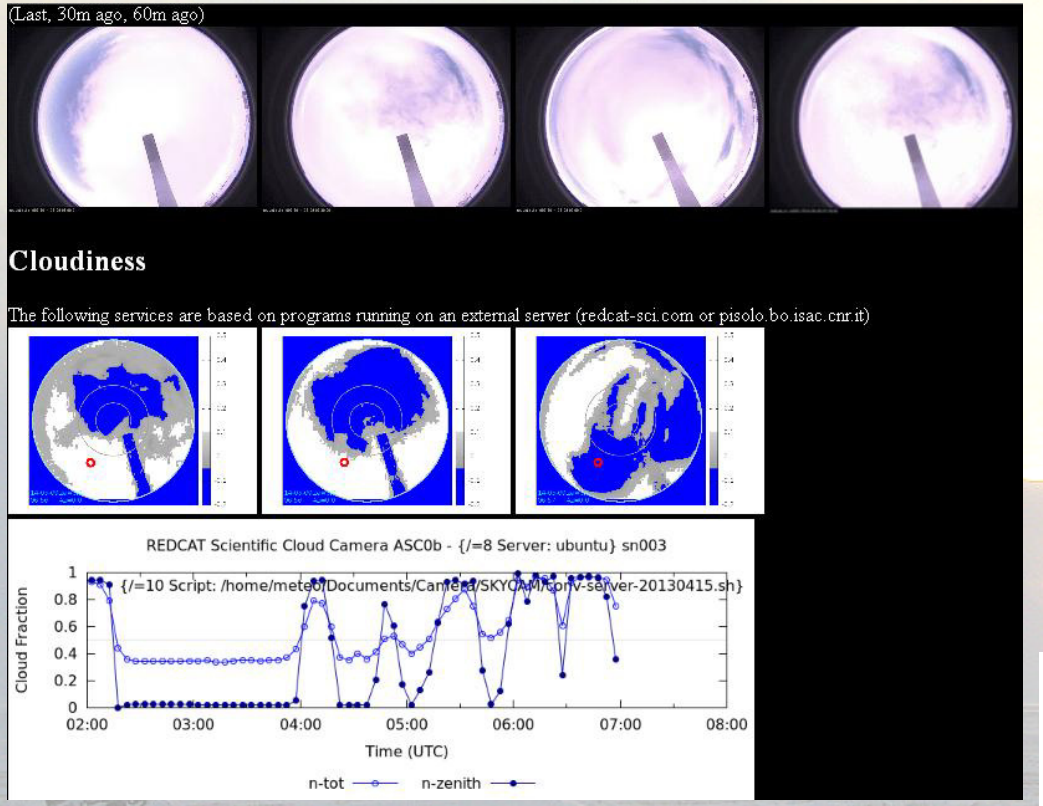




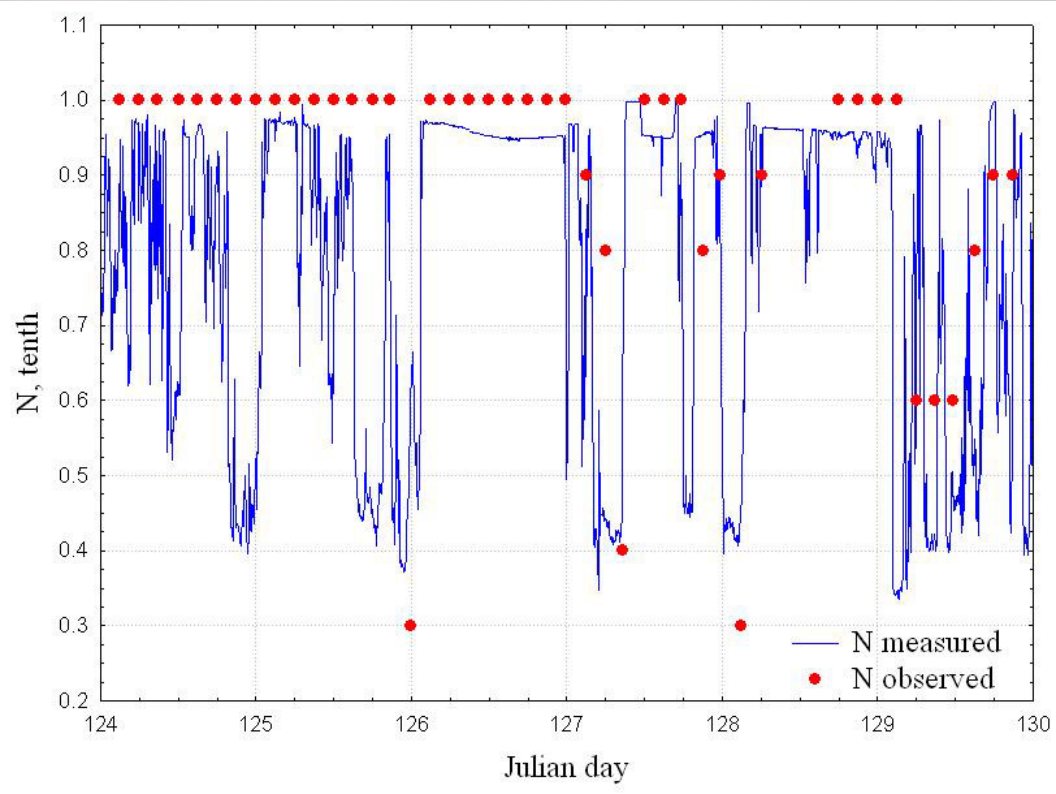




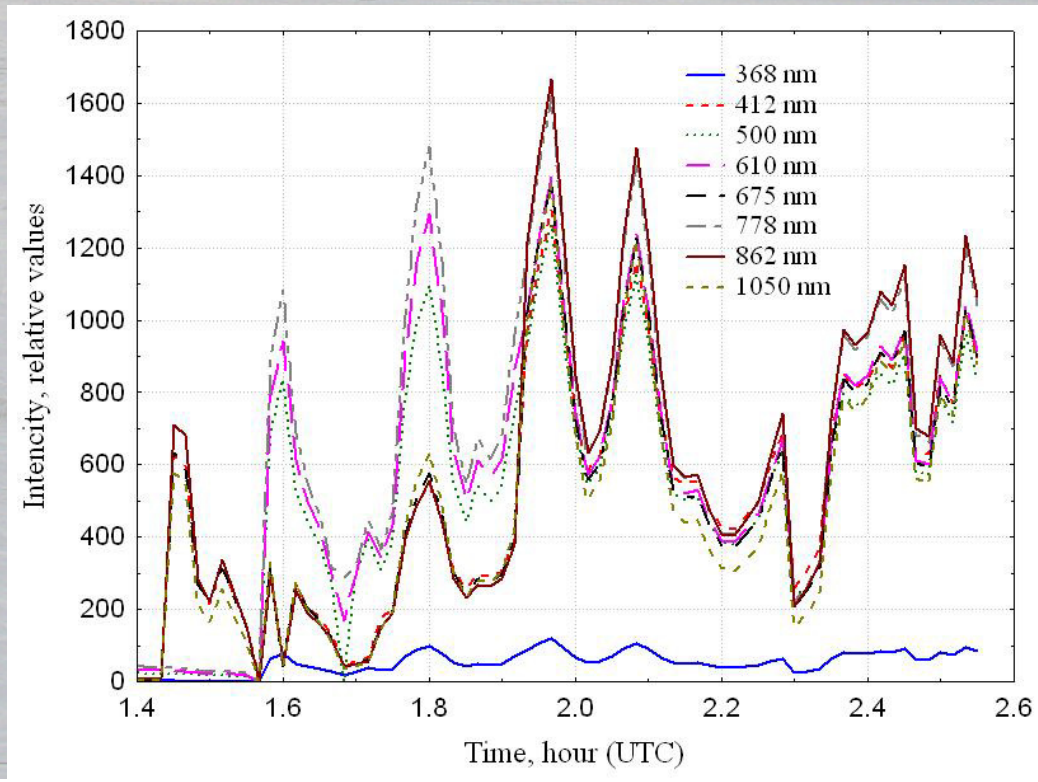
Cloud camera “Red Cat” screen shot



Comparison of cloud camera data with data of visual observations

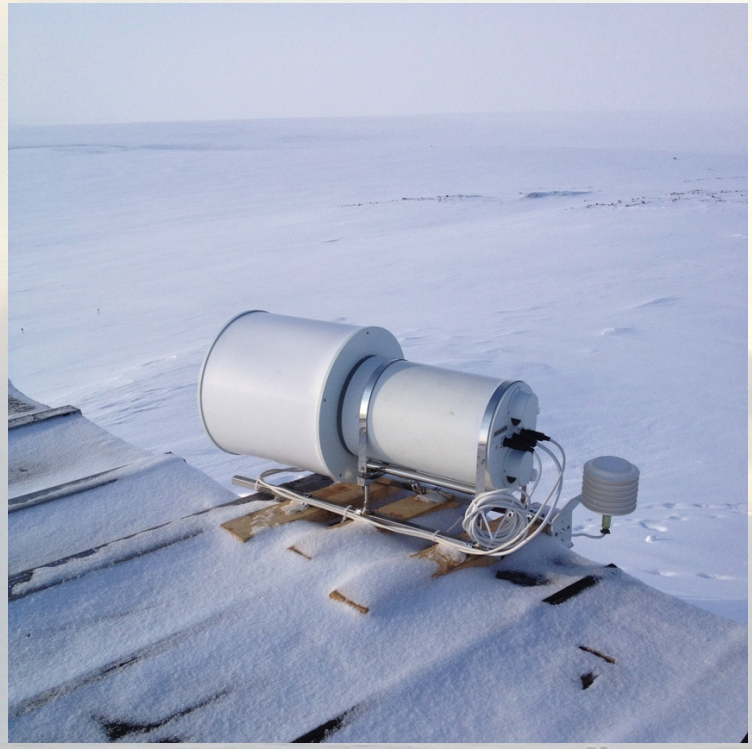


Solar photometer “ SUN” at tracker and example of data in 8 spectral ranges

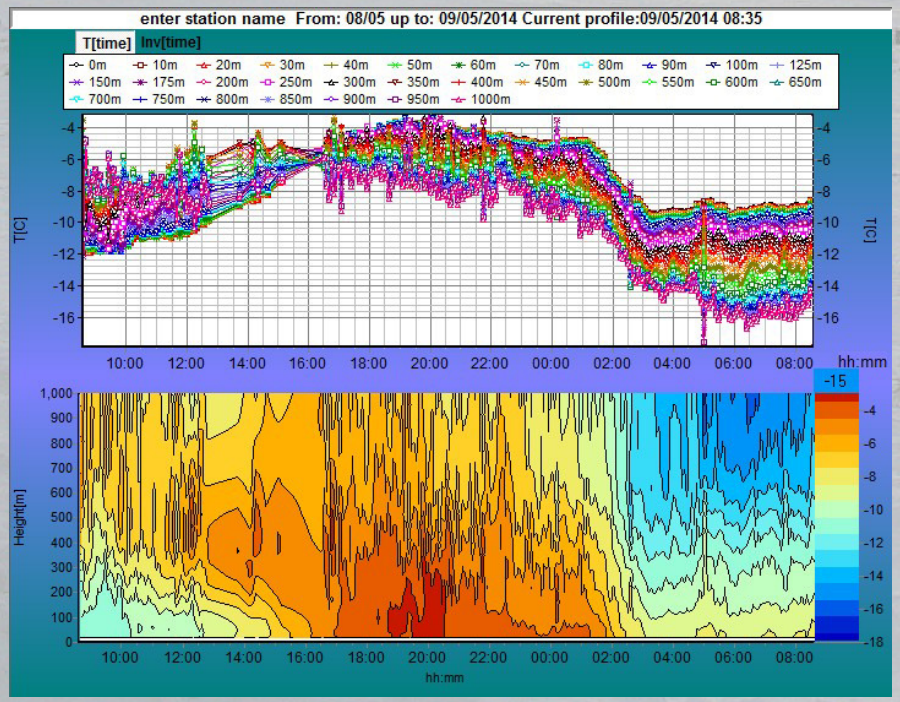



Study of atmospheric boundary layer and free atmosphere

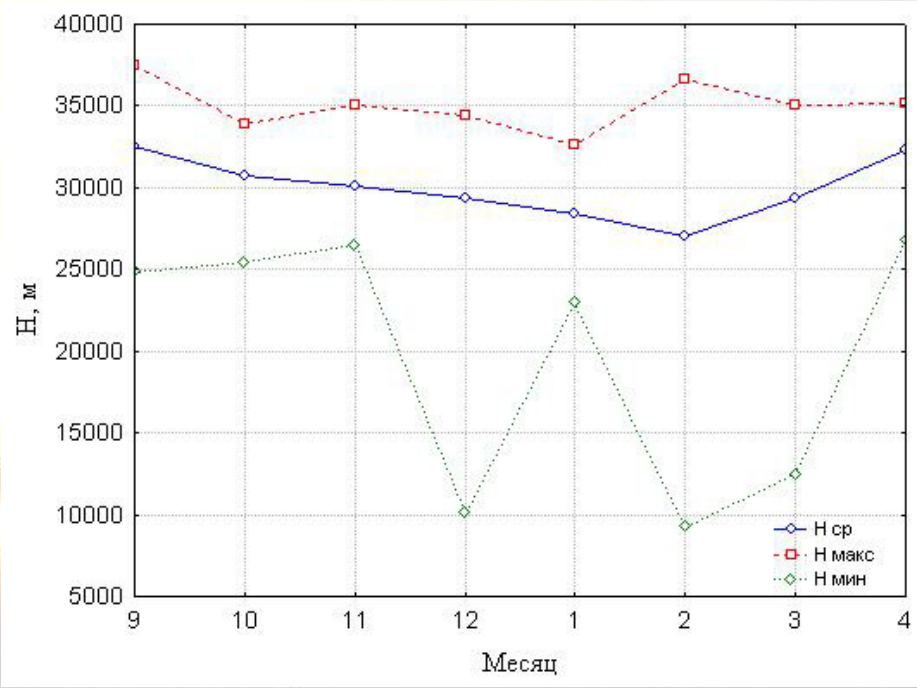
Measurements of atmospheric boundary layer temperature with profiler MPT-5



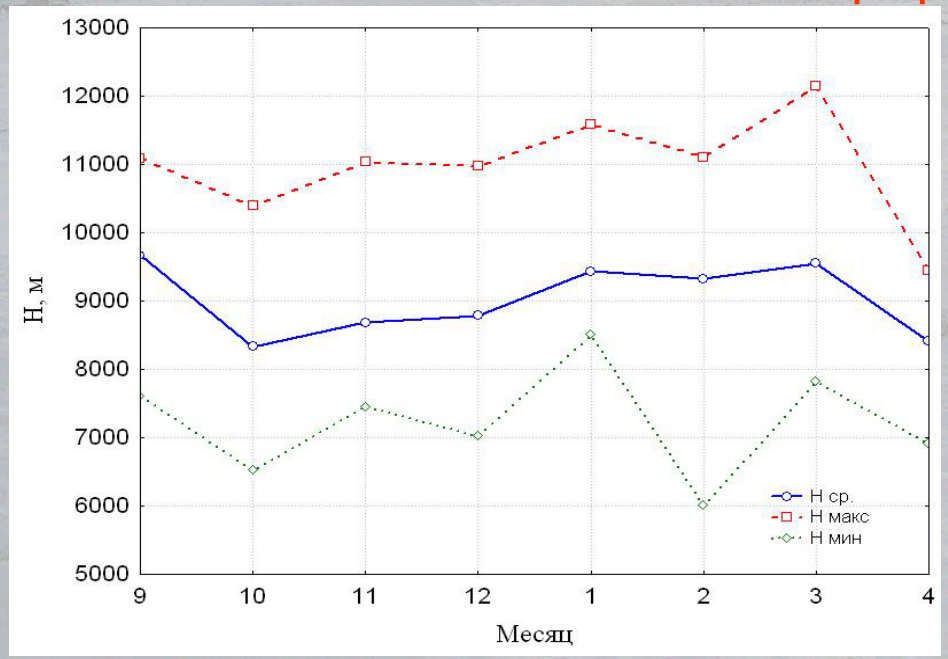
Range of air temperature measurements and accuracy	-40 °C - +40 °C ± 1.2 °C
Range of profile measurements heights	0-1000 м
Resolution from 0 to 100 м	10 м
Resolution from 100 to 200 м	25 м
Resolution from 200 to 1000 м	50 м
Periodicity of profile measurements	5 мин

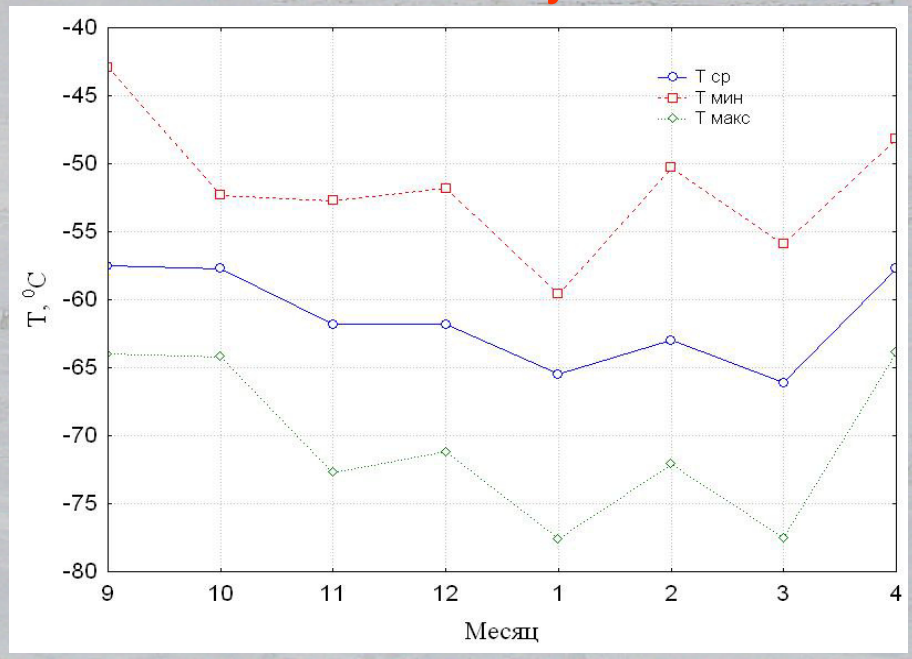


Standard upper-layer observations



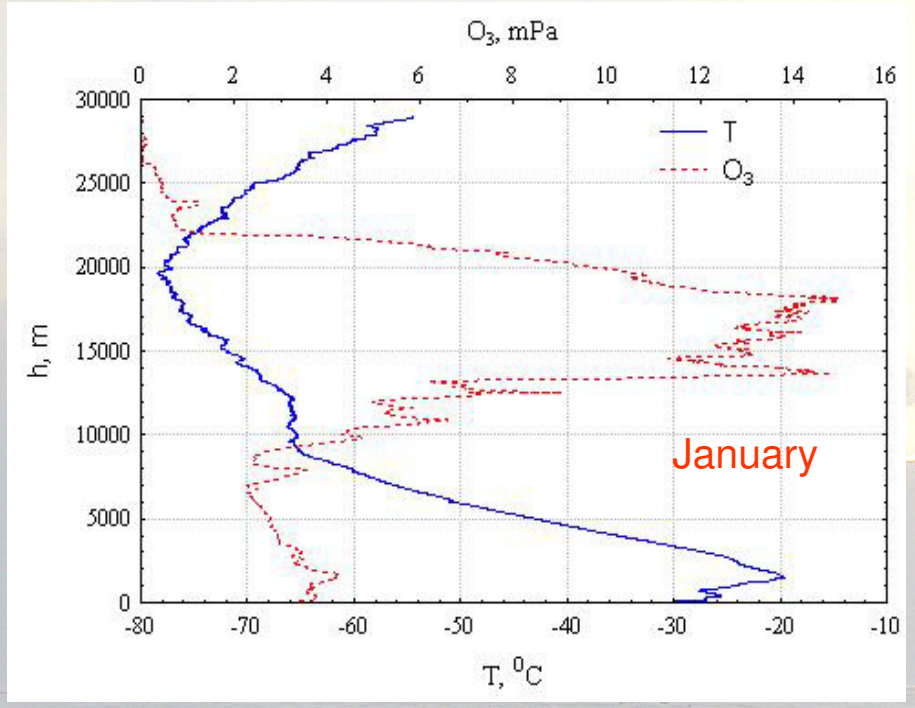
Characteristics of tropopause seasonal variability

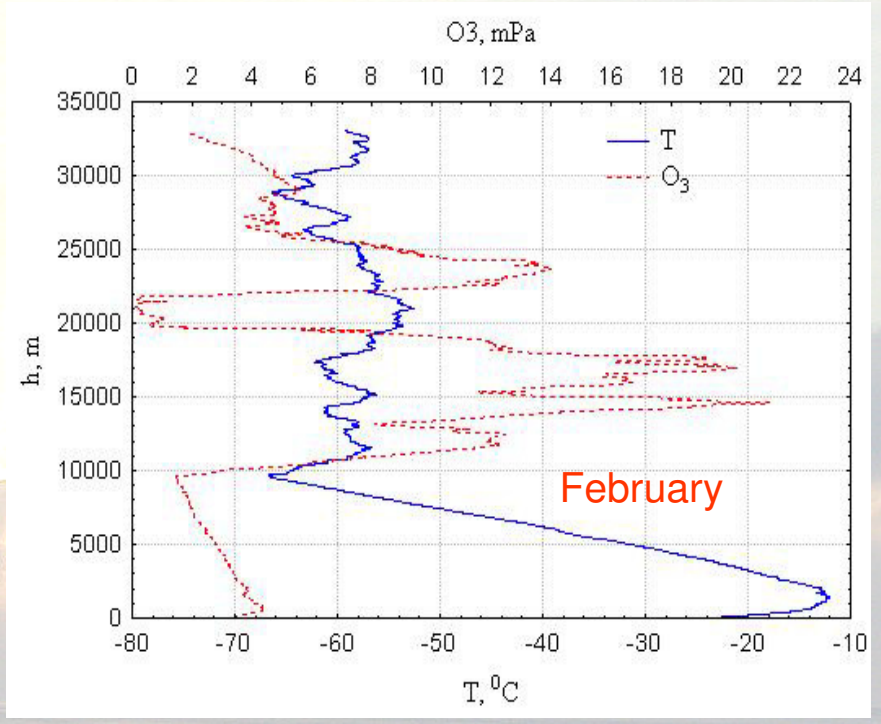


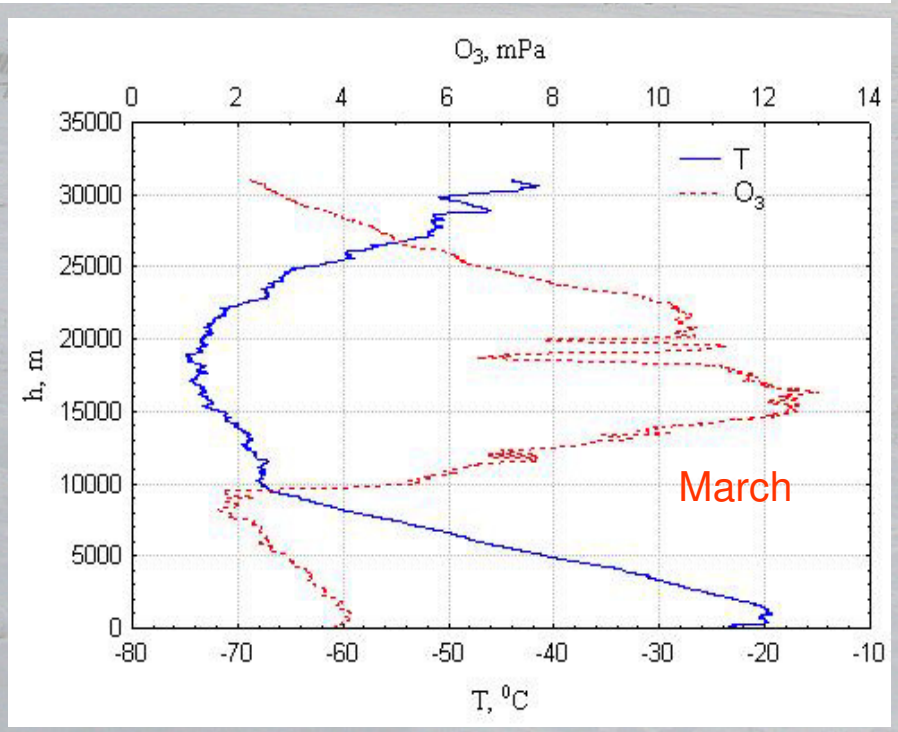


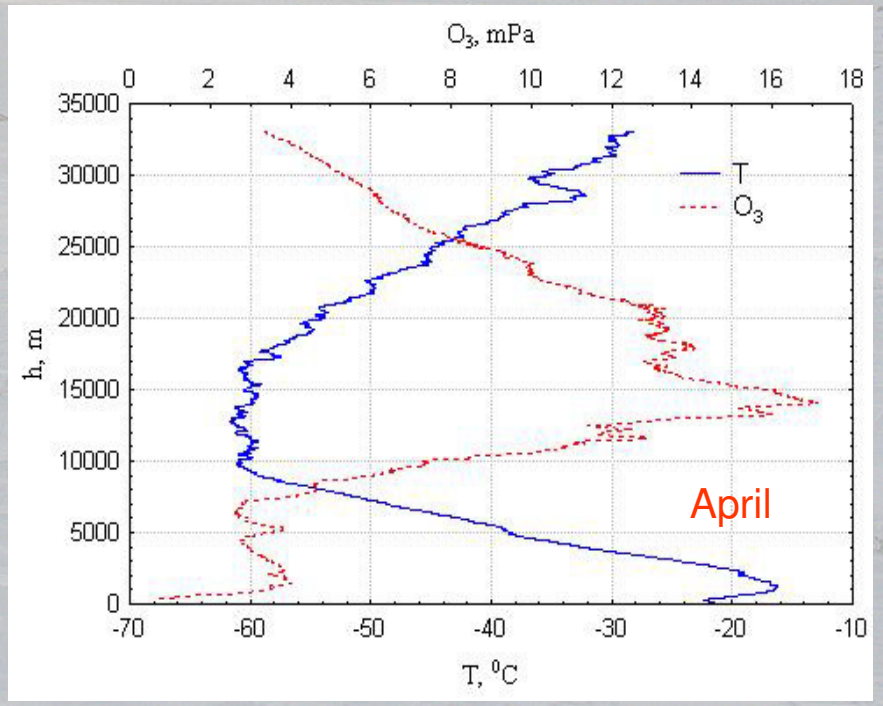

Green house gases

Vertical distribution of atmospheric ozone in winter 2014

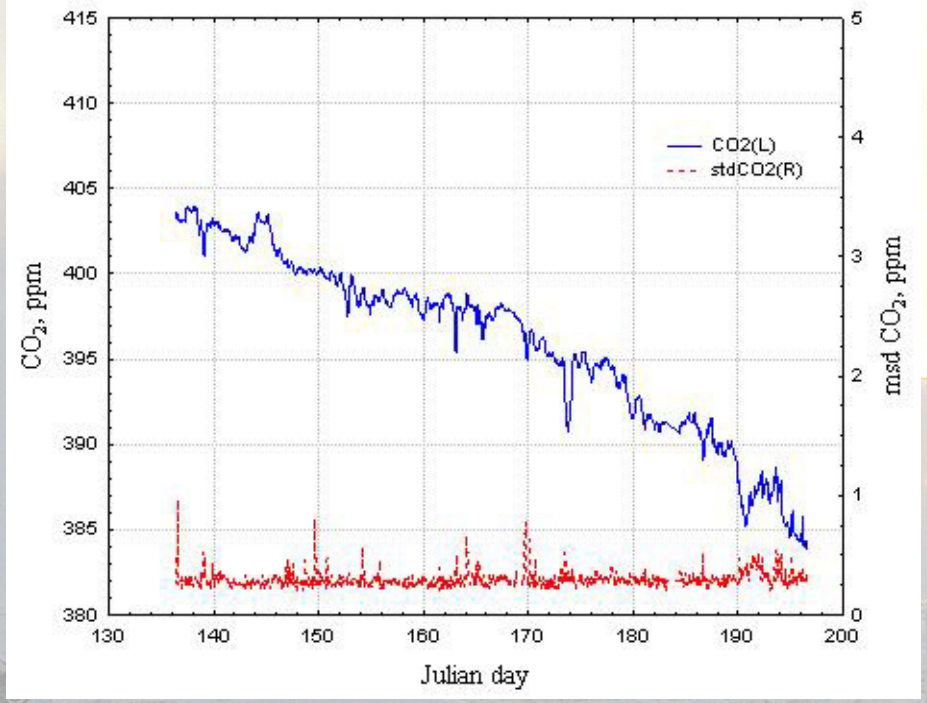


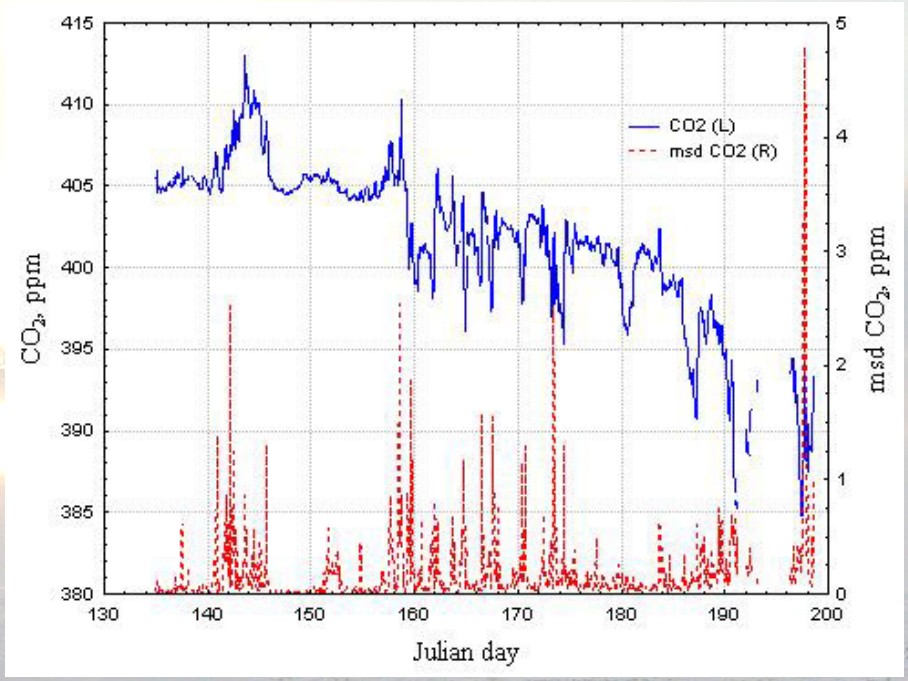


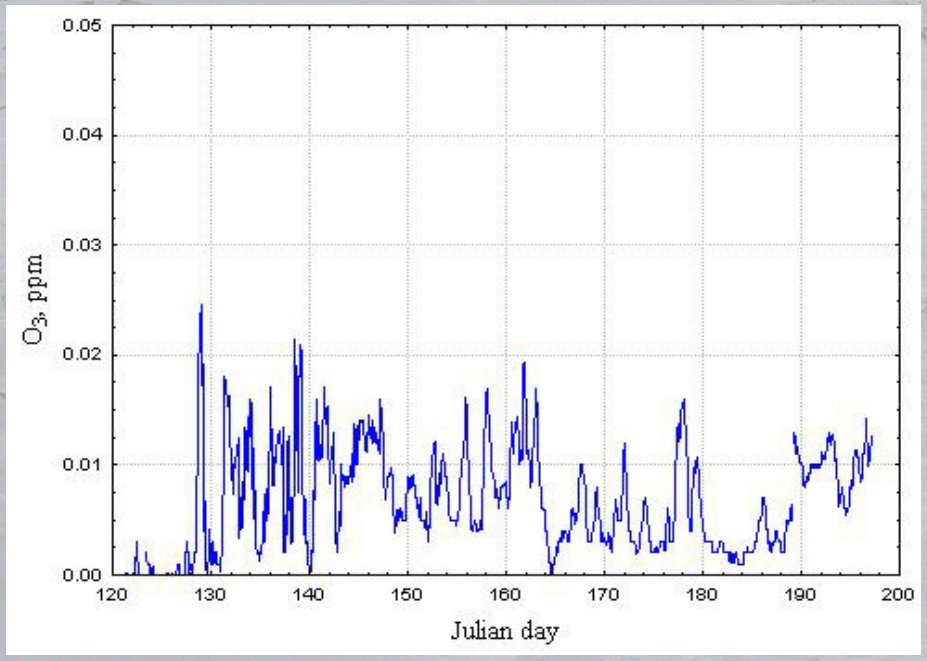


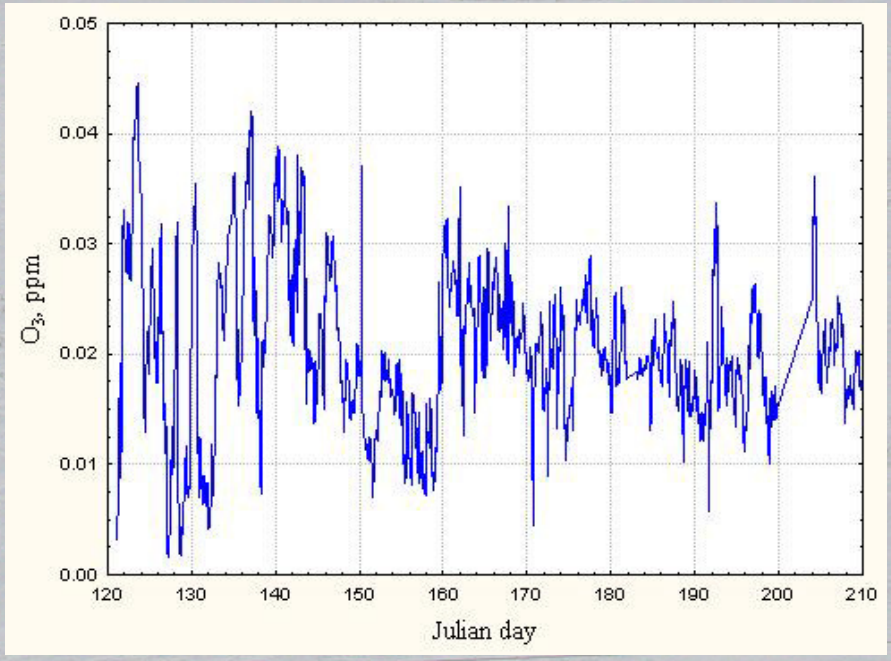


Temporal variability of carbon dioxide and ozone in atmospheric surface layer in the “Ice base cape Baranov” (left) and HMO Tiksi (right)

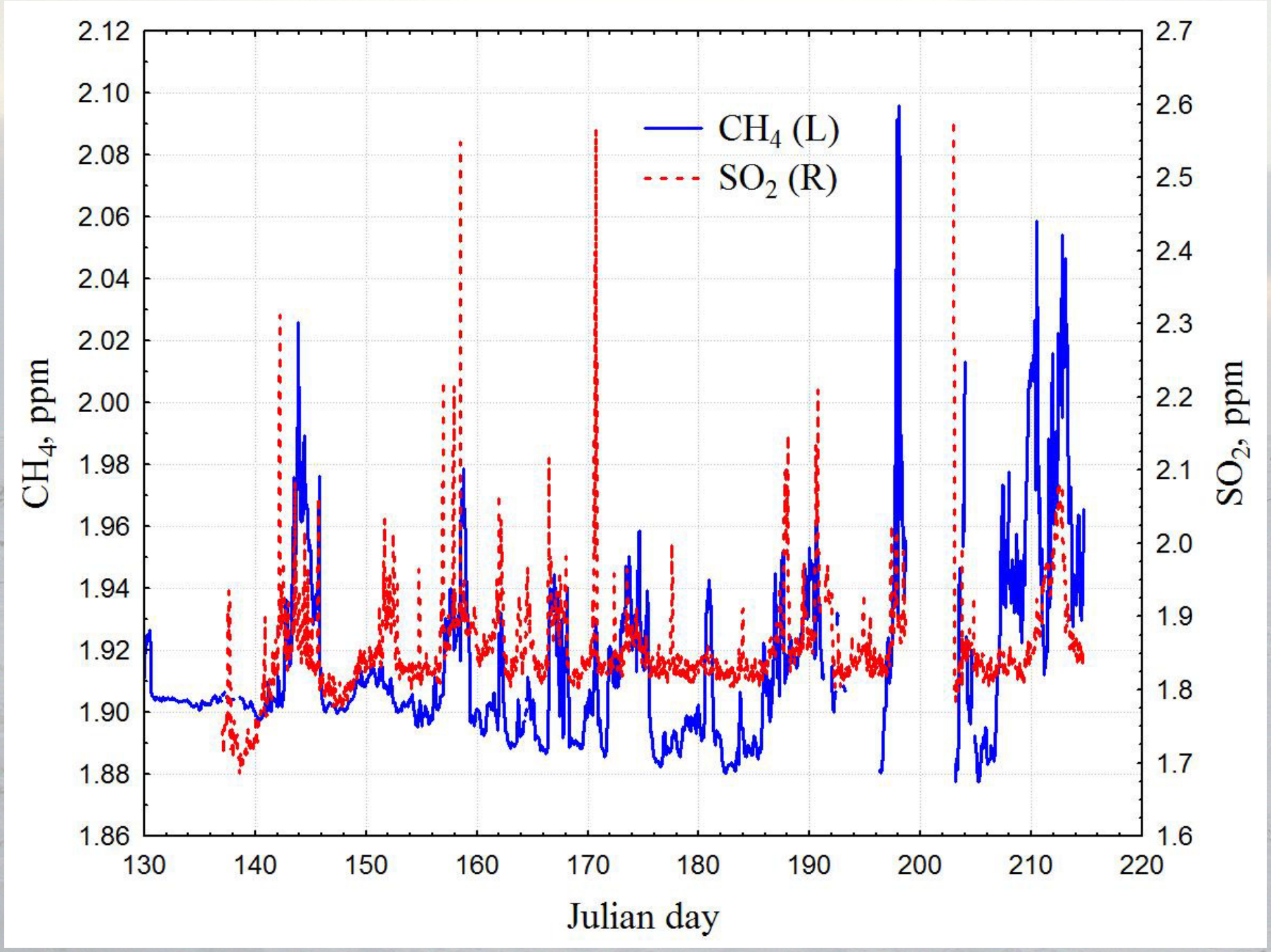








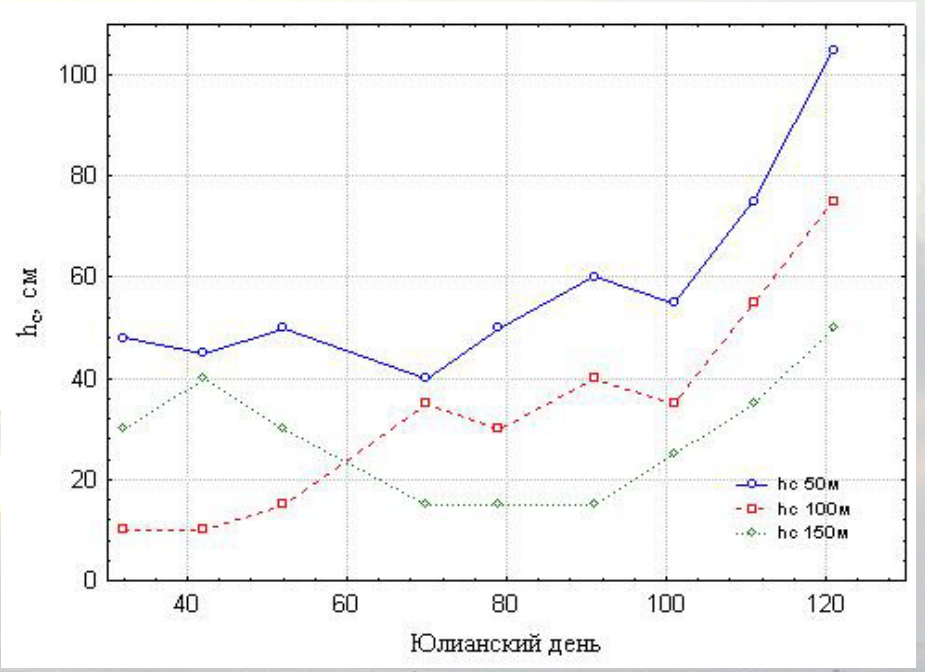
Methane and sulfur dioxide in HMO Tiksi

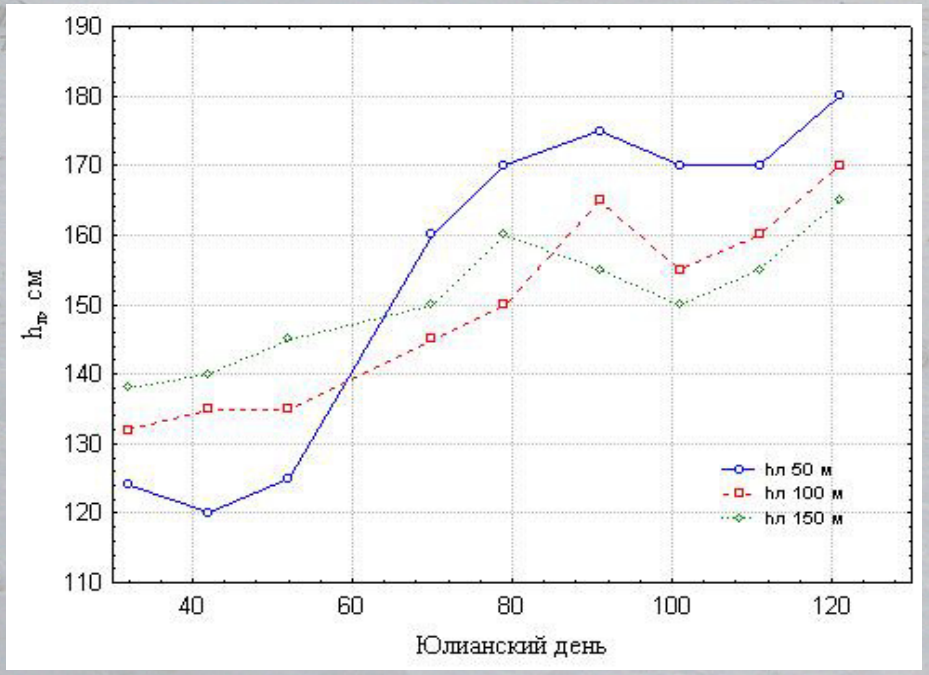


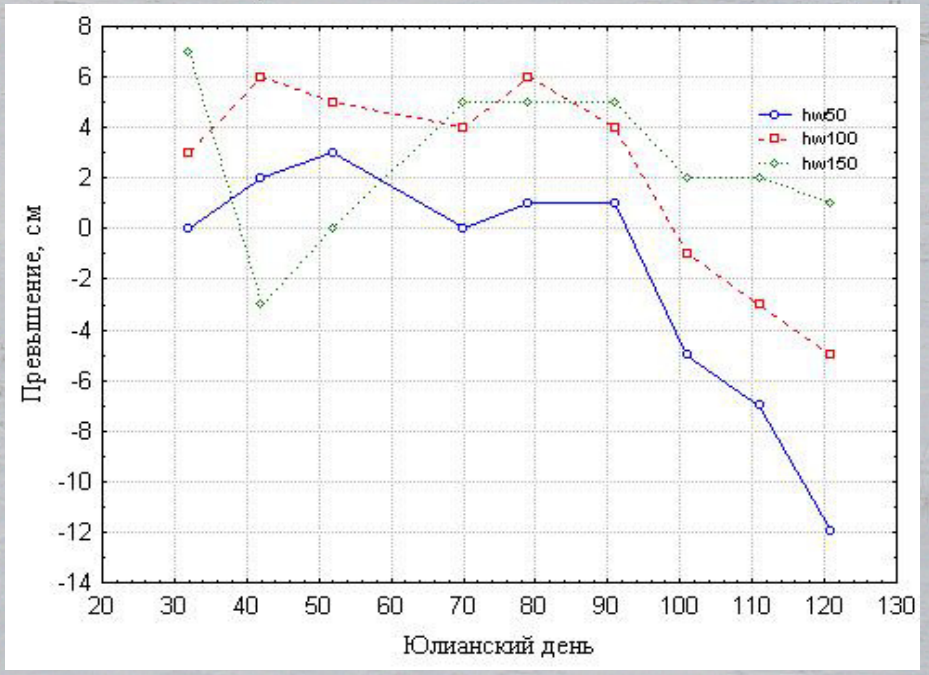

Ice studies

Fast ice formation in area of “Ice base cape Baranov” in 2013

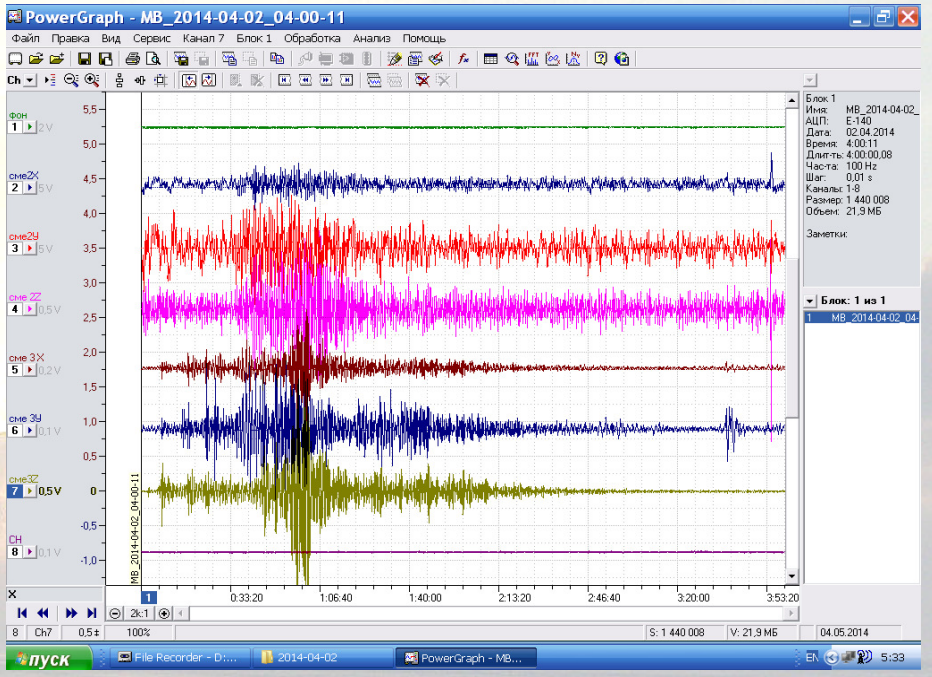
Morphometric characteristics of fast ice in the station area

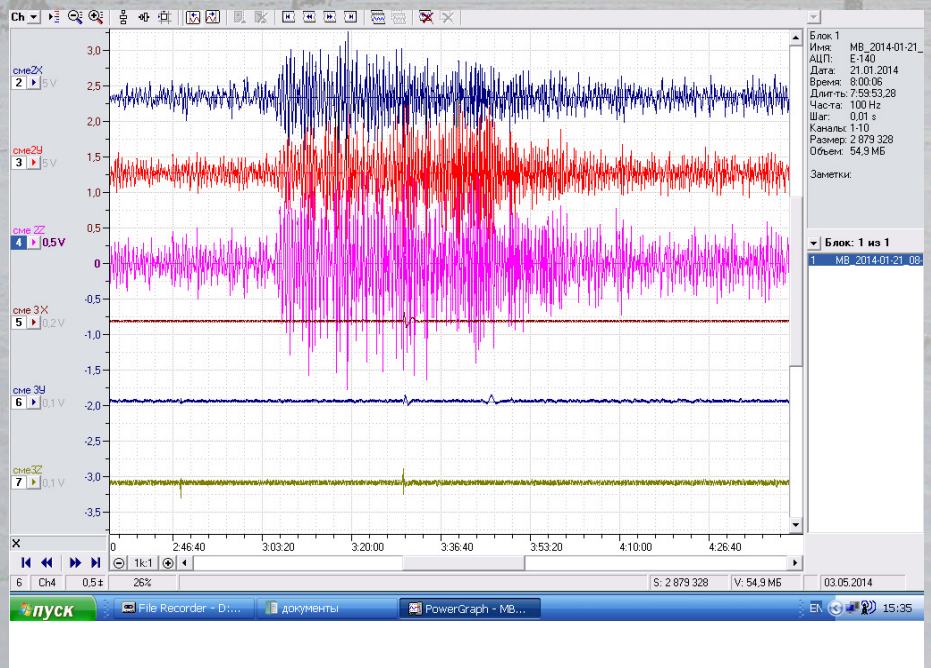


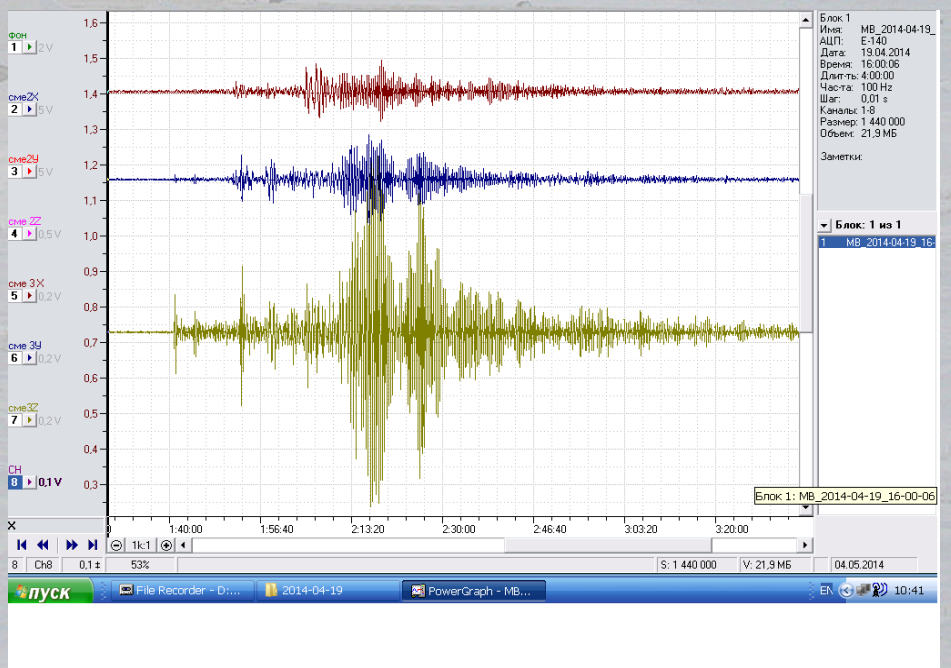




Waves in fast ice and on the Island Bolshevik shore

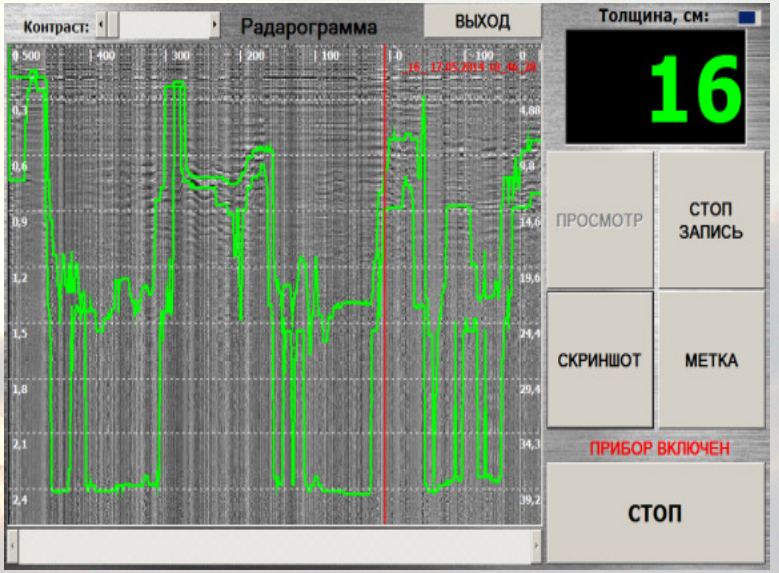




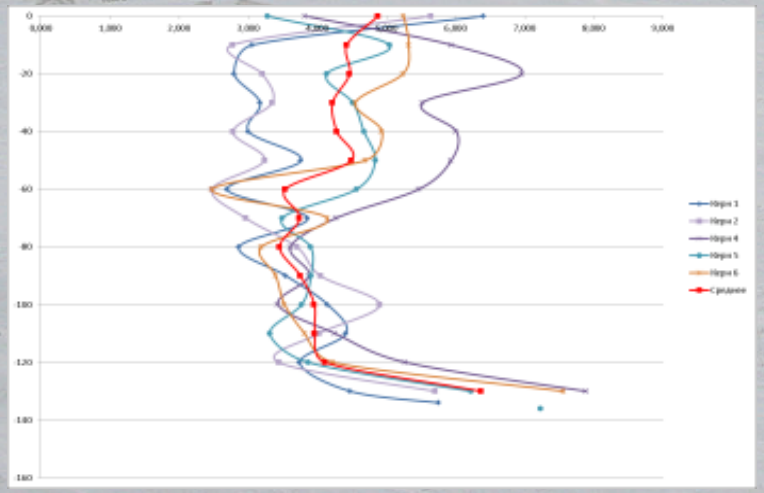


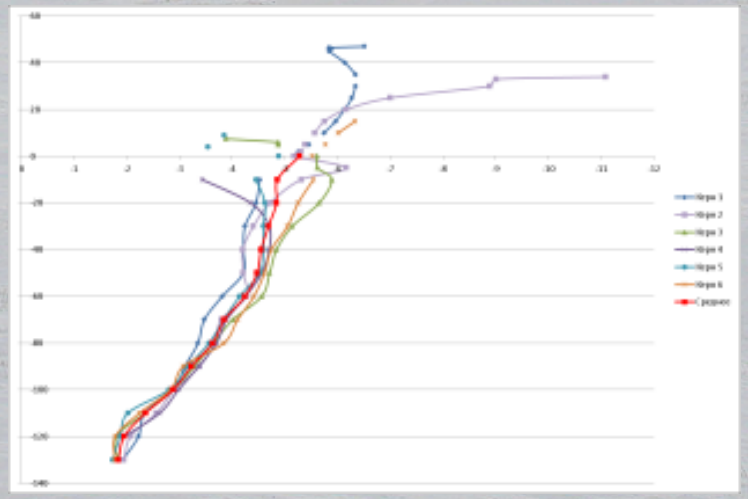
First results of snow – ice microphysics studies

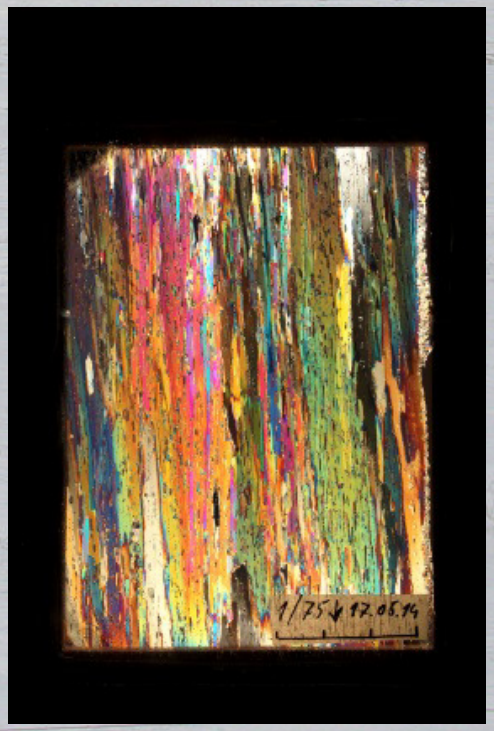
Measurements of ice thickness with EM31-Ice and dielectical properties with radar “ПИКОР-лед”



Test radarogram



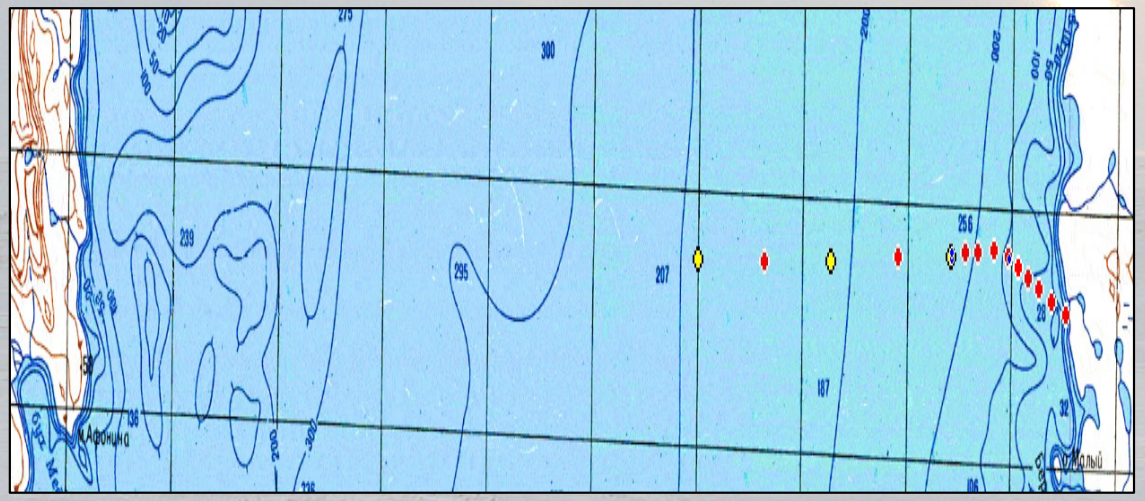


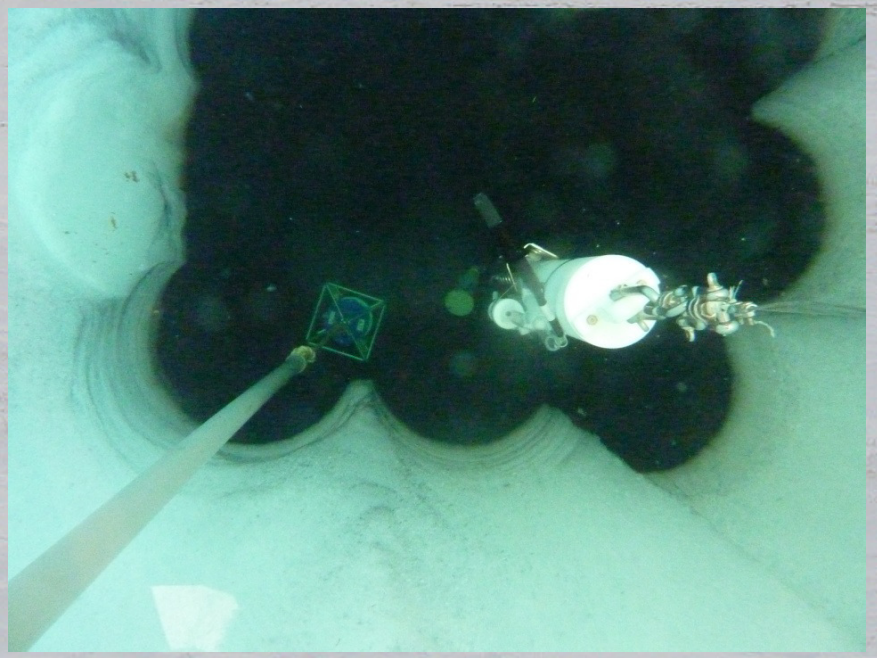


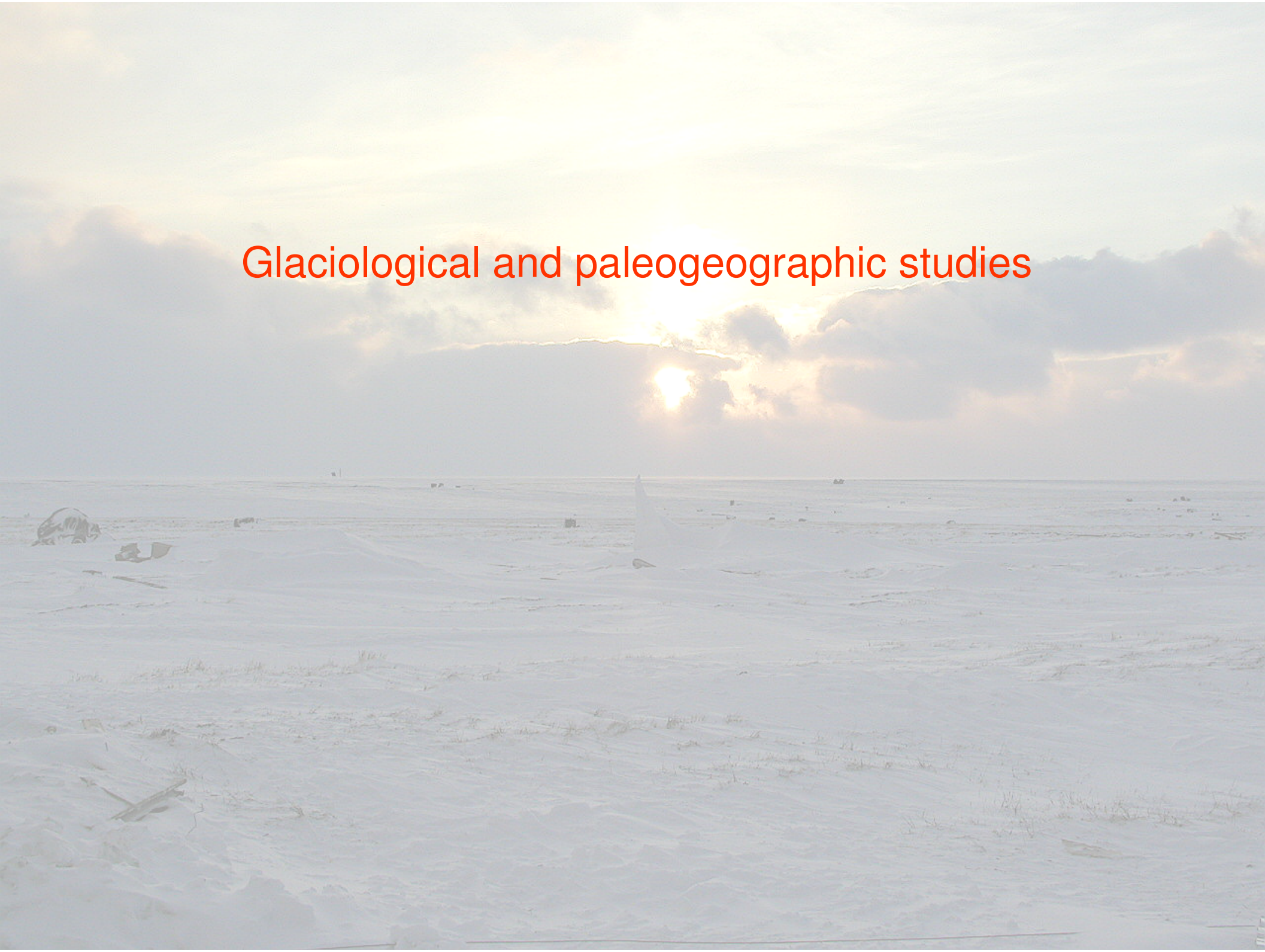
Temperature, salinity and texture of fast ice


Oceanographic studies

Oceanographic section in the Shokalski island



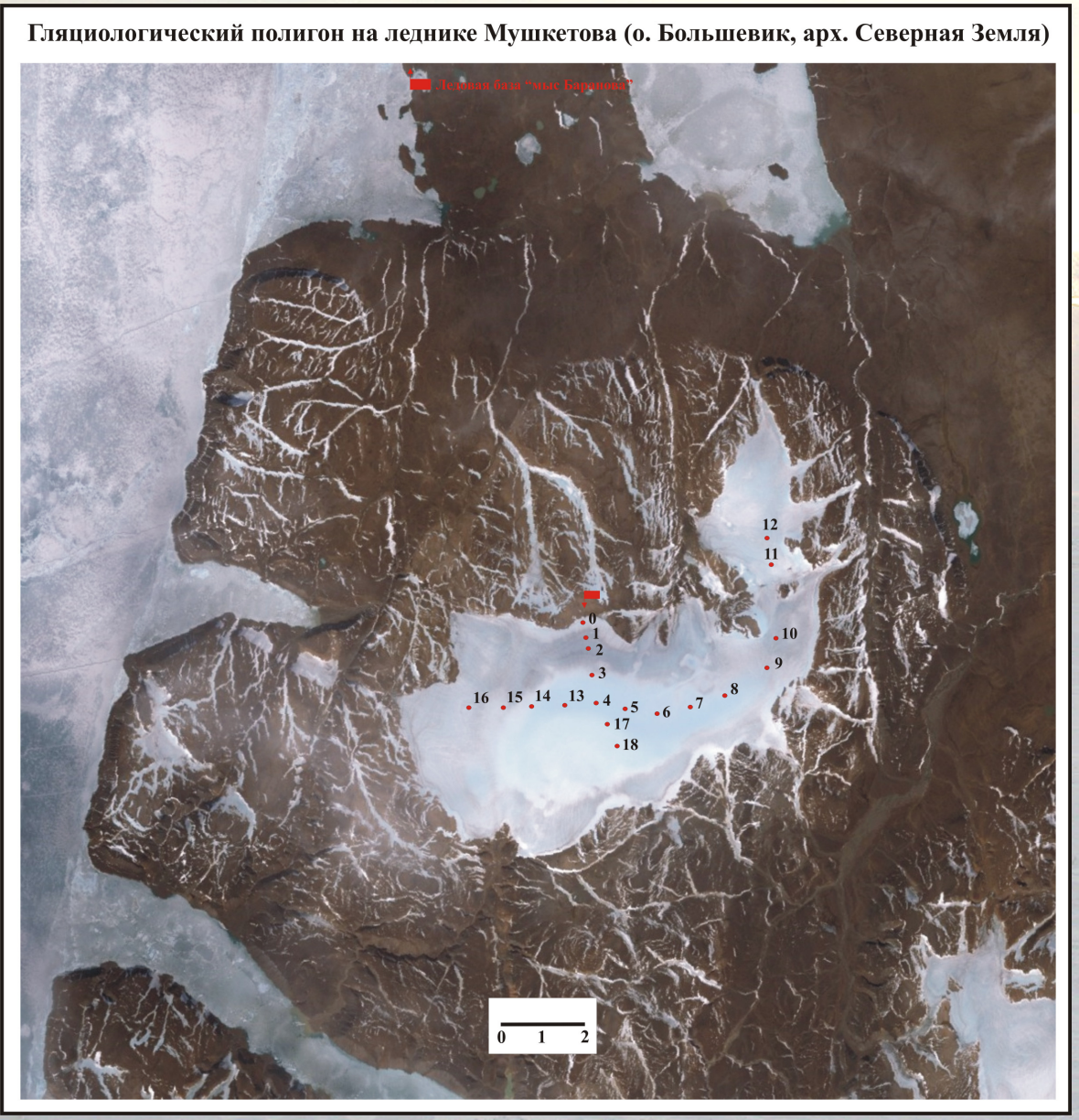


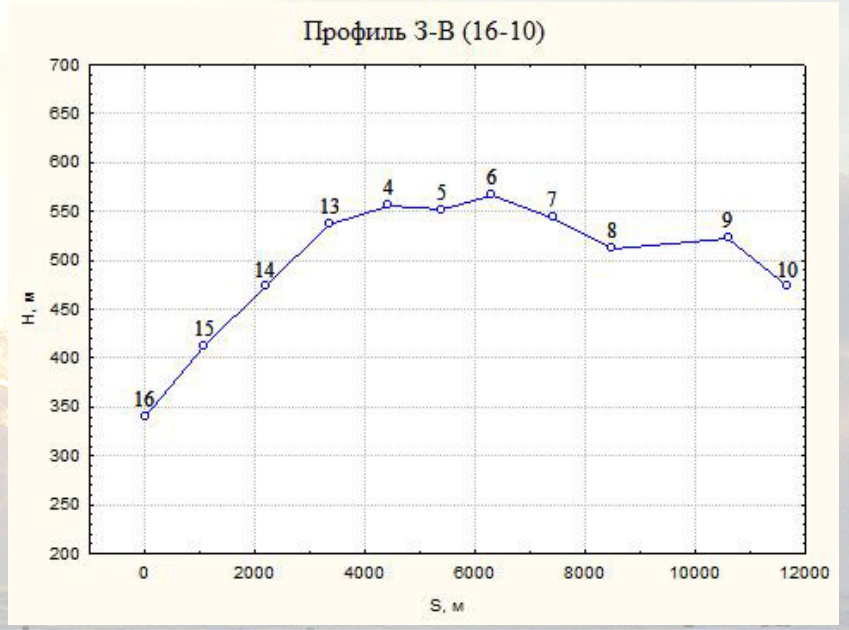

Glaciological and paleogeographic studies

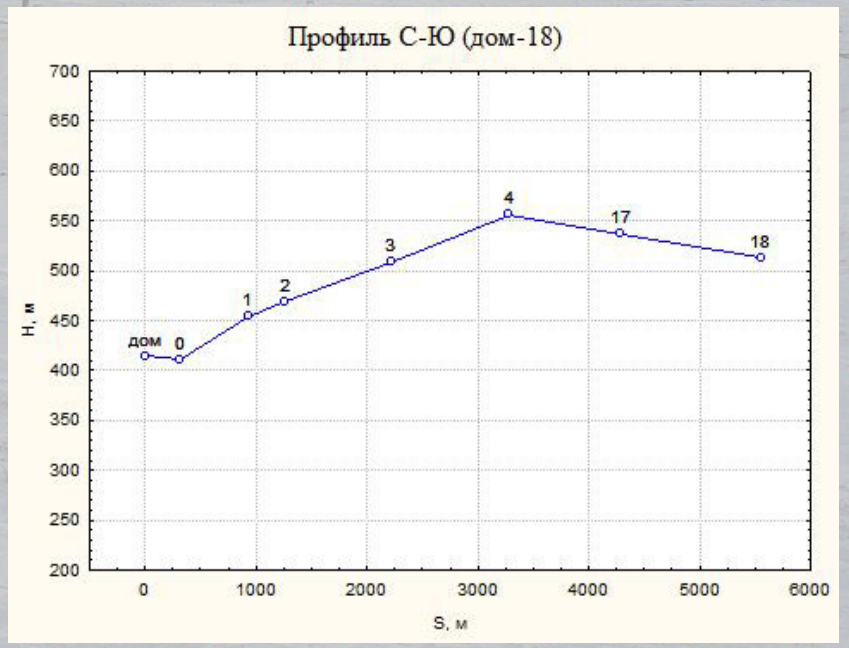
Small camp near the glacier Mushketov

Setting of milestones at the top of the glacier

Profile observations on the glacier Mushketov

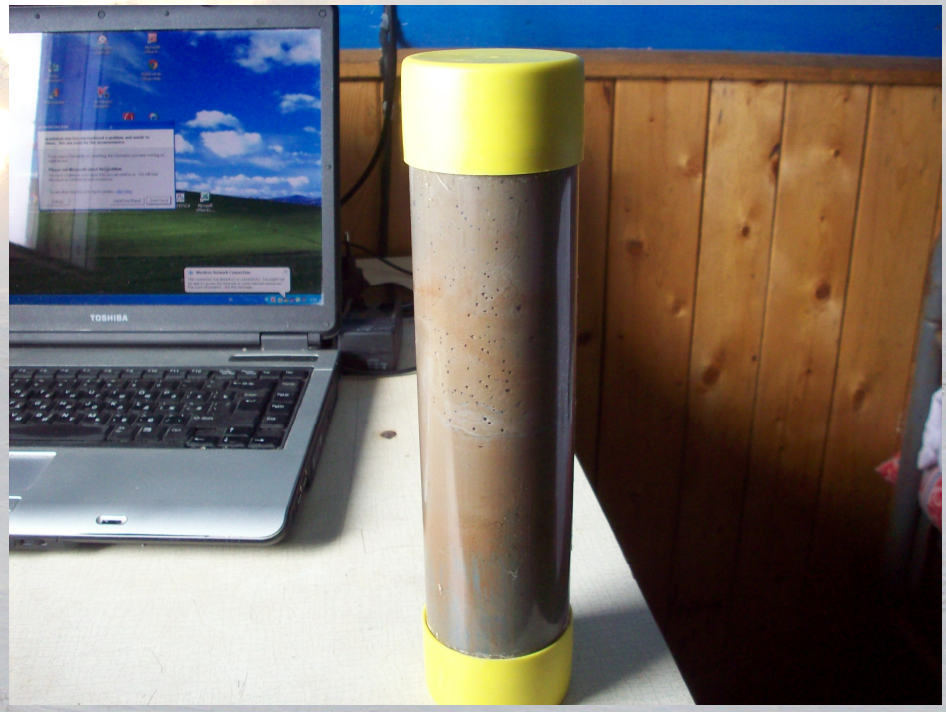






First paleogeographic studies of the lake Tverdoe

Depth – 5 -7 m,
ice thickness 170 – 180 cm.



Sediment sample

Welcome to Observatory "Ice Base Cape Baranova"