REPUBLIC OF KAZAKHSTAN

MINISTRY OF SCIENCE AND HIGHER EDUCATION

unesco
Centre
Under the auspices
of UNESCO

CARGC
Central-Asian Regional
Glaciological Centre

Research activity of the Central-Asian regional glaciological centre (category 2) under the auspices of UNESCO

Kuala Lumpur, Malaysia, 2024

The Central Asian Regional Glaciological Centre (CARGC) of category 2 under the auspices of UNESCO was created in 2020 by decision of UNESCO at the initiative of the Government of the Republic of Kazakhstan

Main areas of research

- evolution of glaciation as a response to climate change;
- modern and forecasted dynamics of glaciosphere components;
- changes in the condition of glaciosphere and permafrost components in hydrological regime and formation of regional water resources.
- dangerous natural phenomena caused by changes in the condition of glaciosphere components

Glaciological research station «Tuiyksu glacier»

Geocryological research station «Zhosaly-Kezen»

Hydrophysical research station «Big Almaty Lake»

Experimental base of CARGC consist of 3 -mountain research stations on the Northern Tien-Shan:

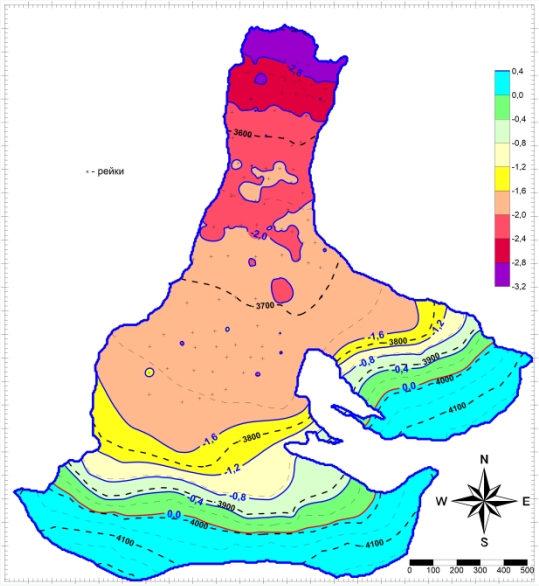
- glaciological «Tuiyksu glacier» in the basin of Kishi Almaty river at the altitude of 3500 m;
- hydrophysical «Big Almaty Lake» in the basin of Ulken Almaty river at the altitudes of 2500 m;
- geocryological «Zhosaly-Kezen» in the basin of Ulken Almaty river at the altitudes of 3400 m;

- Since1958: Regular mass balance measurements using a network of over 100 stakes and snow density measurements
- Contributes data to WGMS
- 1958-74: Seasonal meteorological measurements
- Since 1974: Regular standard meteorological measurements according to WMO protocols (NOT WMO station)
- Precipitation measurements at 9 rain gauges

Drilling stakes into the glacier

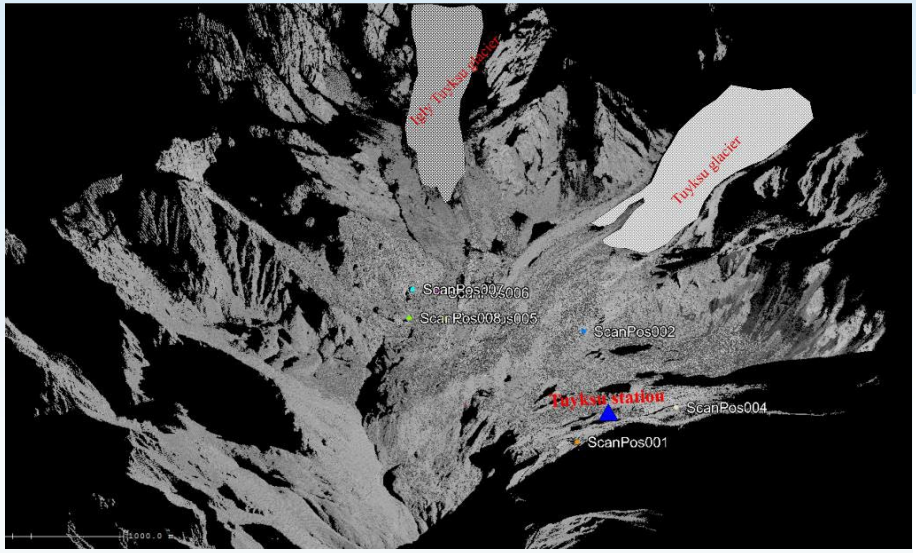
Snow density measurements

Geodetic survey of the Tuyuksu glacier

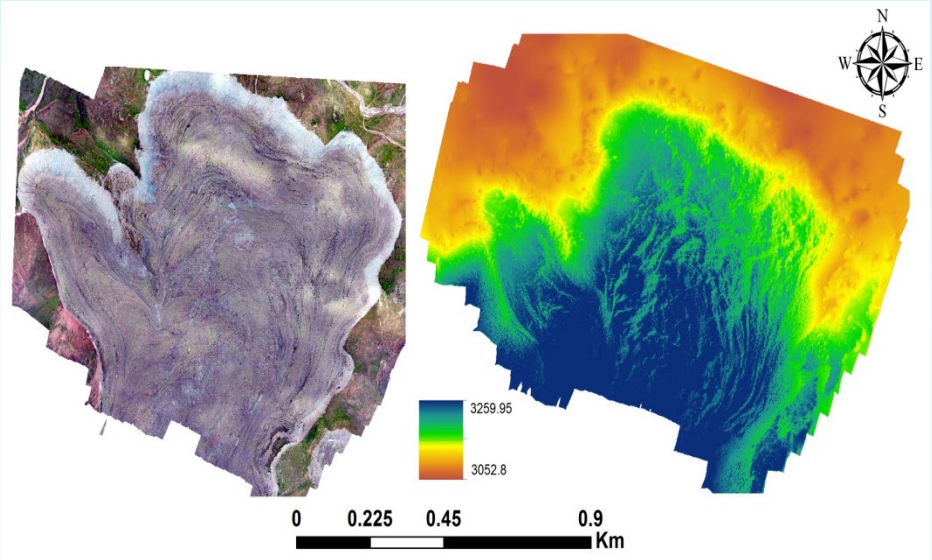


Annual balance of the Tuyuksu Glacier 2022

Monitoring of buried ice and rock glaciers



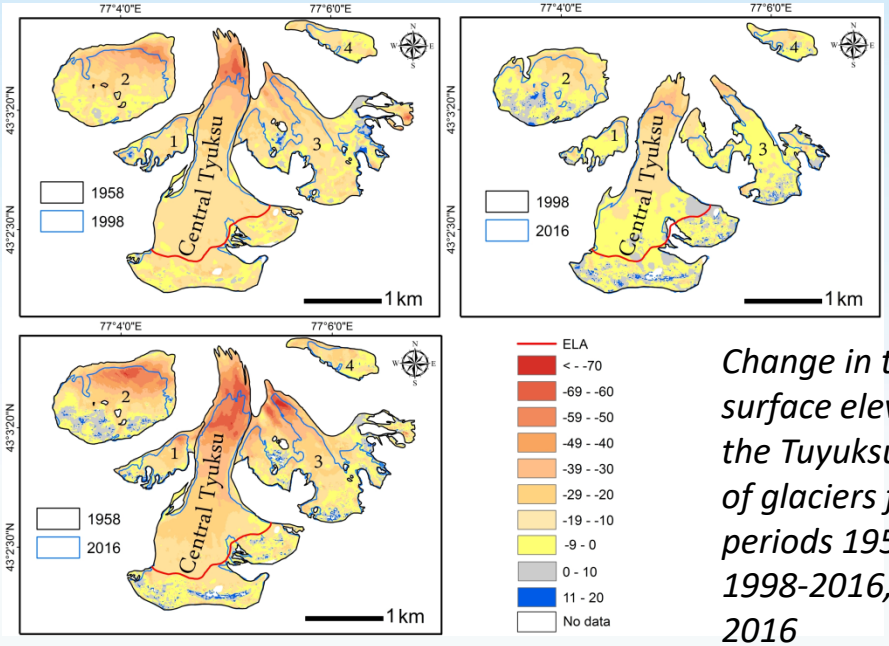
UAV (Unmanned Aerial Vehicle) survey on Morenny rock glacier



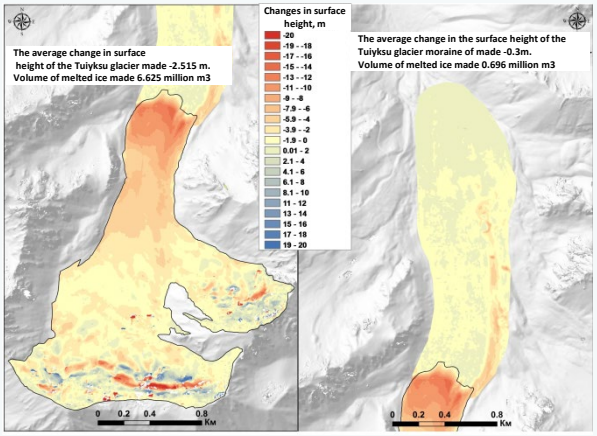
Survey using 3DTerrestrial laser scanner Riegl VZ-4000

Supporting satellite measurements

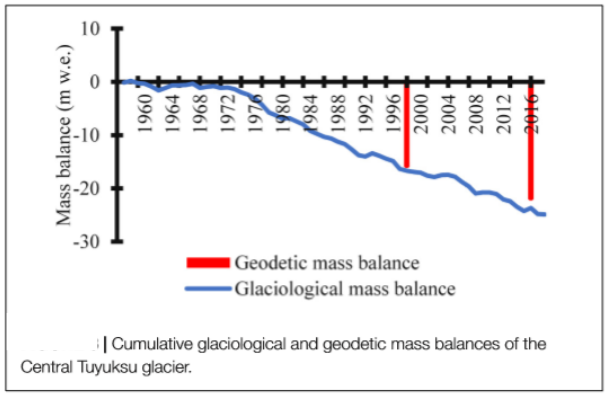
- WGMS Pleiades Observatory: Geodetic mass balance using high resolution DEM



Change in the surface elevation of the Tuyuksu group of glaciers for the periods 1958-1998, 1998-2016, 1958-2016

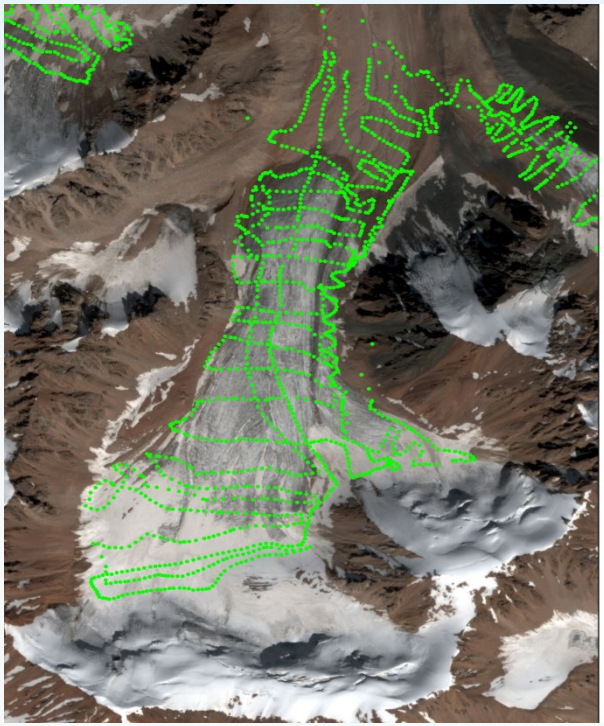


Change in the surface elevation *of the moraine and the Tuiyksu glacier for the period 2016-2021*



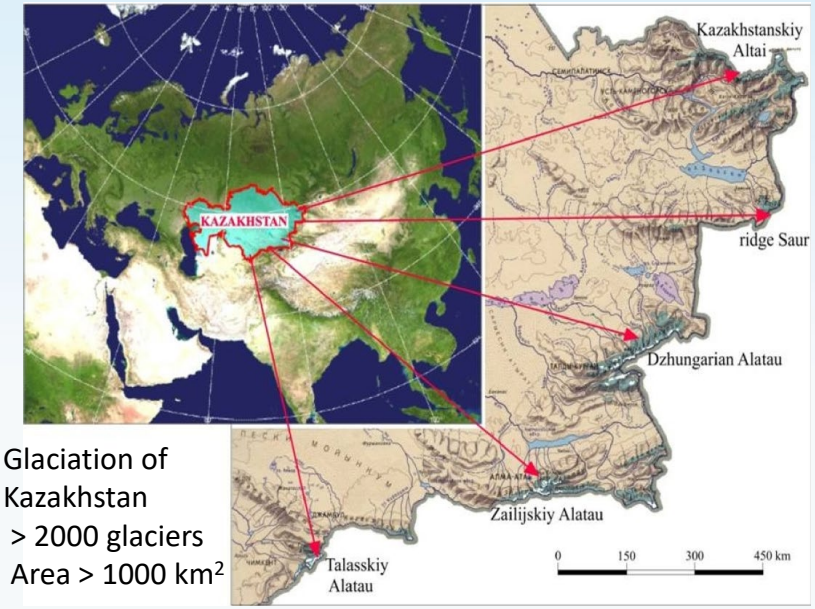
Cumulative glaciological and geodetic mass balances of the Central Tuyuksu glacier.

- Ground truth for satellite measurements and catalogues of glaciers

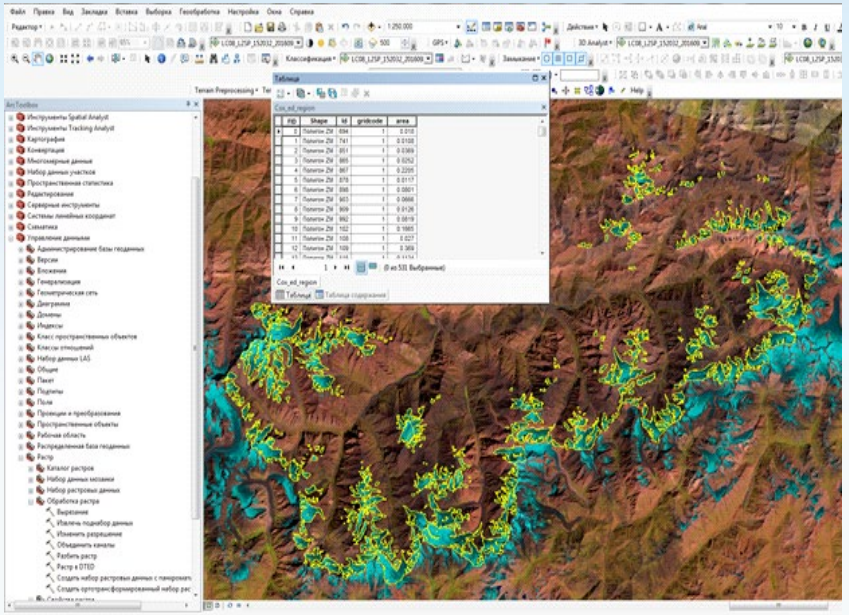


DGPS measurements

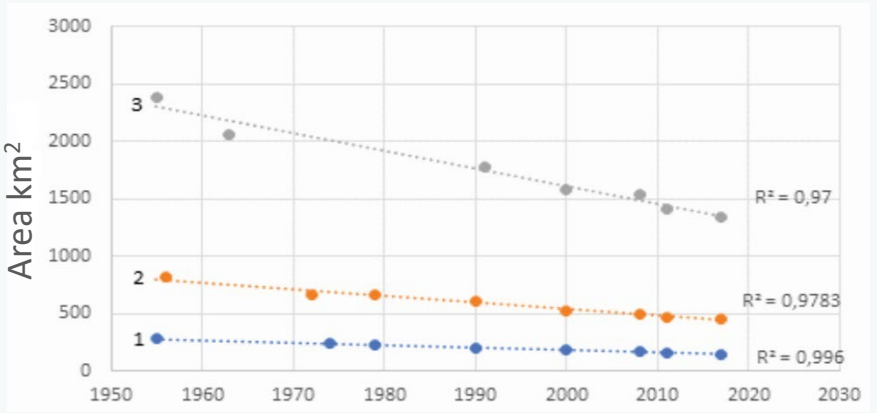
Monitoring of glaciers using remote sensing data



Glaciation of Kazakhstan
> 2000 glaciers
Area > 1000 km^2



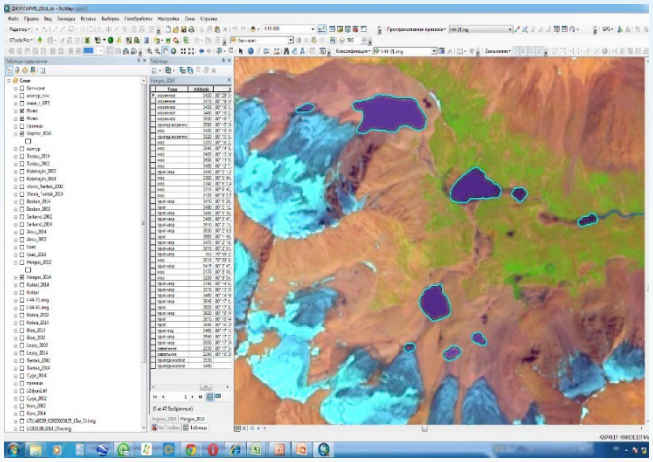
- For the territory of Ile-Balkhash basin were created glaciers inventories for 7–8 time periods from 1960 to 2022.
- For the territory of Ertis River basin were created glaciers inventories for 5 time periods from 1960 to 2021.
- For the territory of Syrdariya River basins were created glaciers inventories for 2-3 time periods from 1990 to 2022.



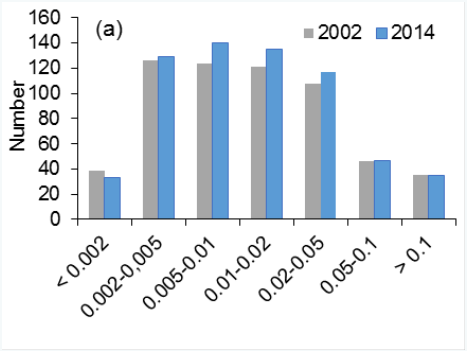
Glacial systems: 1 - North-Ile, 2 - Djungarian, 3 - Upper-Ile

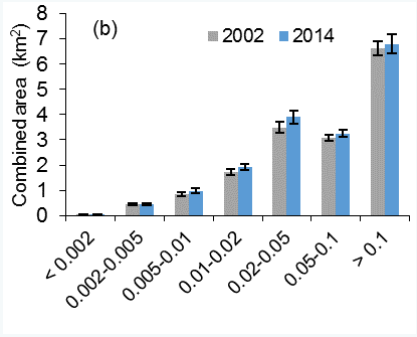
Remote sensing of glacial lakes

Use data:
Ladsat 5-8, Pleiades, Sentinal 2, Alos, SRTM, Aster.
Inventory lakes: semi-automatic and manual method
- Assessments of lake areas (every 10-15 years)
- Assessments of number areas(every 10-15 years)
- Monitoring of dynamic lakes (every year)



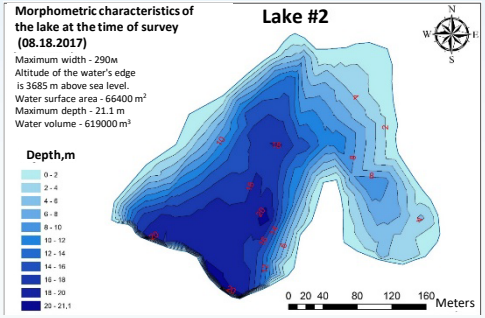
Mapping of glacial lakes

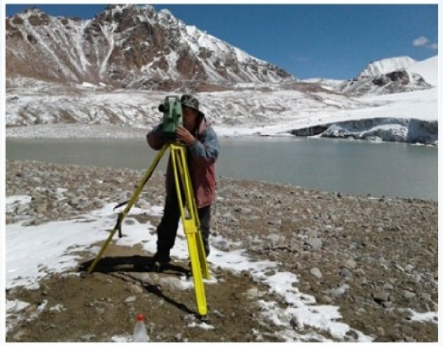


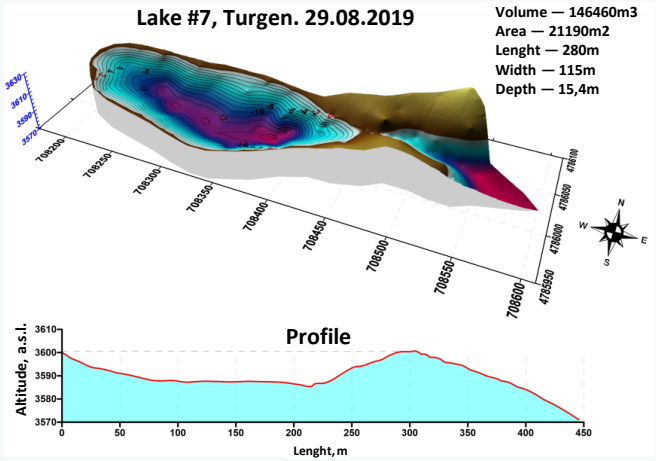


Changes in lakes (a) number and (b) combined area, 2002-2014 in Jetisu Alatau.

Field surveys

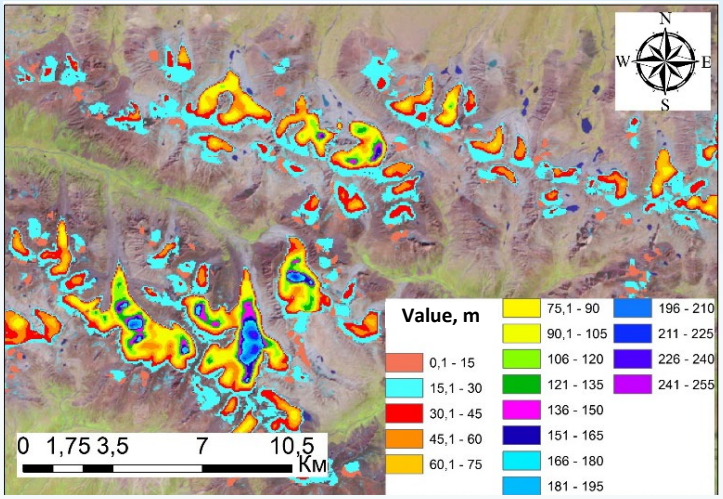


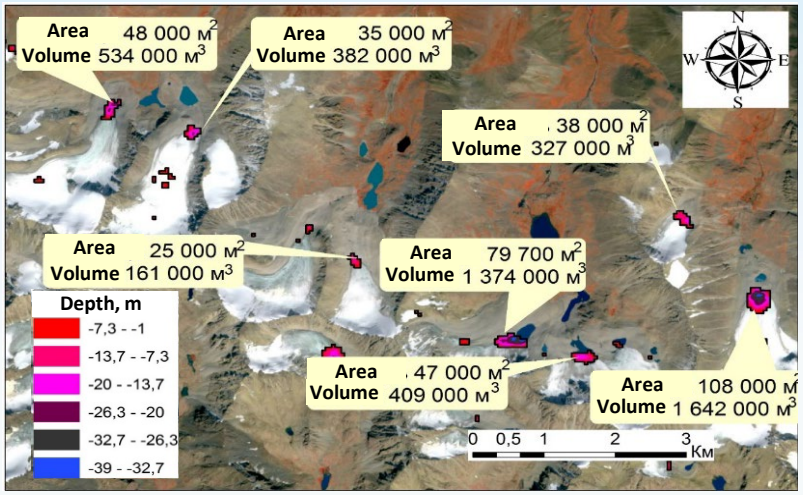




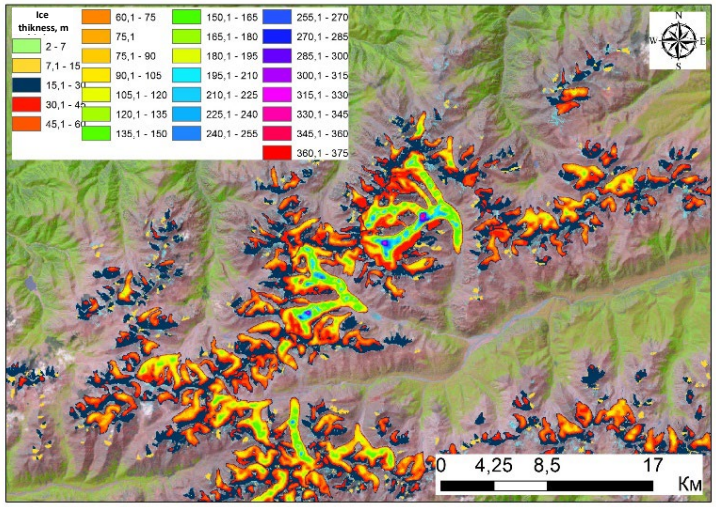
Modelling future lakes

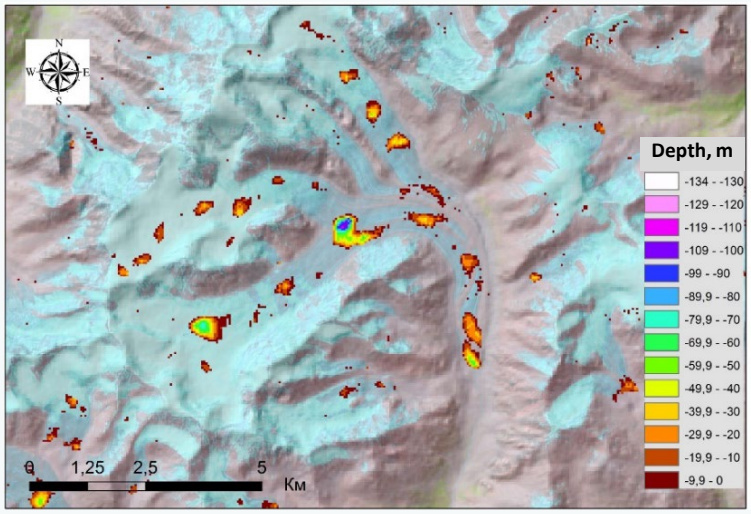
GlabTOP model has been run for the whole of Central Asia (and the Caucasus)





Jetisu (Dzhungarsky) Alatau





Ile (Zailiyskiy) and Kungey Alatau

Planned participation of CARGC in activities of the International Year of Glaciers' Preservation in 2025 :

- Contribution to glaciological science though the development of relevant research projects at the national and regional level
- Participation in the International Conference scheduled in Dushanbe in 2025, dedicated to innovative methods of glacier preservation, adaptation to their degradation, and knowledge exchange
- Participation in the International Conference in Nepal in 2025, dedicated to mountain hydrology and cryosphere
- Participation in the International Water Conference organized by the GEF in 2025, in a session specifically dedicated to glaciers
- Participation in the preparation of the release of the World Water Resources Report 2025 on the topic of glacier melting
- Organization of a regional seminar in cooperation with local organizations on the topic of glacier resources and dynamic (taking into account local specifics)
- Contribution to capacity building by conducting trainings and seminars for resource users, politicians, scientists
- Contribution to exchange of experience and expert assessments in the field of glaciology
- Contribution to information exchange and knowledge dissemination through international networks and initiatives


Thank you for attention