Central Asia Deep Ice-coring International Project (CADIIP)

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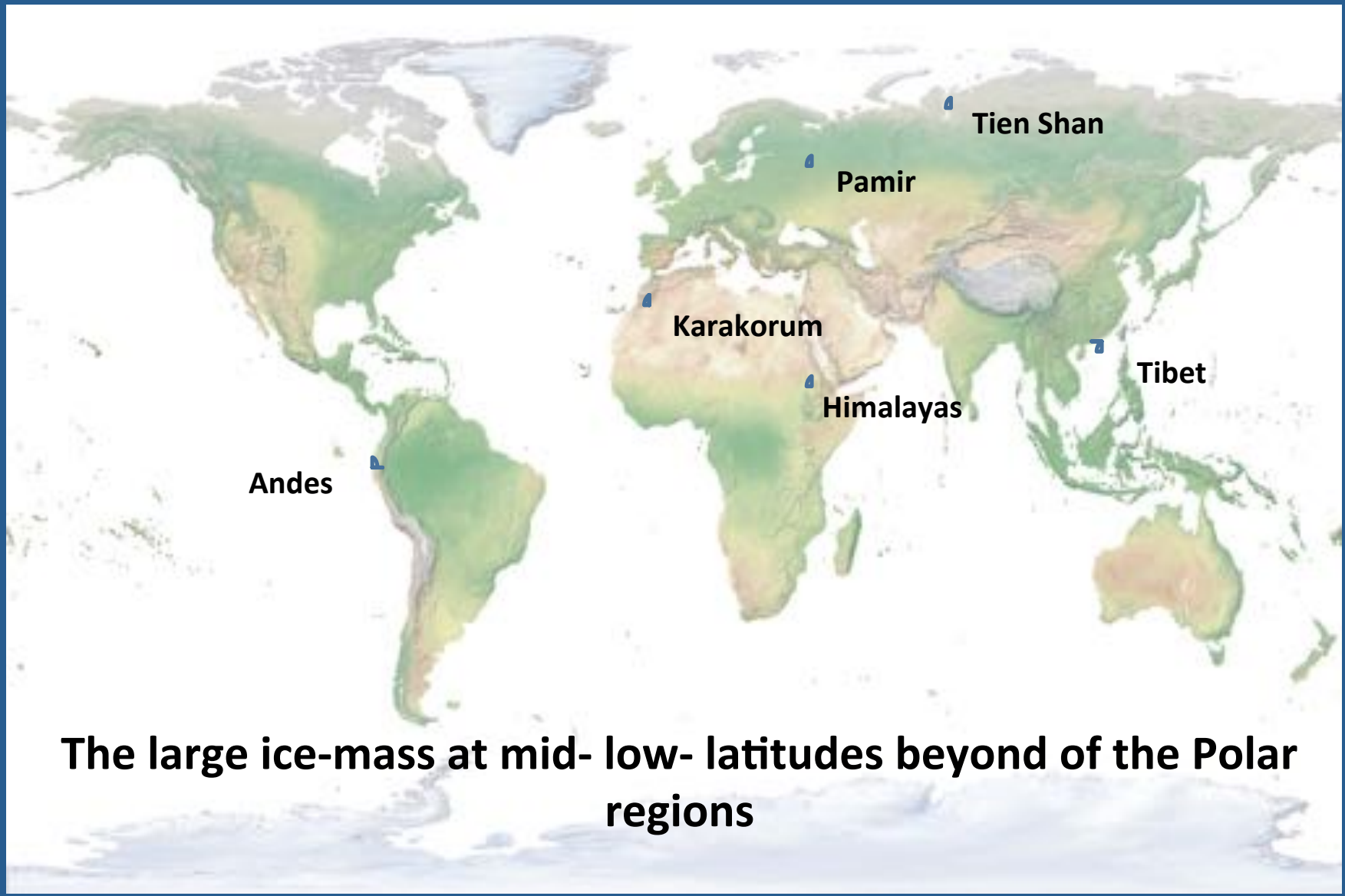


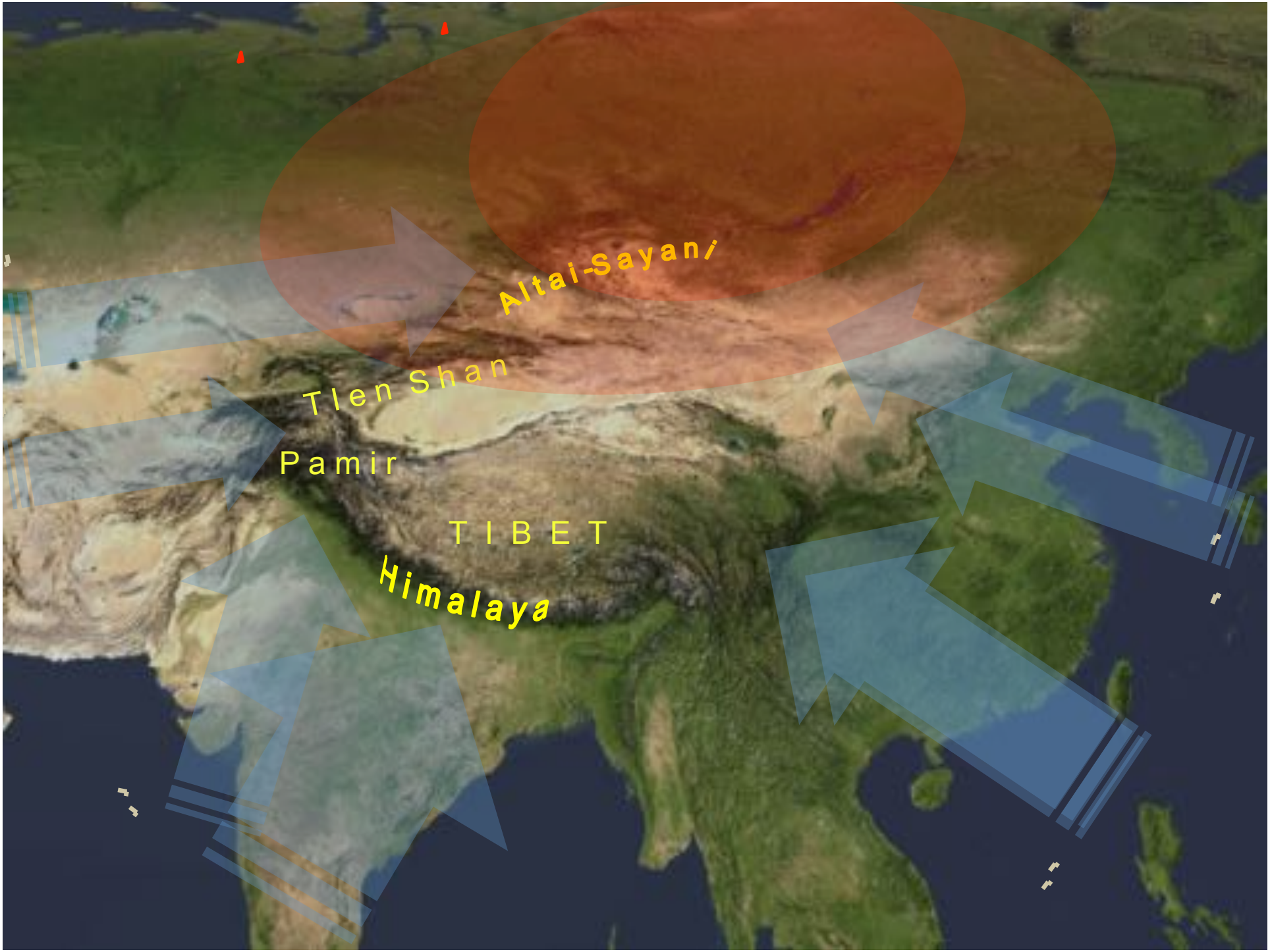
The large ice-mass at mid- low- latitudes beyond of the Polar regions

24,064,000 km^3 of total fresh water in ice-caps, glaciers and permanent snow on our Planet. *(US Geological survey)*

Asian glaciers cover ~ 122,246 km^2 containing ~13,000 km^3 of fresh water, which is only 0. 054% from total fresh water for ~3,000,000,000 consumers, which is 50% of the World's population!

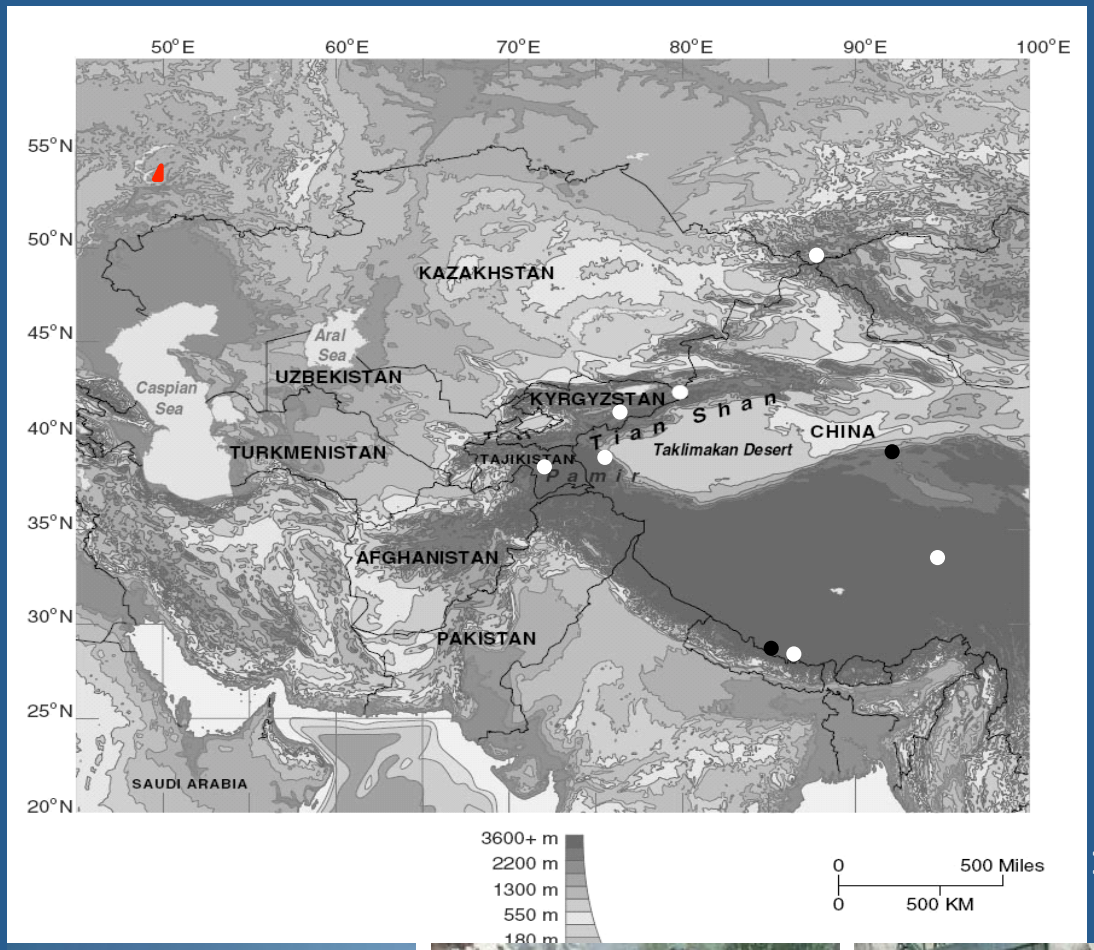
Melt of the World alpine glaciers , potentially, may elevate sea level only by 0.22 m but will cause deficit of fresh water in central Asia and create humanitarian disaster ever known on our Planet

Tomur-Khan Tengri glacierized massif, Tien Shan, Kyrgyzstan
photo by V. Aizen


Altai-Sayani
Tien Shan
Pamir
TIBET
Himalaya

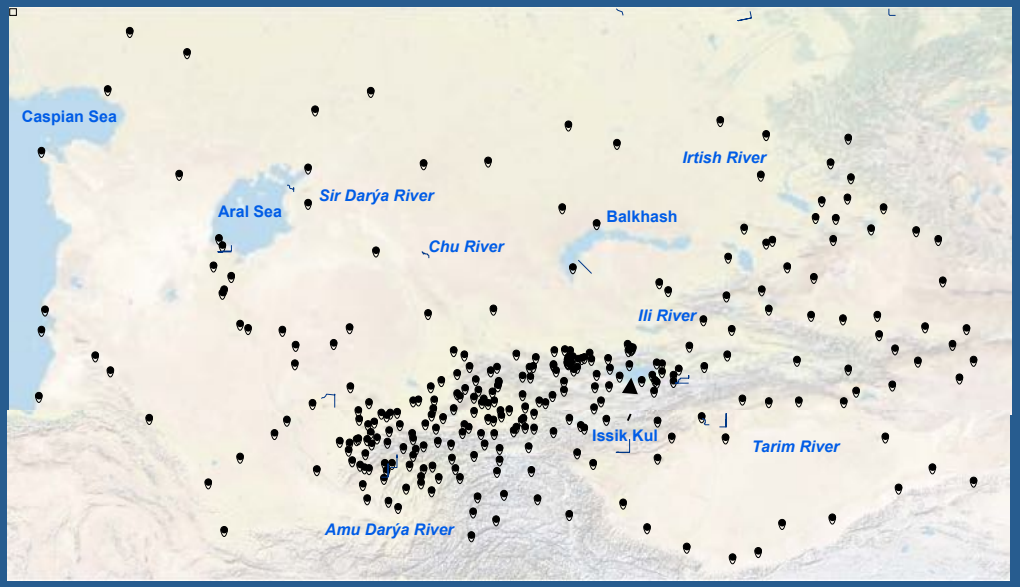
- Increase in population
- Agricultural and industrial expansion/water demand

2000 – 180M

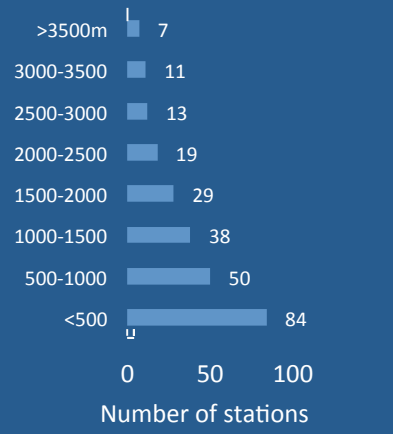


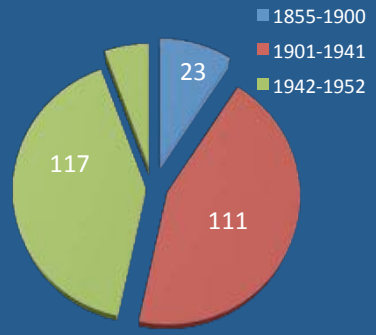
1900 – 15M

Central Asia long-term meteorological stations

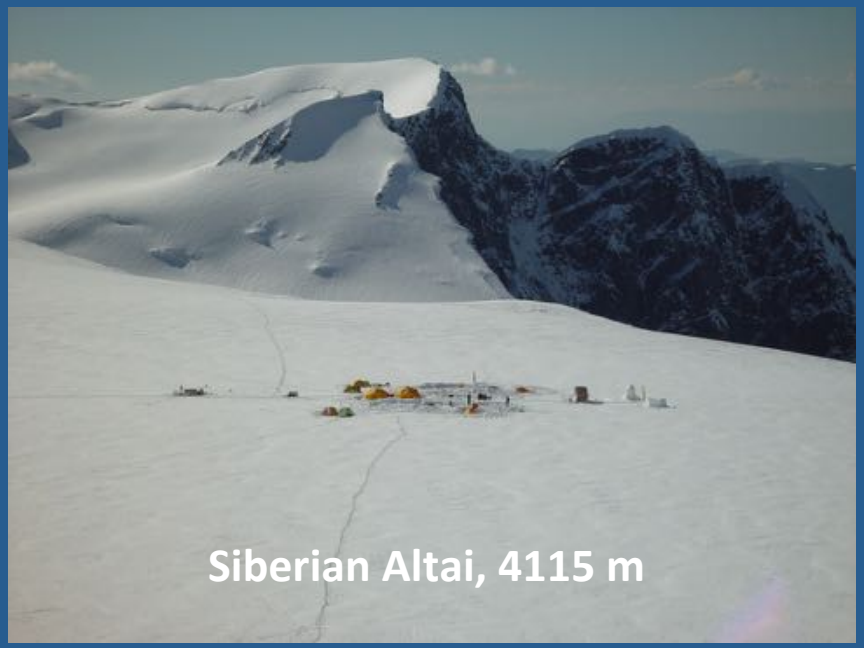


Distribution by elevations



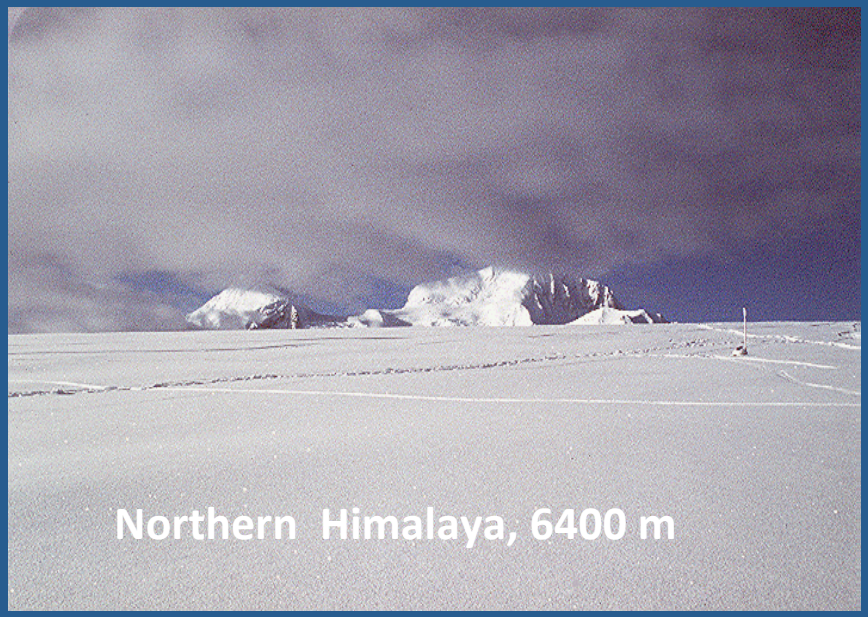


Proportion of start date



Siberian Altai, 4115 m

Central Tien Shan, 5200 m



Northern Himalaya, 6400 m

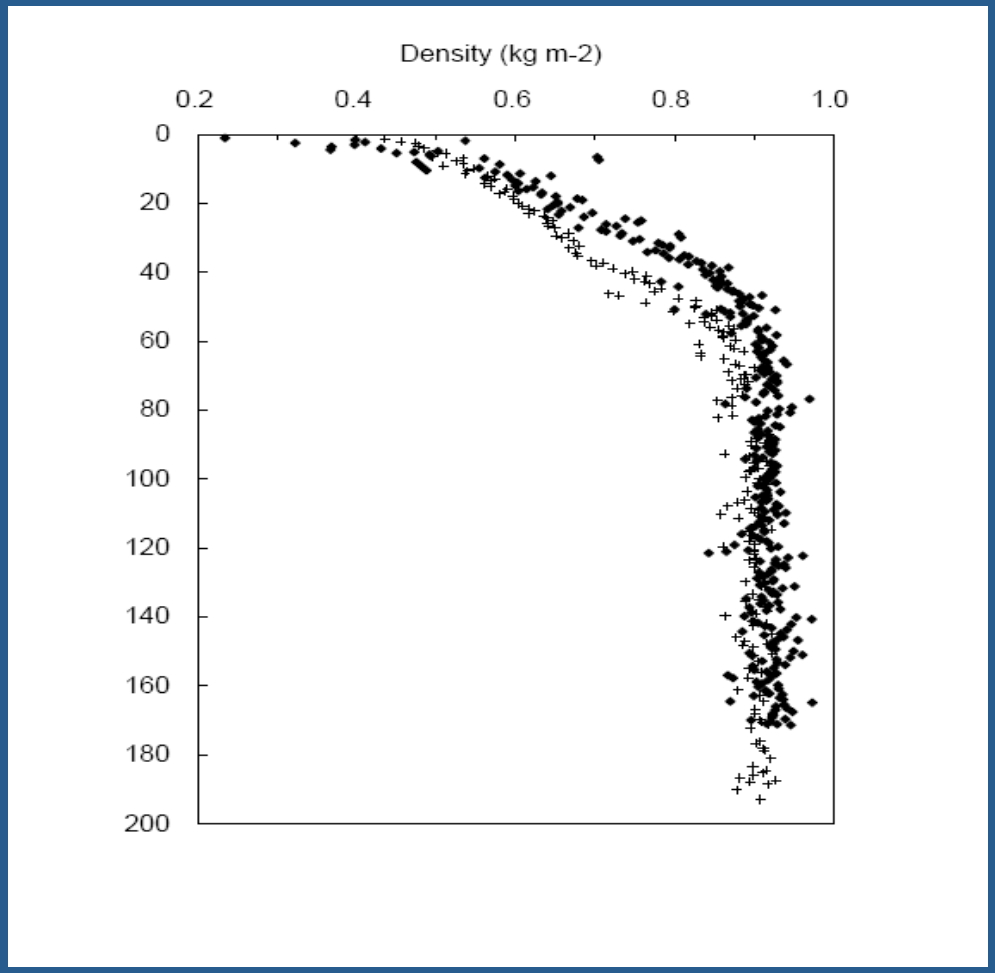
Central Pamir, 5300 m

First glacio-climatic monitoring at south Inylchek area 1988-1991. Four meteorological stations at 3400, 4100, 5100 and 6100 m.

First ice-coring at the head of south Inylchek Glacier at 6100 m.

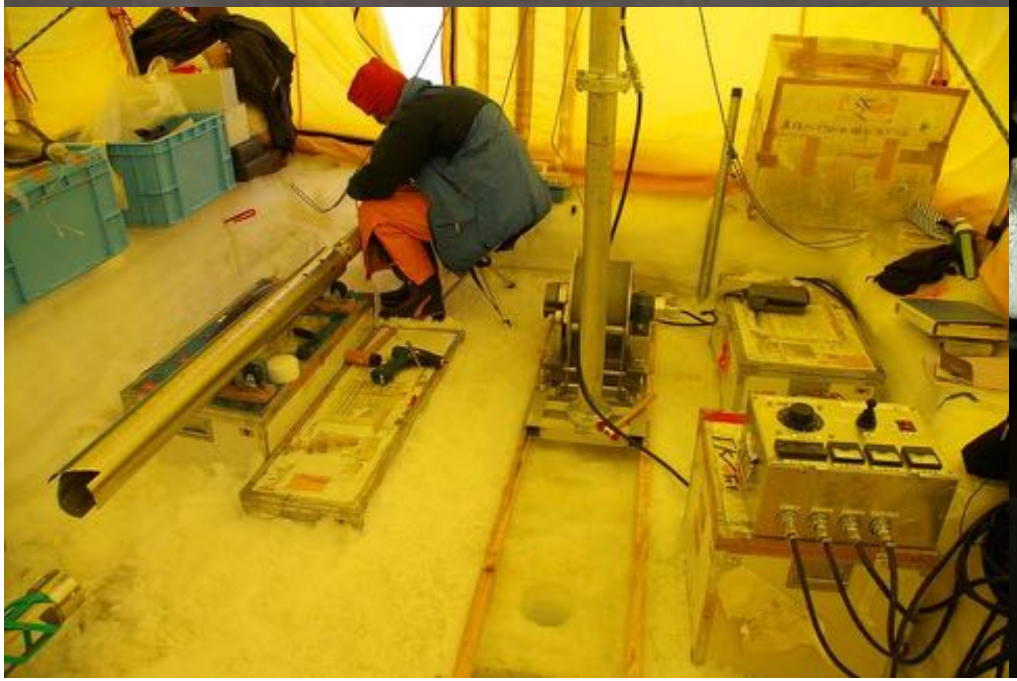
23 m core has been drilled with hand-drill.

165 m core drilled at the head of south Inylchek Glacier at 5100 m.



Bulk density profile from surface to bottom ice-core obtained from the Belukha Plateau and the Mt. Logan core (Shiraiwa, et al. 2002).

Grigoriev Ice cap, Kyrgyz, Tien Shan



85.4m core from Gregoriev Ice-cap

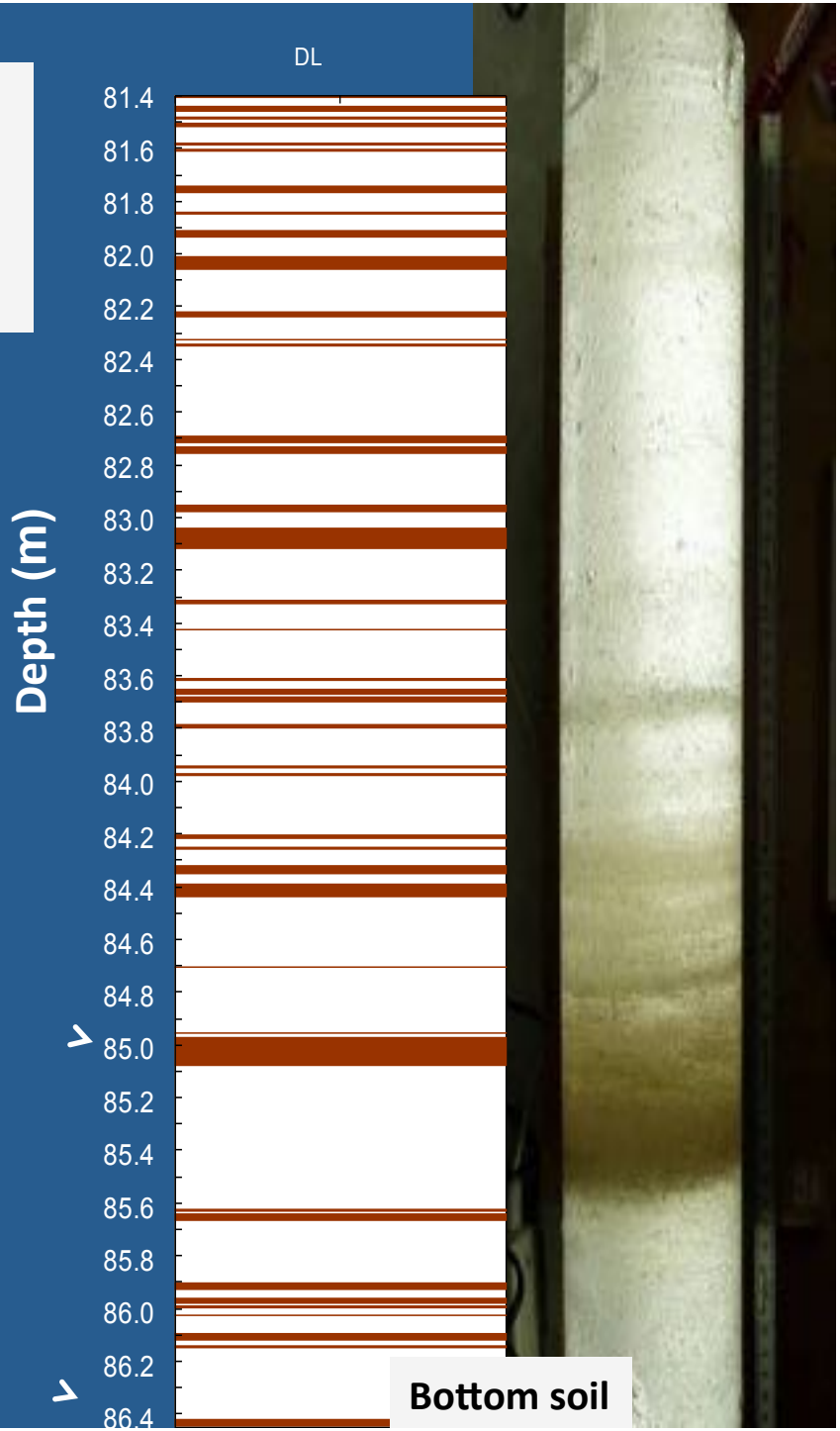
Soil organic dated by C14 at the core bottom

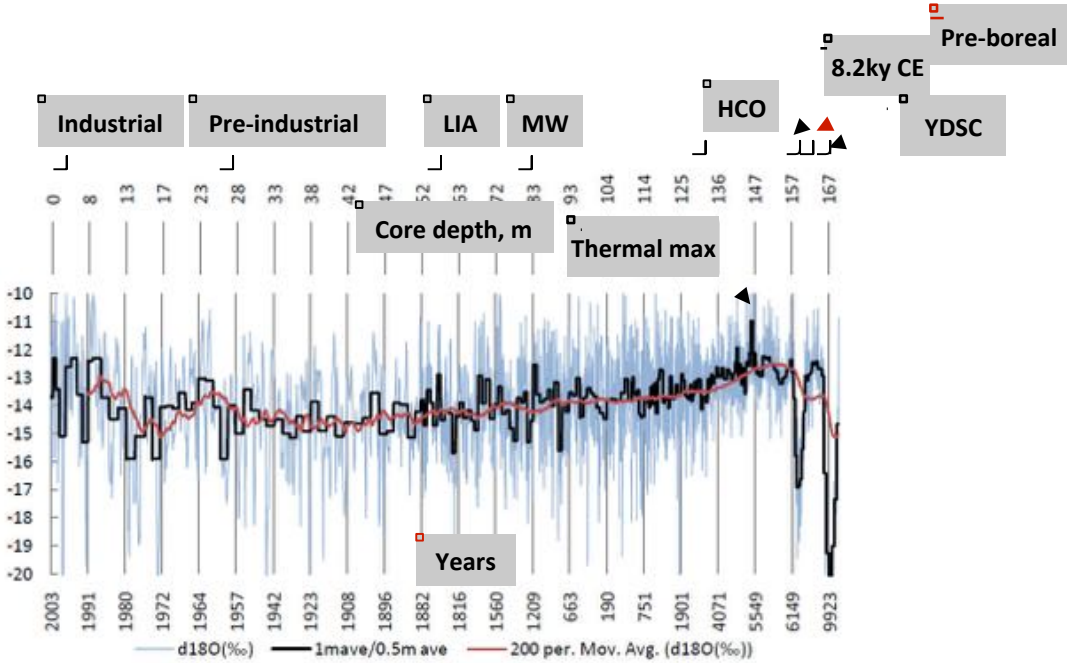
- **The Holocene Climate Optimum**

  8,170 -7,970 BP cold event

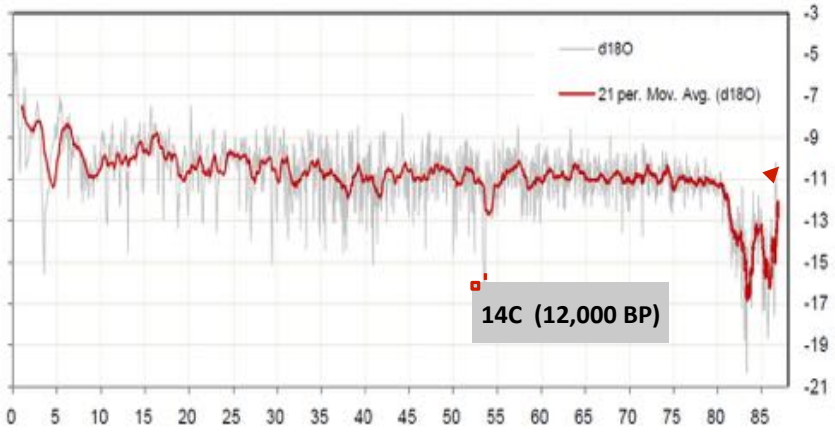
- **The Younger Dryas**

  15,650-15,000 BP the last glacial period





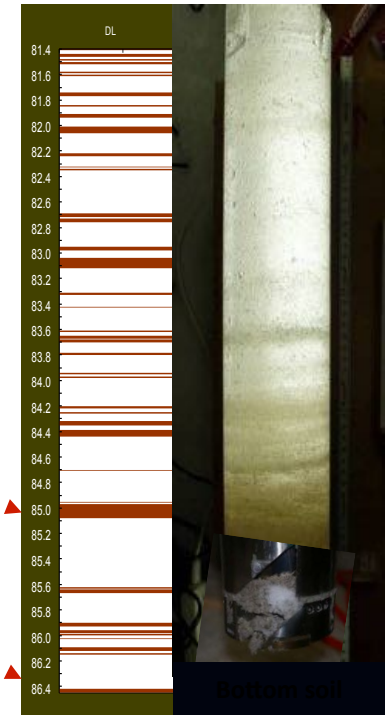
(**A**) Stable isotopic composition ($\delta^{18}O$), 1m/0.5 m and 200 samples moving averages for the period of moderate/abrupt changes (ice-core from Belukha Plateau, Siberian Altai) and (**B**) in Tien Shan (Grigorieva Ice-cap).

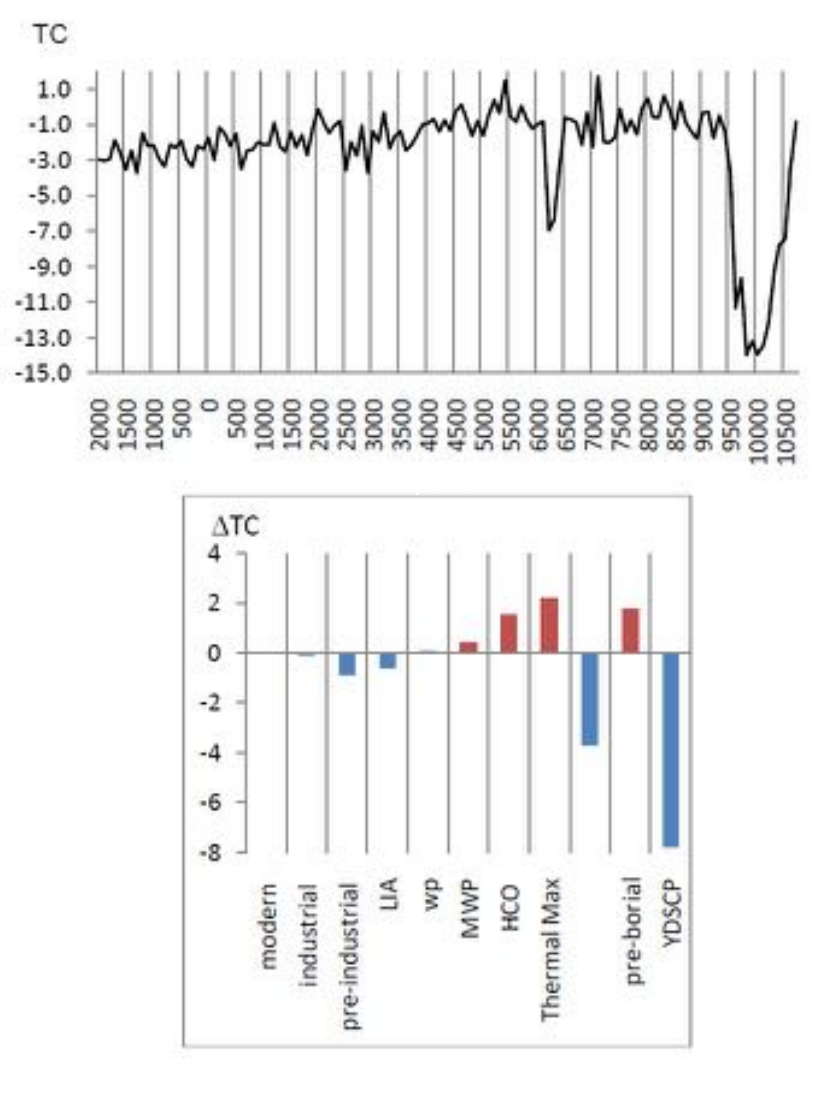


85.4m core from
Gregoriev Ice-cap
Soil organic dated by 14C
at the core bottom

The Holocene Climate Optimum , 8.2ky CE

The Younger Dryas, 15,650-15,000 BP, the last glacial period





(A) Reconstructed air temperatures based on $\delta^{18}O$ records

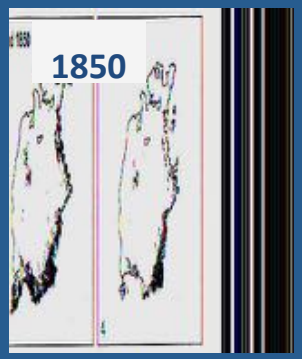
and

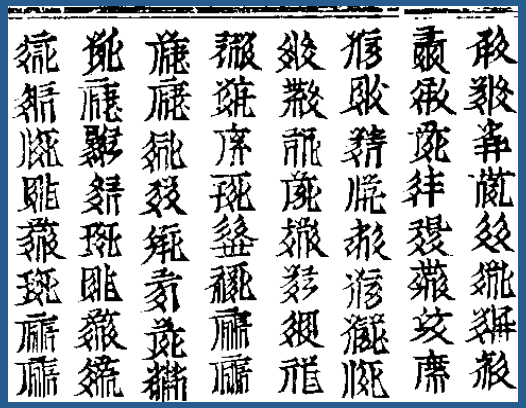
(B) their deviations from modern mean during different historical periods.

Air temperatures were on average 8°C cooler than modern during YDSCP and on average 2.5°C warmer during Thermal Maximum.

Vulnerability, adaptation, sustainable development

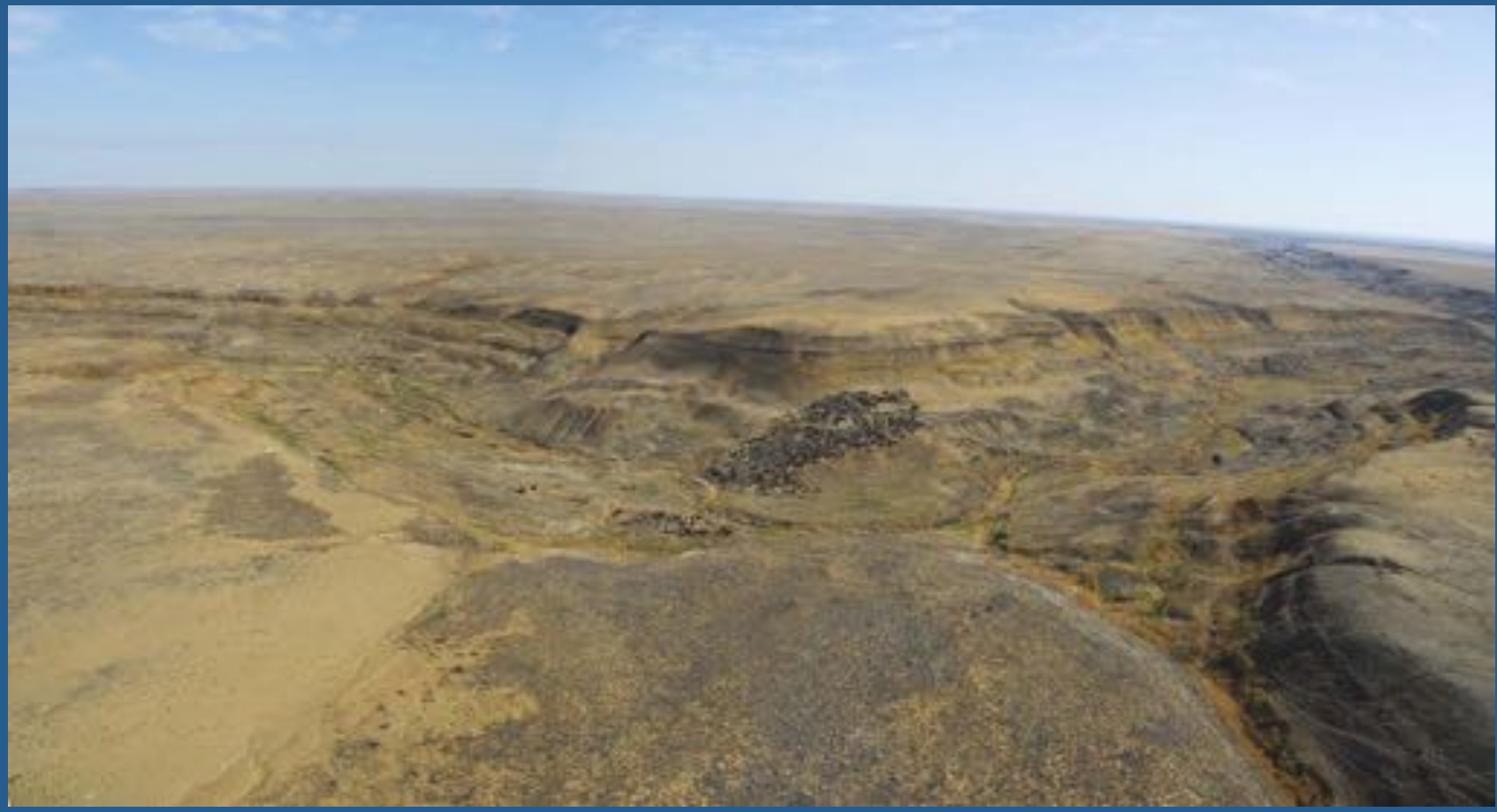
Xixia Dynasty(11～13C)





(N. Boroffka, et. al. 2006; Aizen, et.al. 2010)

Water channels formed during late Pleistocene glacier melt in central Asia (Aral-Caspian desert)



The Fedchenko Glacier, central Pamir

the longest and deepest Asian mountain glacier

38°15’N and 72°15’E

649 km^2 total area

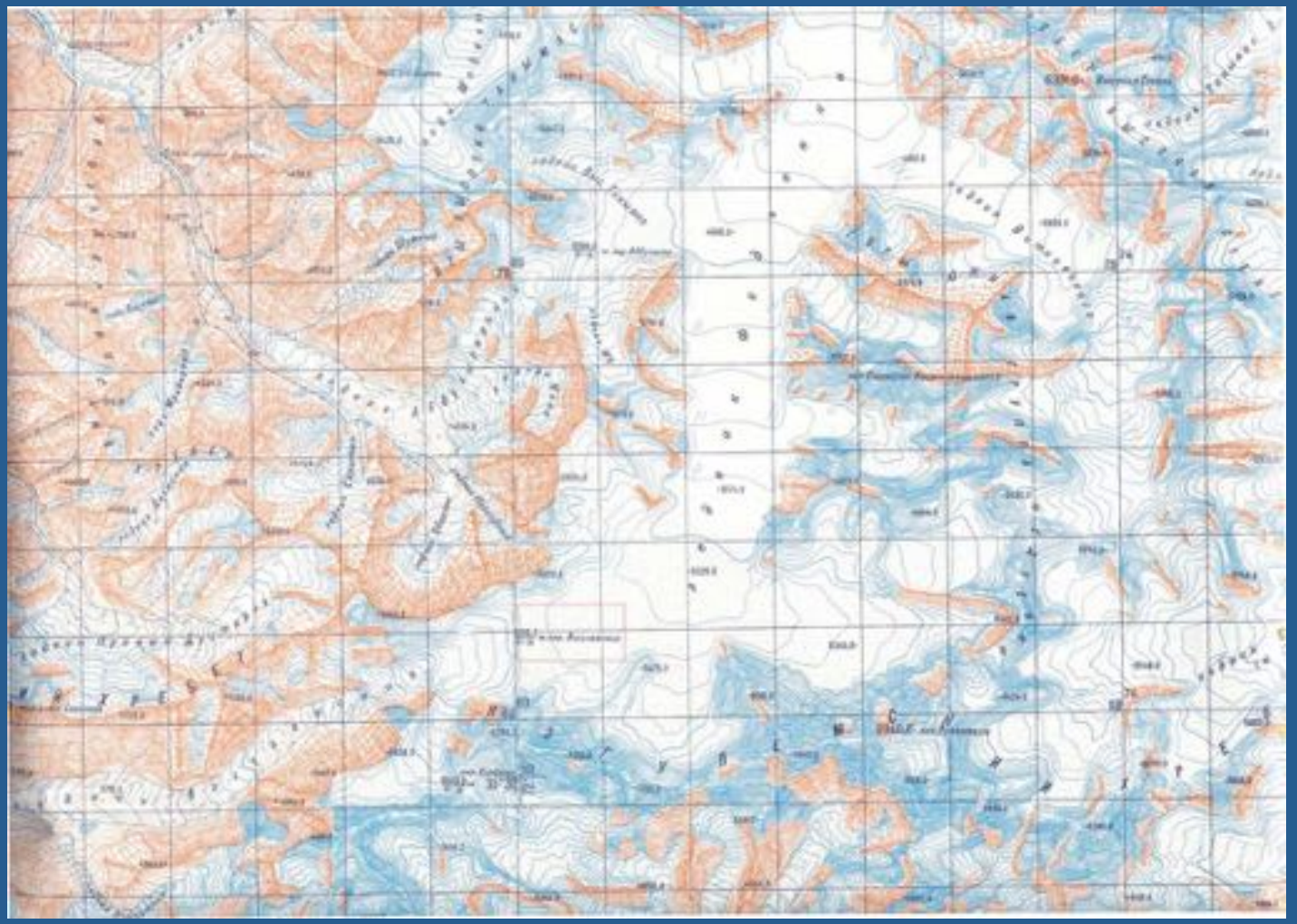
77 km length

2900 to 6300 m a.s.l. altitudinal range

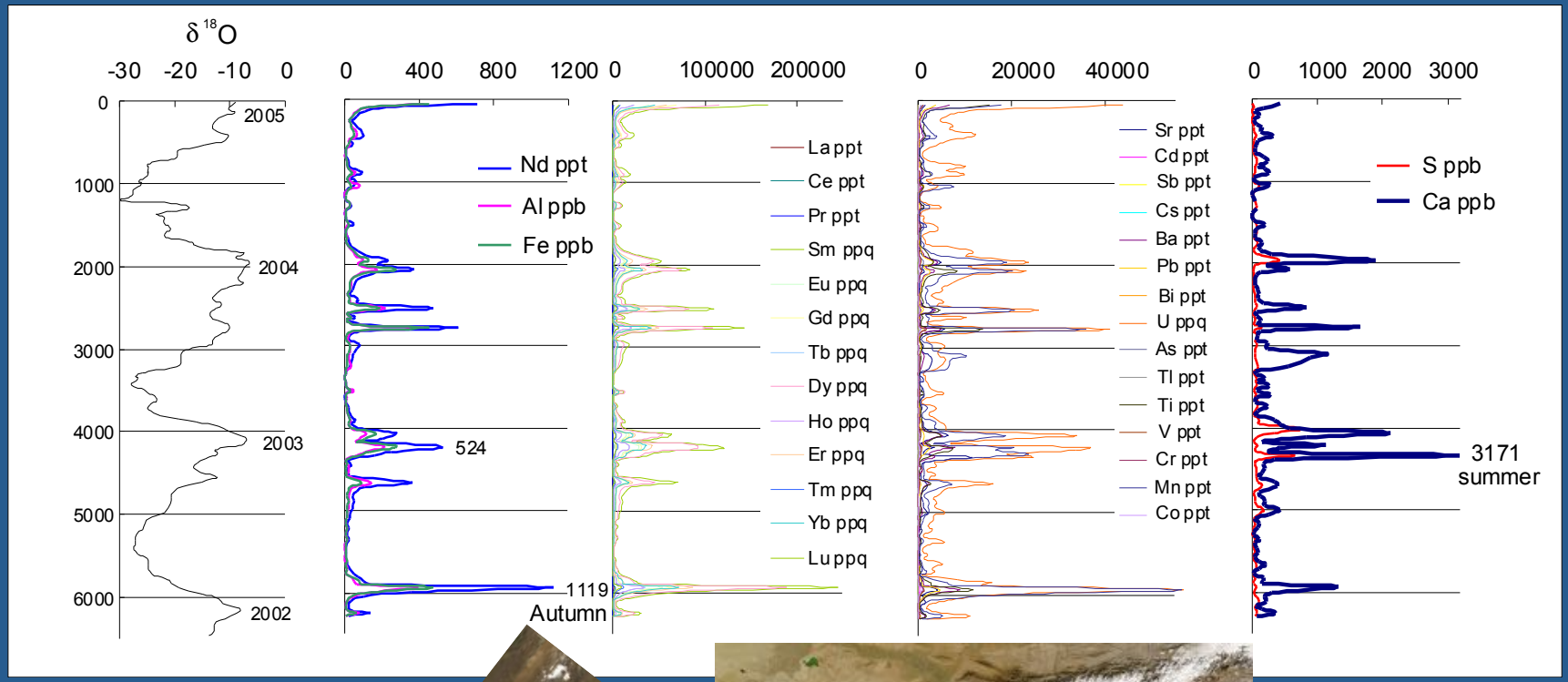
up to 1000 m depth

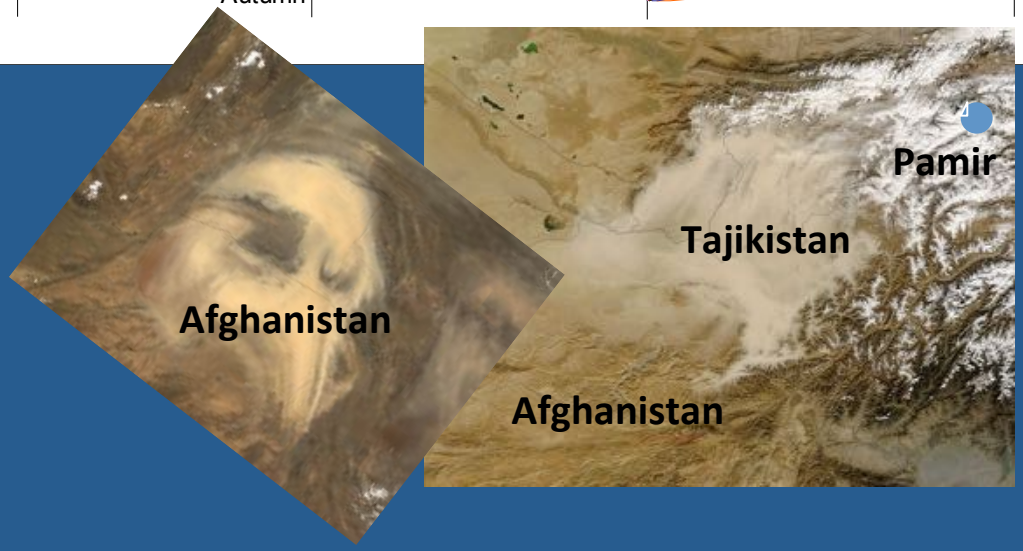
The Fedchenko Glacier geophysical observatory,
Pamir , 1928-1994

Map of the Fedchenko Glacier accumulation area



REE, major and other elements distribution in shallow ice core recovered in 2005 from the Fedchenko glacier (5400 m a.s.l.), Central Pamir.



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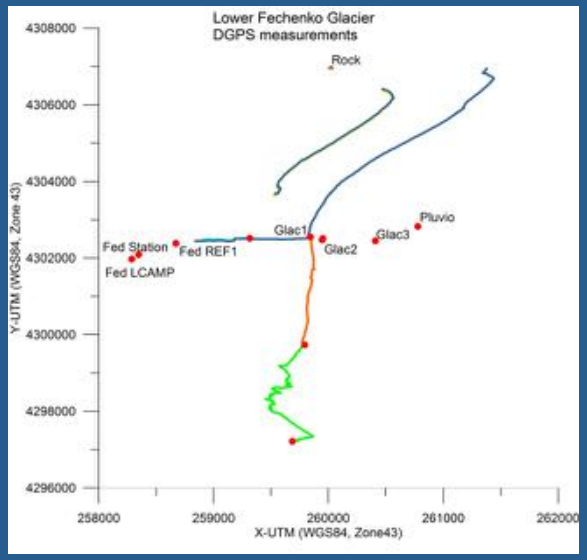
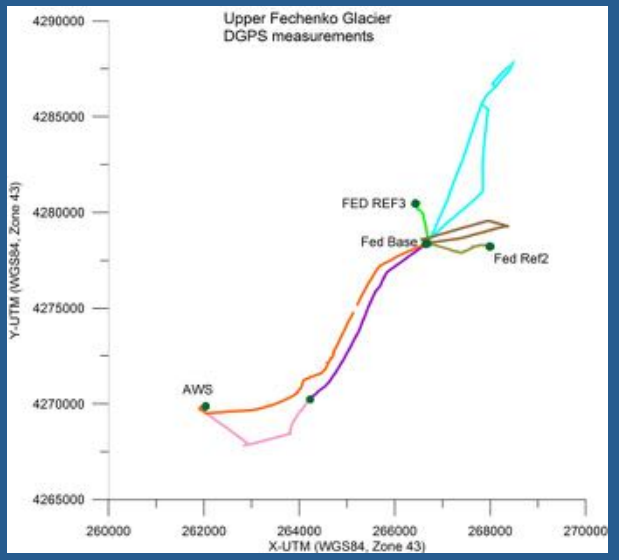
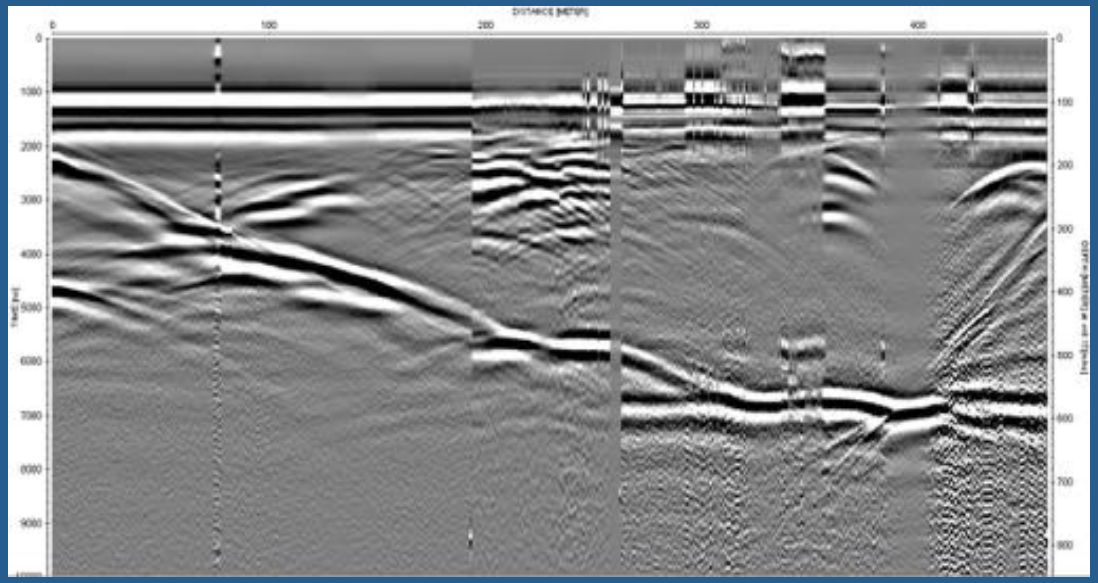
Very first results from the ice-thickness measurements

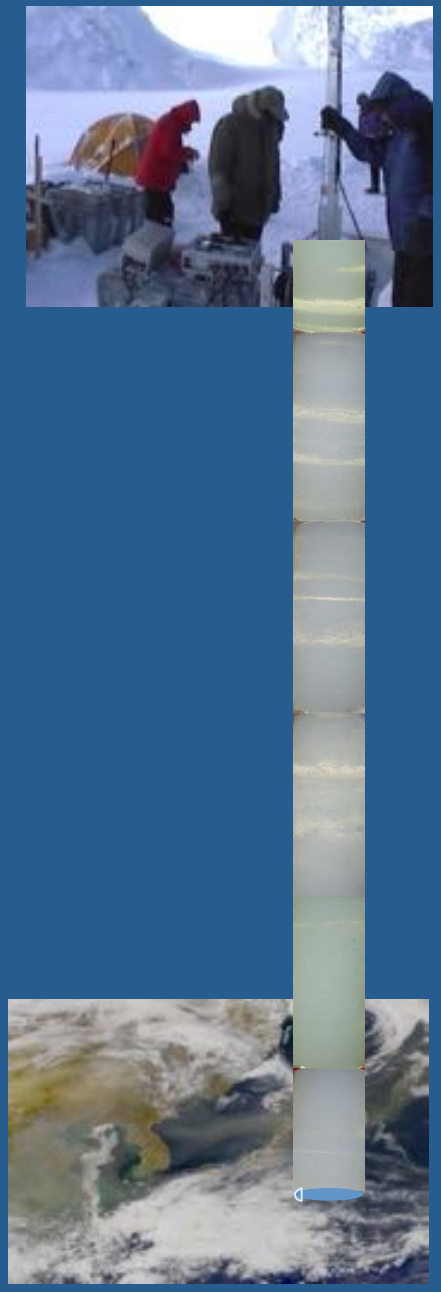






OBJECTIVES

- integrate deep Asian and Polar ice-core records
- link the modern sources of ice-core isotope-chemistry and bio-chemistry with the modern climate and environment processes
- reconstruct major synoptic patterns, climate, water resources, and environmental dynamics and variability for the last thousands of years
- modeling future climate, environment and water resources changes possible scenarios
- understand the Climate variability process at mid-
- low- latitudes



Conclusions:

- Central Asia high elevation ice-firn fields are ideal for deep core/long climatic records studies
- heavy logistics preparation
- reliable deep ice-drill
- monetary support
- reliable transportation vehicle (helicopter of aircraft)

Thank for your attention