



**The 10th Session of the East Asia Winter Climate
Outlook Forum**



Climate overview of summer 2022 over Mongolia

Tergel Shijirtuya, Urtnasan Naransukh, Enkhbat Erdenebat

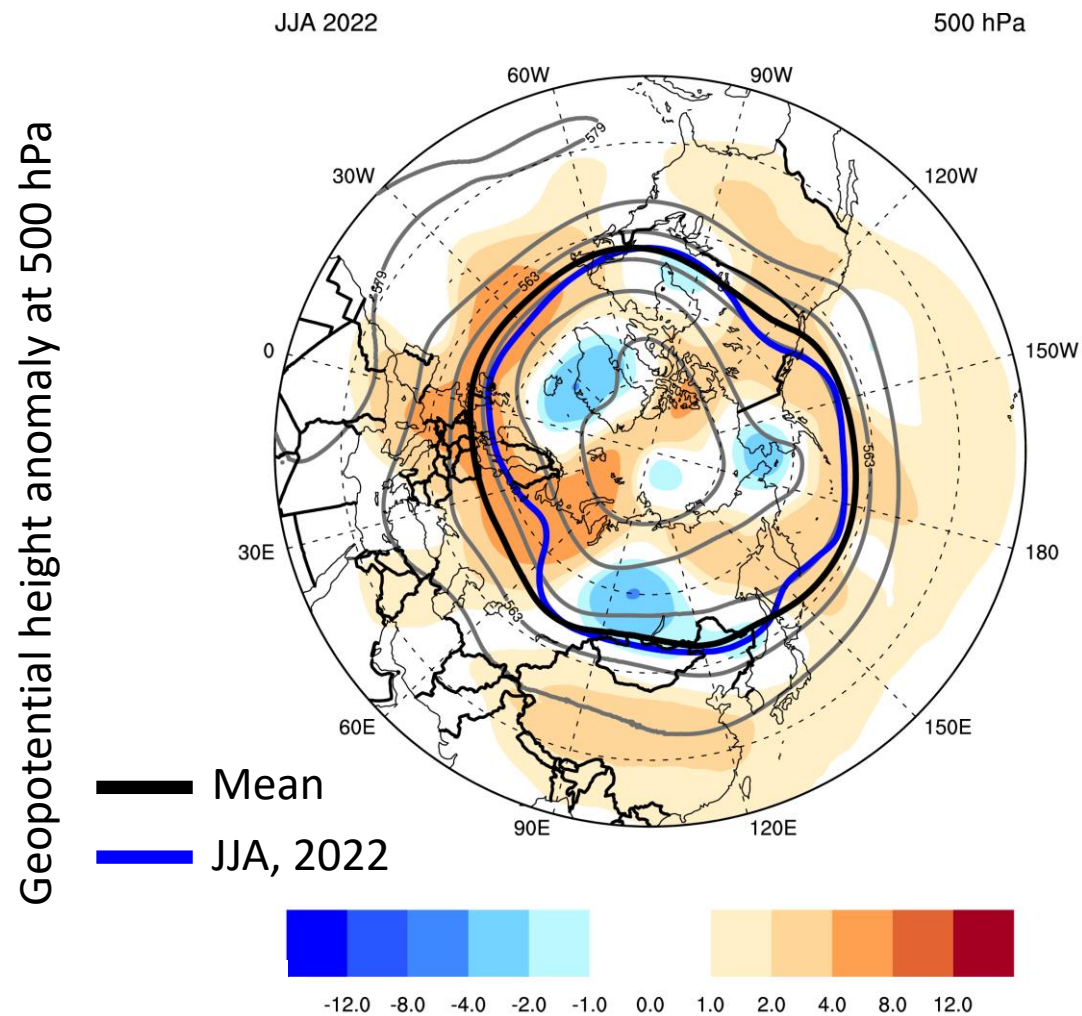
Research Division of Weather and Environmental Numerical Modeling

Information and Research Institute of Meteorology, Hydrology and Environment
MONGOLIA

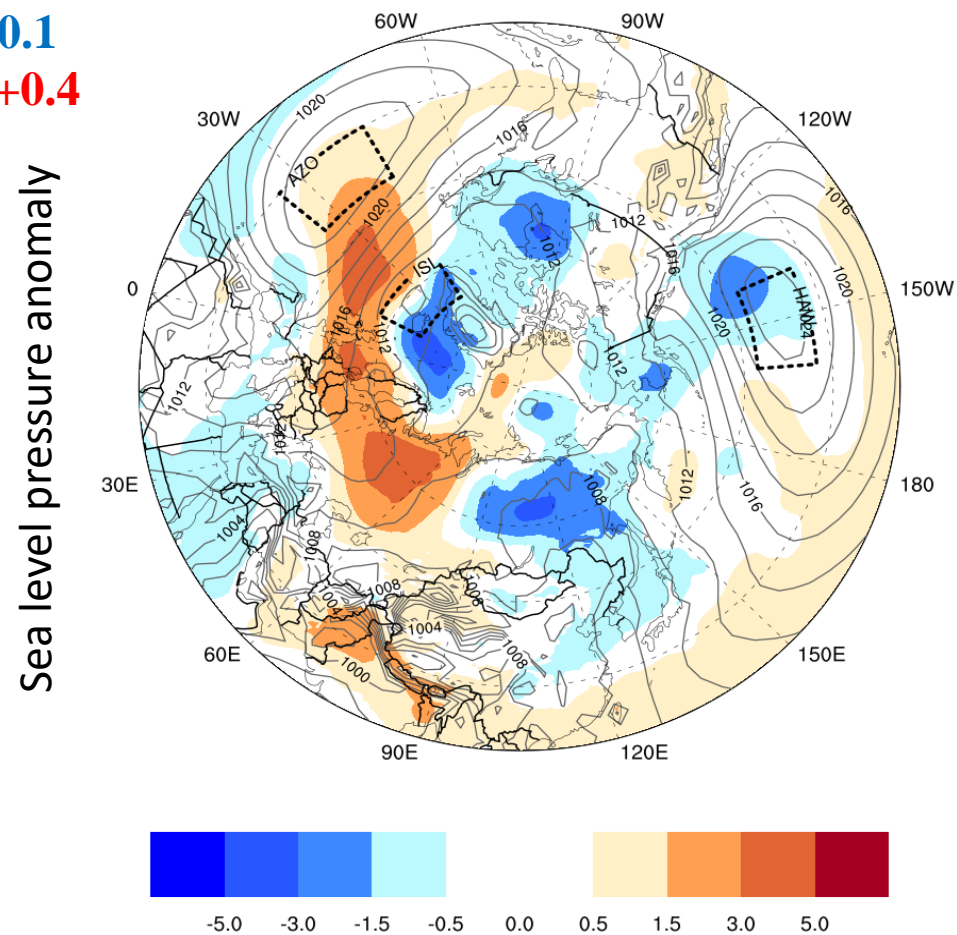
10 November 2022

Atmospheric circulation during the last summer

In summer of 2022, Mongolian summer was cold and precipitation was near average due to negative anomaly over central Siberia.



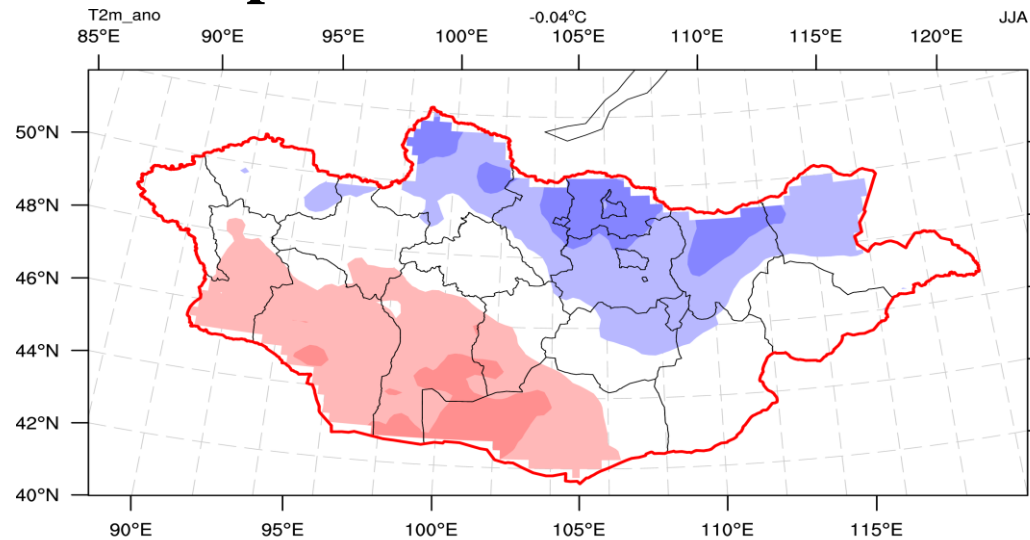
AO **-0.1**
NAO **+0.4**



Data source: ERA5

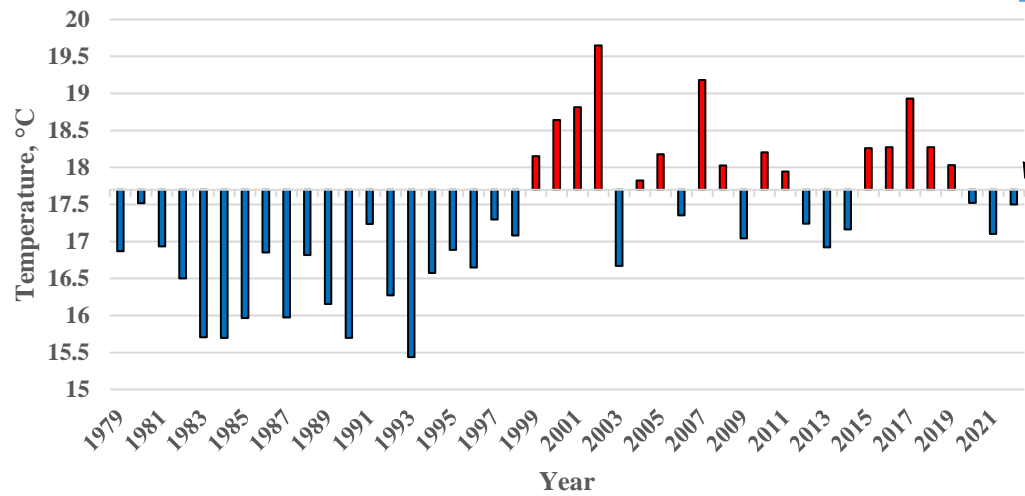
Temperature and precipitation anomalies for JJA

Air temperature of JJA

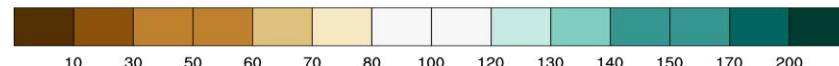
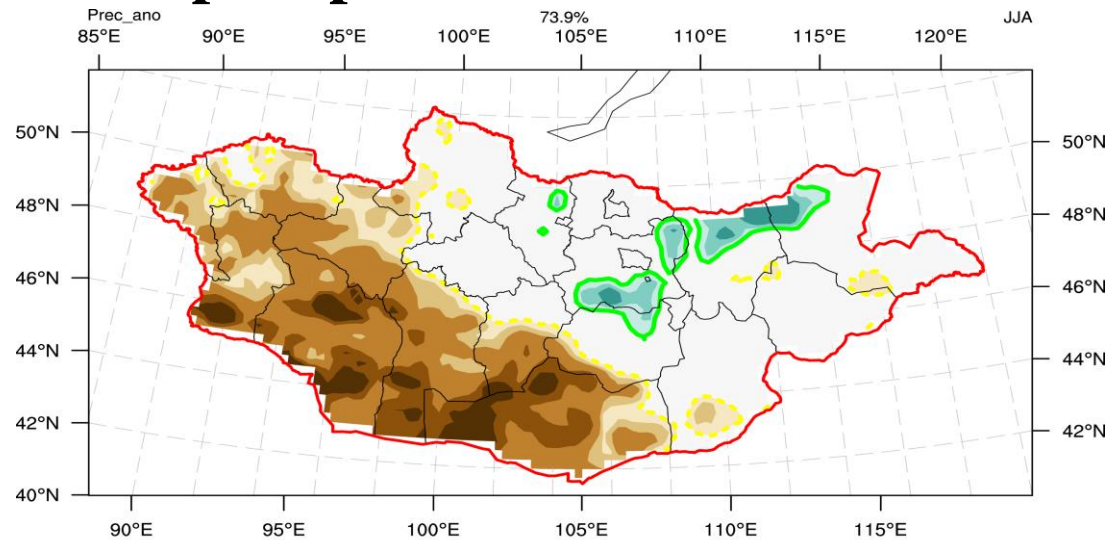


Temperature anomaly (°C)

N/B
-0.2°C

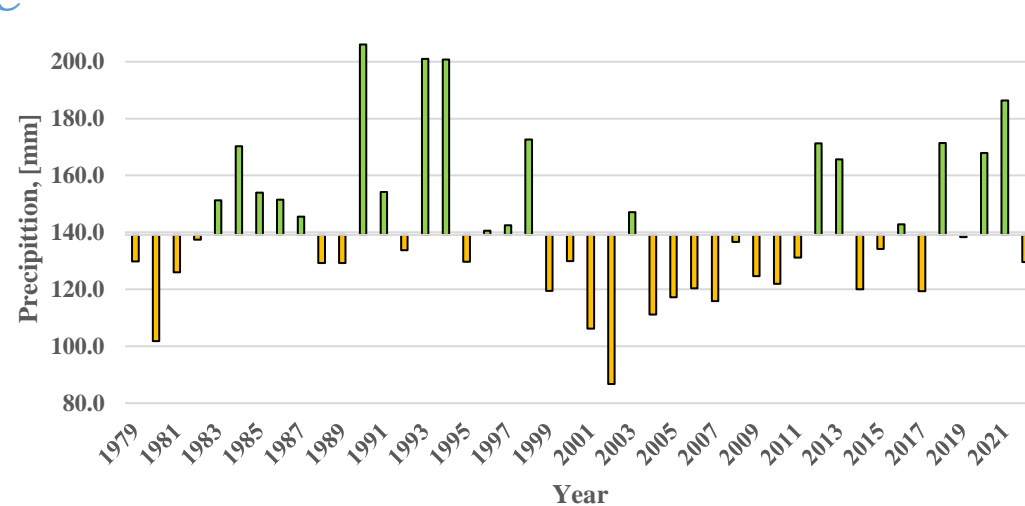


Total precipitation of JJA

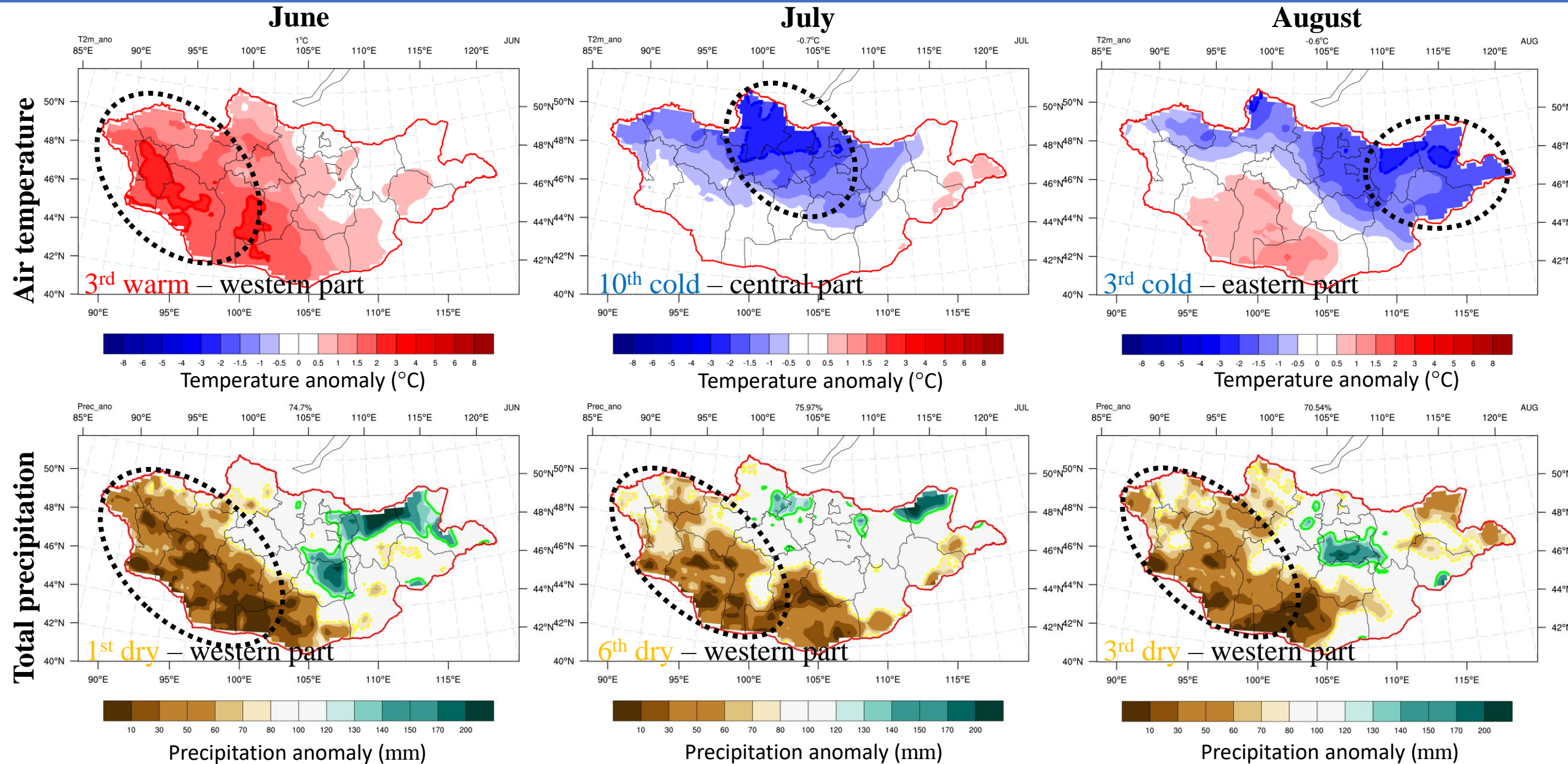


Precipitation anomaly (mm)

B/N
93.1%

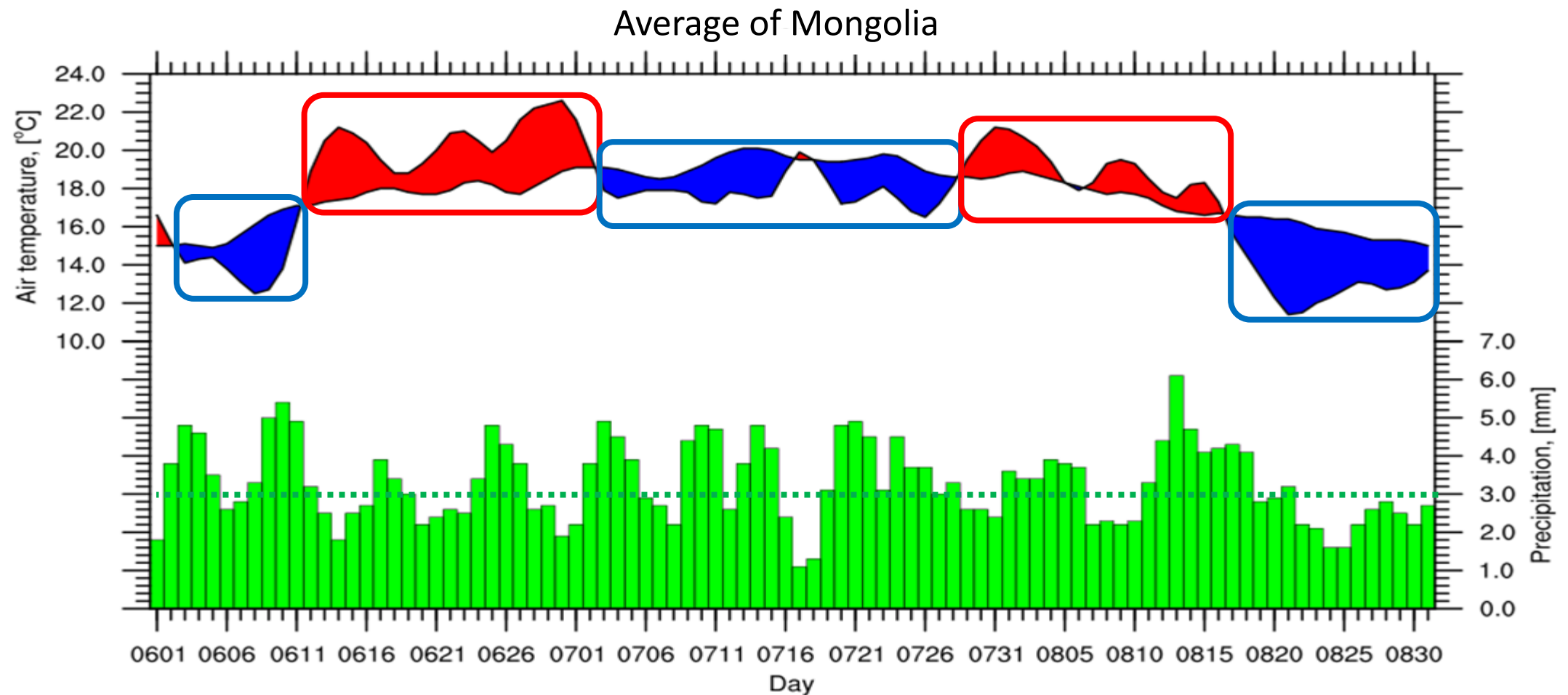


Temperature and precipitation anomalies by months



Timeseries of air temperature and total precipitation for Mongolia

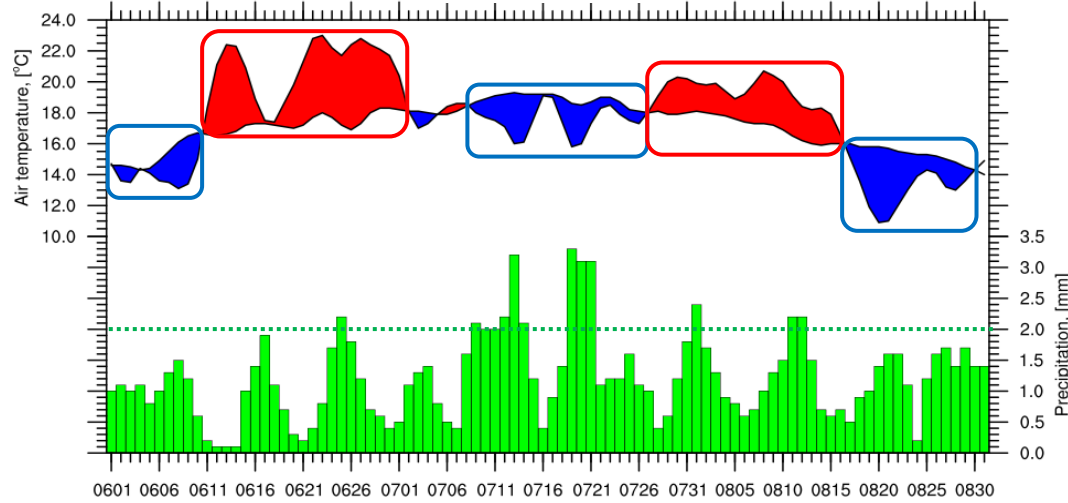
During the summer of 2022, two warmer than normal periods occurred for June and July, as result, many maximum temperature record were broken in June.



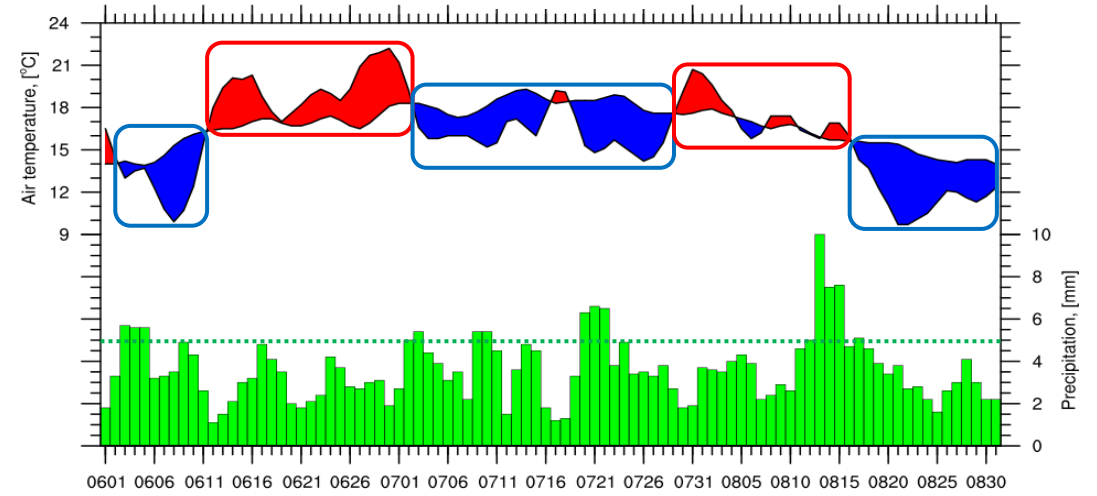
Timeseries of air temperature and total precipitation by regions

Western Mongolia had a less rain for JJA. In contrast, northeastern Mongolia had more than normal rain for JJA.

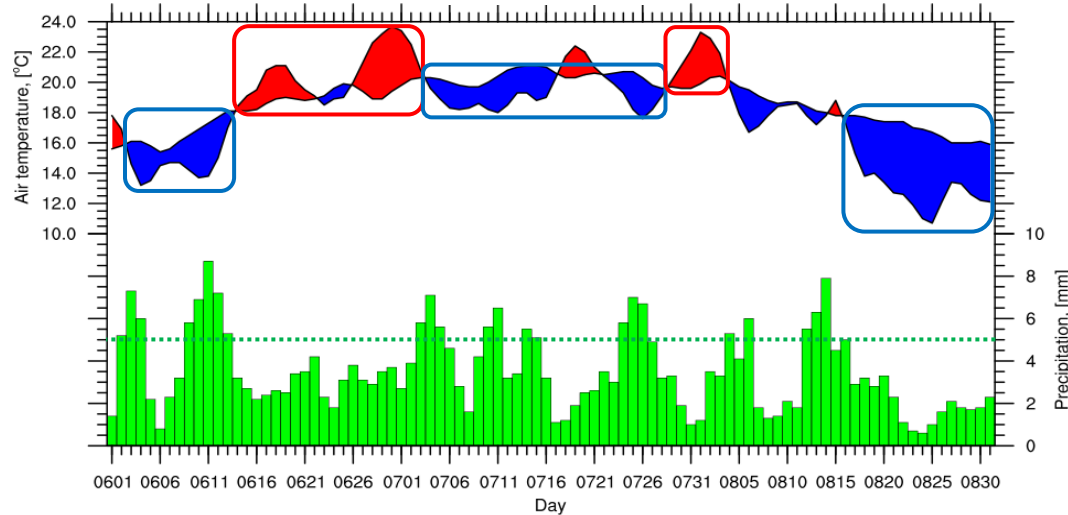
Western Mongolia



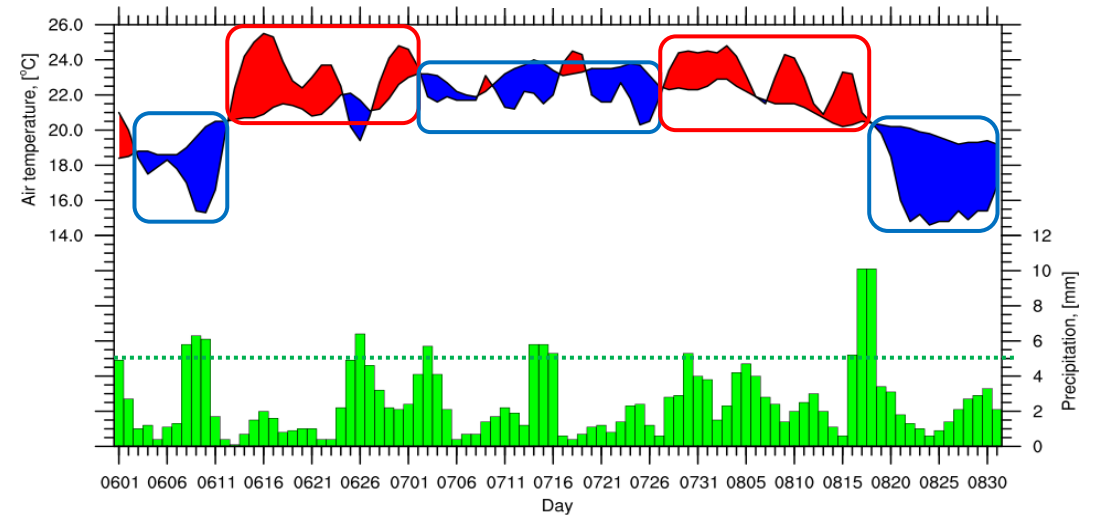
Central Mongolia



Eastern Mongolia



Gobi area

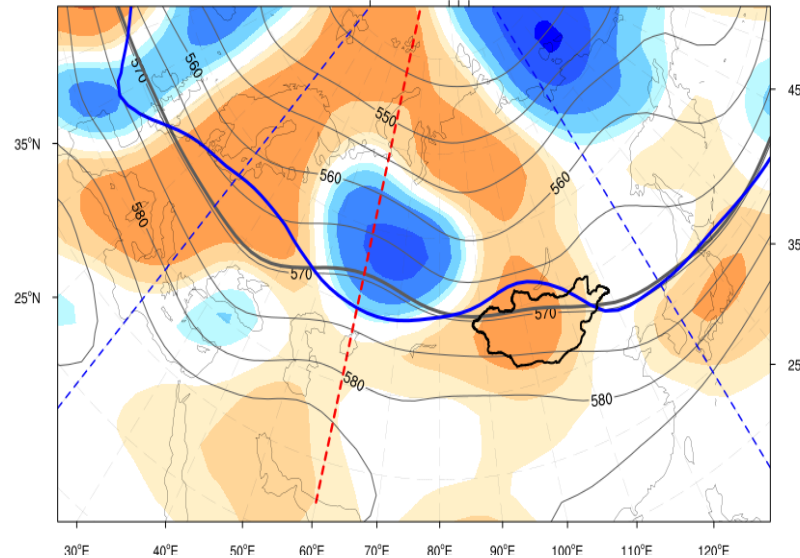


Atmospheric circulation during the cold and hot periods

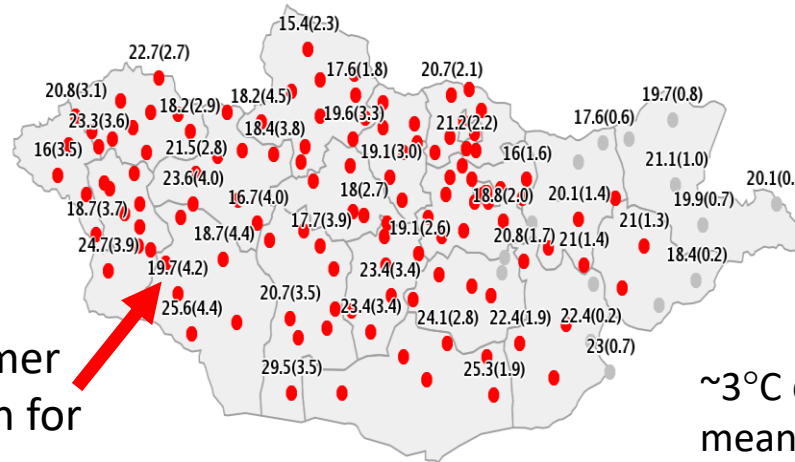
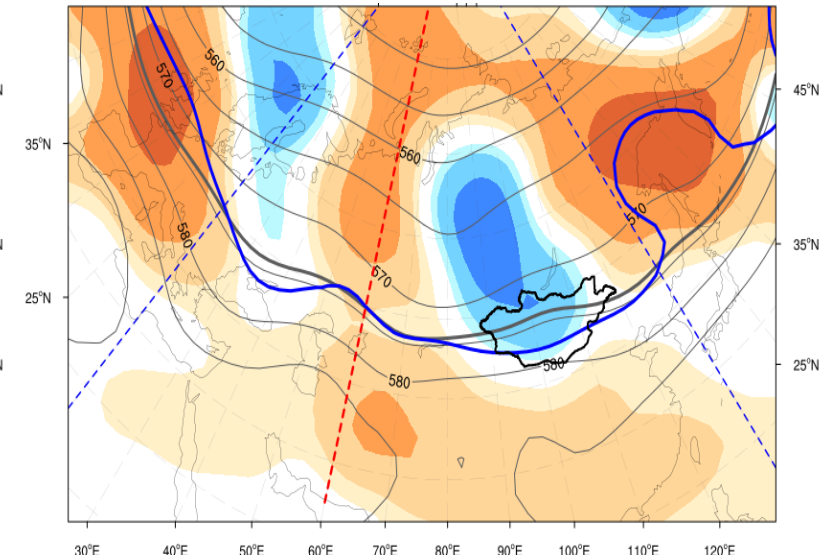
During 12-30 June, stationary blocking high located over Mongolia for several days that surface air temperature reached as high as 40°C for Gobi areas and 33-38°C for western Mongolia.

Prolonged cold period is observed for July. Sometimes minimum temperature reaches 3-5°C in Mountainous areas.

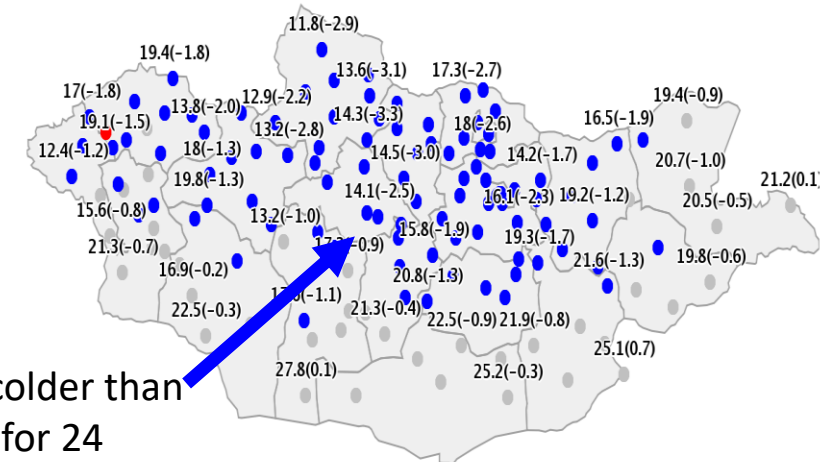
Warm period (12-30 June)



Cold period (04-28 July)



~4°C warmer than mean for 18 days.

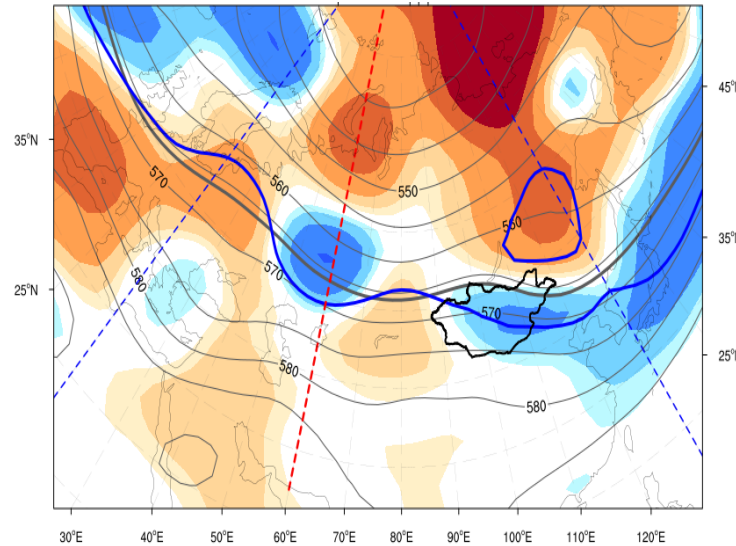


~3°C colder than mean for 24 days.

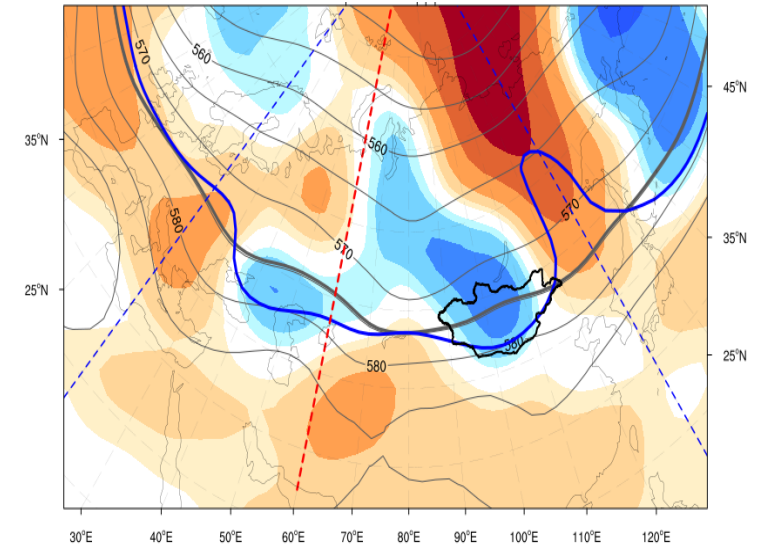
Atmospheric circulation during the high precipitation periods

During 05-12 June, a stationary Rossby wave was located over Mongolia for several days and central Mongolia received heavy rainfall. Some areas received 5-7 times more rainfall than the daily mean.

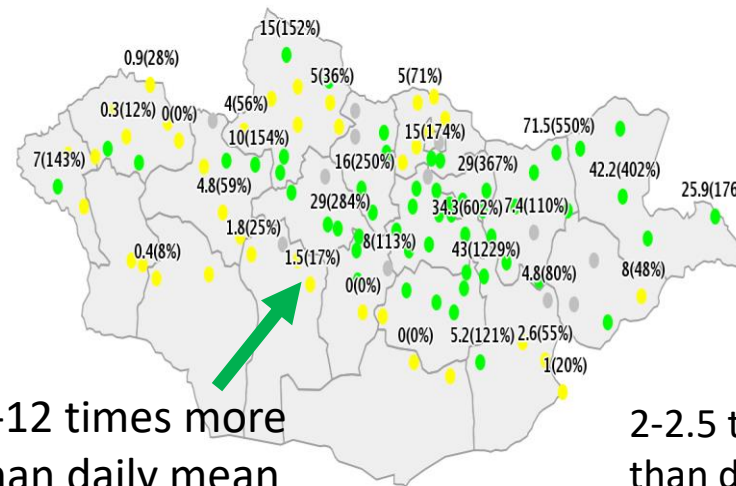
Wet period (05-12 June)



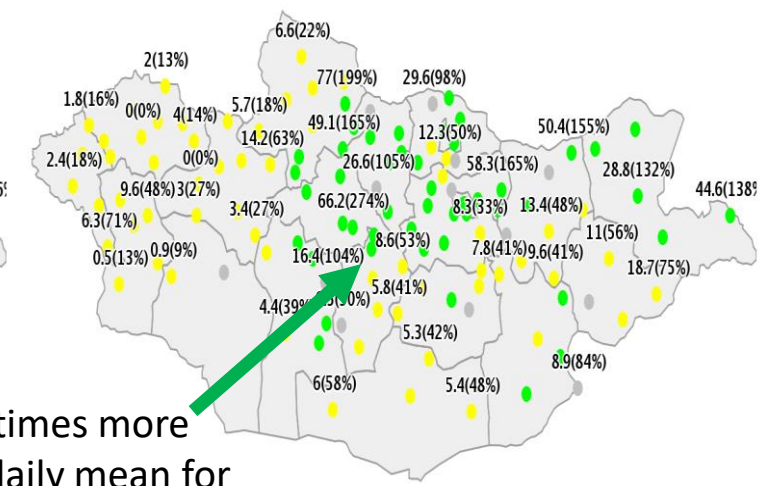
Wet period (21-31 July)



A prolonged wet period during 21-31 in July, northern Mongolia had more rainfall that some areas rainfall amount was 10 times more than the mean in a single day.



2-12 times more than daily mean for 7 days.



2-2.5 times more than daily mean for 11 days.

Number of record-breaking events

Daily MAX Temperature

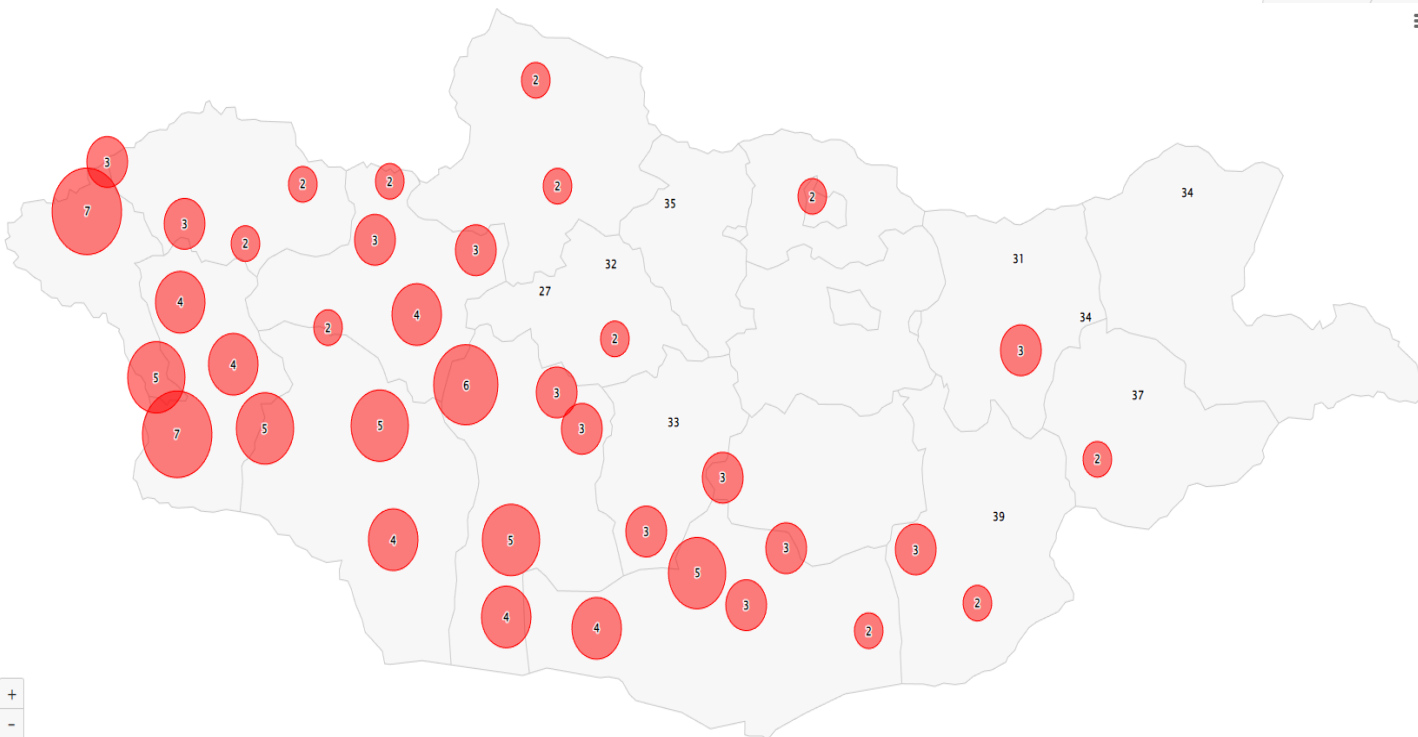
36.0 ... 40.0°C

during the second half of June,
over the southwestern part of Mongolia

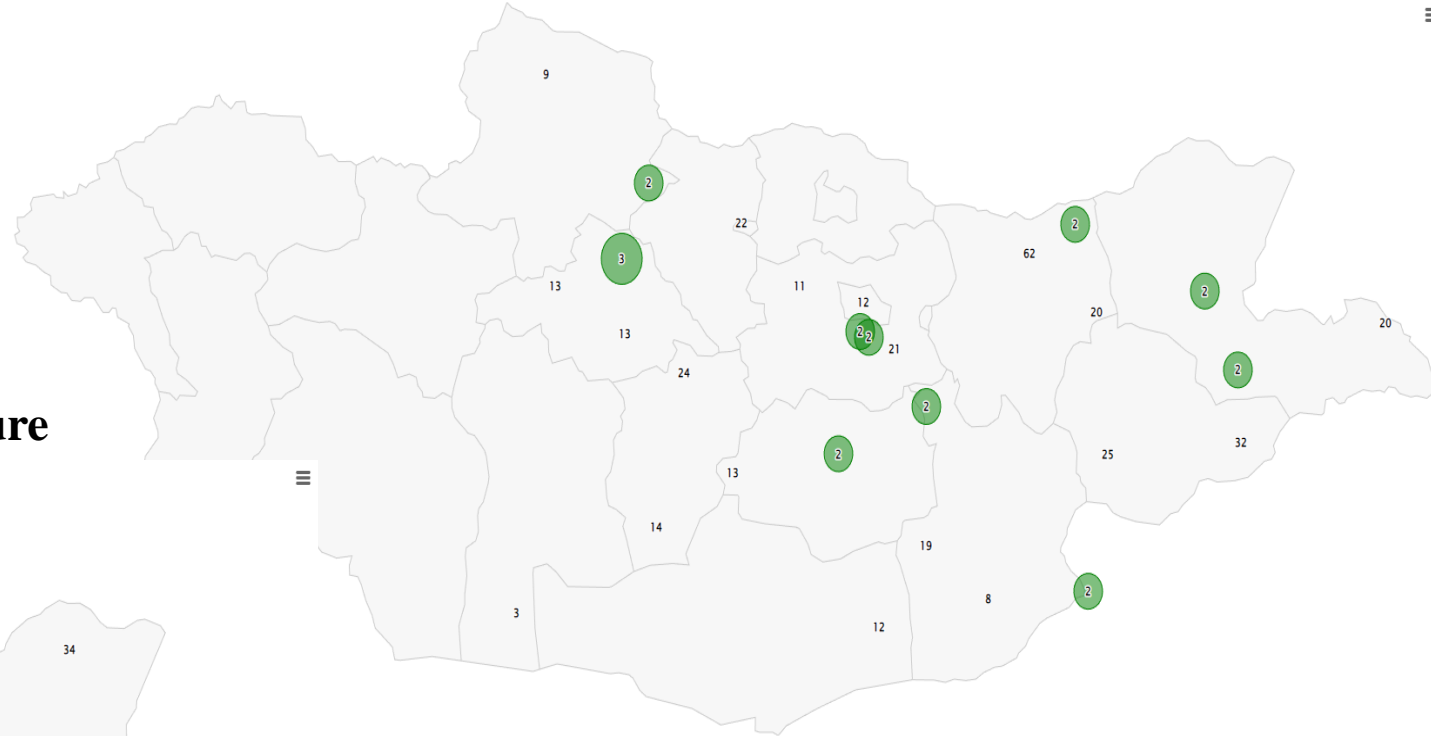
Record-breaking:

Total 46 station; 2 – 7 times broken for JJA

Number of record-breaking events for temperature



Number of record-breaking events for precipitation



Daily MAX Precipitation

27.1 ... 61.9 mm

on 4th of June, over the northeastern part of
Mongolia

Record-breaking:

Total 28 station; 1-3 times broken for JJA

Disasters for JJA

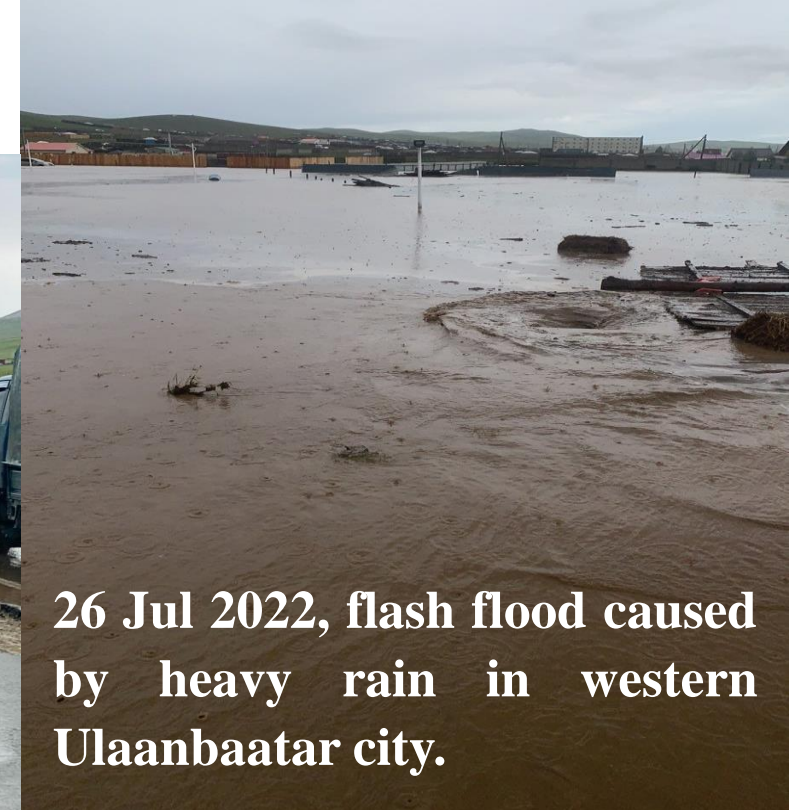
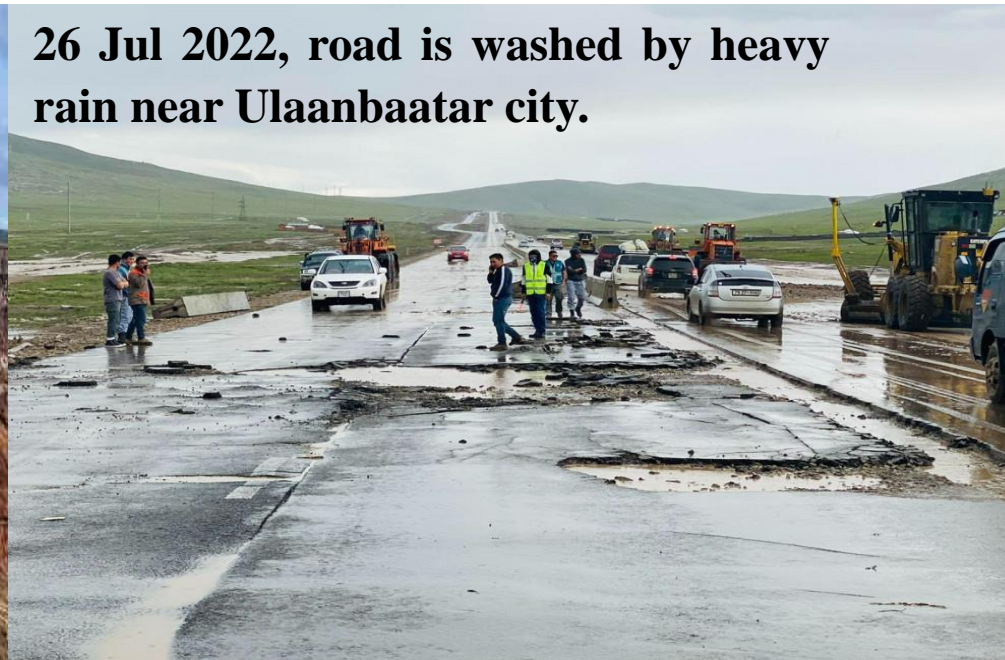
On July 17, heavy rain with thunder and hail with a diameter of 13-23 mm hit the western part of central Mongolia, resulting in the death of 1,800 livestock and the collapse of several traditional houses. In July, roads and railways were damaged by heavy rainfall.

15 Jul 2022, Heavy rain and hail in central Mongolia



16 Jul 2022, railway is washed by heavy rain near Ulaanbaatar city.

26 Jul 2022, road is washed by heavy rain near Ulaanbaatar city.



26 Jul 2022, flash flood caused by heavy rain in western Ulaanbaatar city.

Summary

Following can be summarized in summer of 2022.

- Negative anomaly was prevailed in central Siberia and positive anomaly over Sea of Okhotsk that results cold summer in Mongolia, especially over northern and eastern Mongolia.
- The summer mean temperature was 17.5°C (-0.2°C below normal) in Mongolia.
- The summer mean total precipitation was 129.6 mm (93.1%) in Mongolia. The highest amount of rainfall was 61.9 mm/day in Khentii mountain area and 54.9 mm/day in Khangai mountain area.
- Due to the heavy rains, railways and roads were damaged, and several Mongolian houses collapsed due to strong winds.

Thank you