



The Eleventh Session of the East Asia Winter Climate Outlook Forum



Review of Summer Climate over Mongolia, 2023

*Research Division of General circulation and Long range prediction
Information and Research Institute of Meteorology, Hydrology
and Environment, MONGOLIA*

6-8 November 2023

Content

1. Recent Climate Changes in Mongolia

2. Review of last summer, 2023

3. Characteristic of atmospheric circulation

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1. Recent Climate Changes in Mongolia

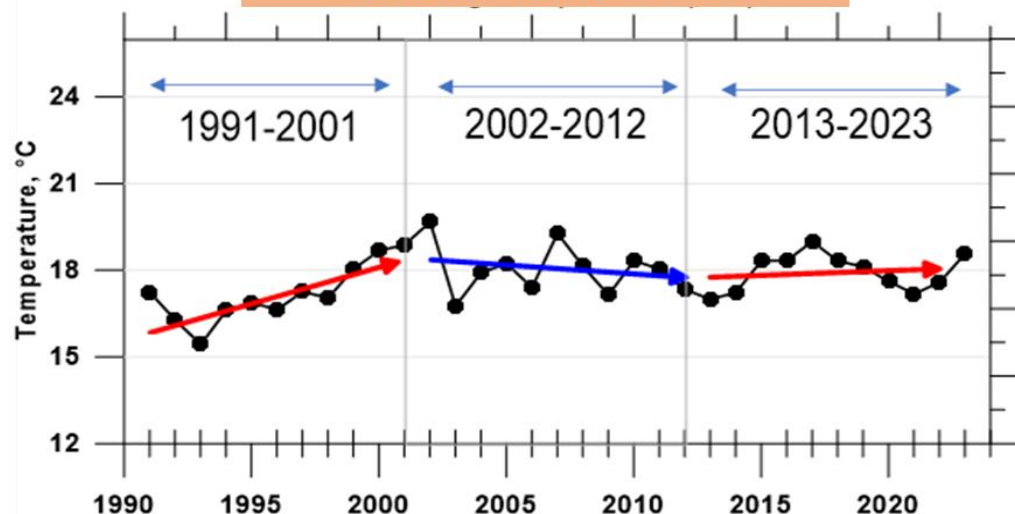
Seasonal changes of Temperature, [1991-2023]

Air temperature	DJF	MAM	JJA	SON	Annual
1st decade (1991-2001)	-3.81	5.78	2.23	1.55	0.92
2th decade (2002-2012)	-7.60	-1.33	-0.56	1.38	-0.96
3th decade (2013-2023)	-0.25	2.41	0.29	1.87	0.26
1991-2023	-0.33	0.61	0.12	0.29	0.09

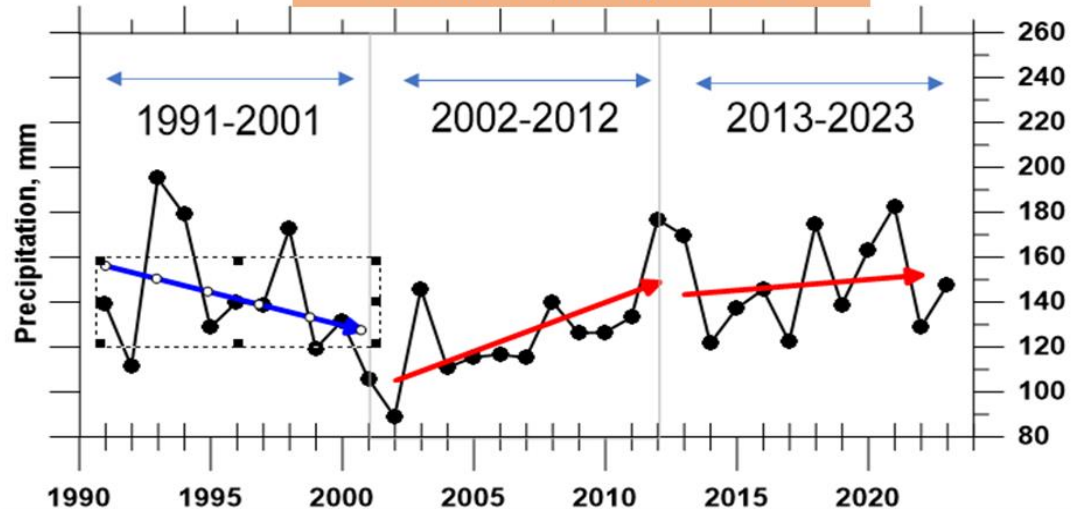
Seasonal changes of Precipitation, [1991-2023]

Precipitation	DJF	MAM	JJA	SON	Annual
1st decade (1991-2001)	-26.04	5.94	-26.04	-3.09	-33.09
2th decade (2002-2012)	39.6	-10.48	4.37	3.13	32.02
3th decade (2013-2023)	8.75	-11.45	39.76	-6.32	-5.01
1991-2023	1.06	0.46	1.06	0.58	1.52

Summer Temperature



Summer precipitation



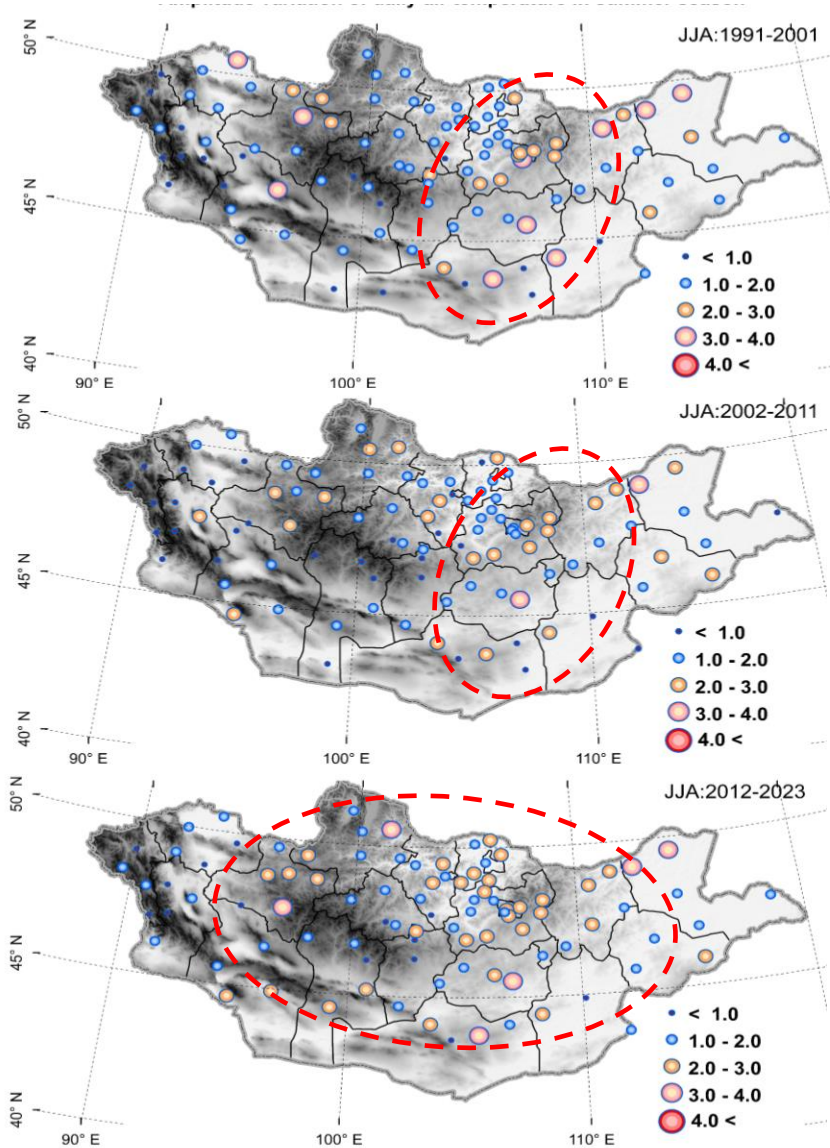
Trend analysis

- 1991-2001 Opposite trend
- 2002-2012 Opposite trend but reversed
- 2013-2023 Same trend

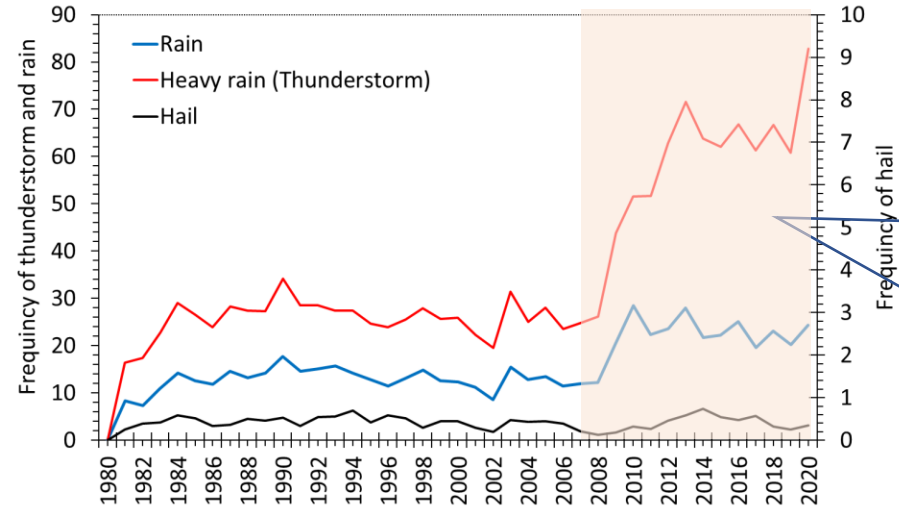
Based on the in situ observation data

1. Recent Climate Changes in Mongolia

Daily temperature variation changes, [1991-2023]

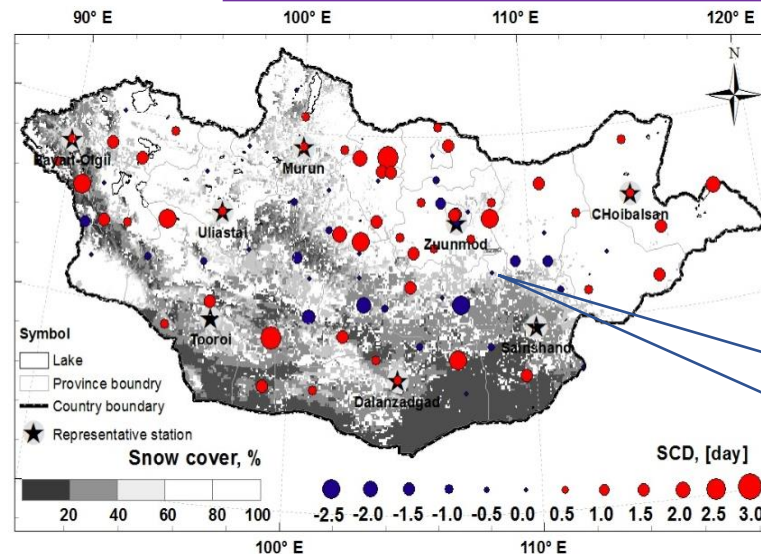


Changes in Summer Precipitation type



Increased frequency of heavy rain during the last decade

Changes in Winter snow cover day



Snow cover can affect regional patterns of enhanced cold air formation.

Snow cover days
Nearly 60% of country ↑

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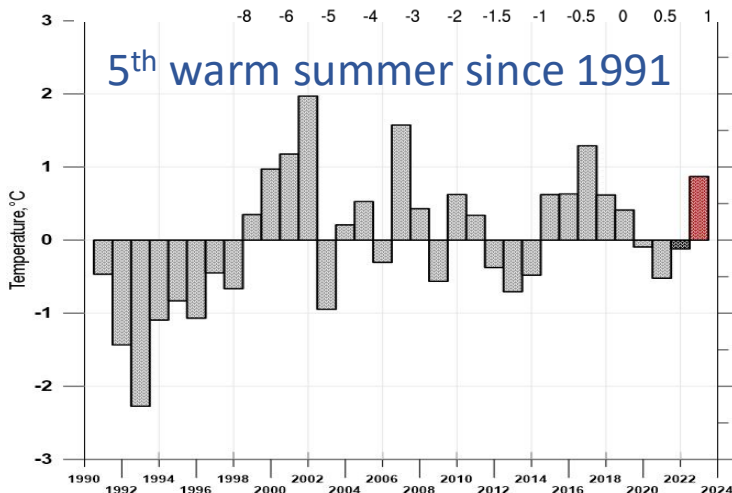
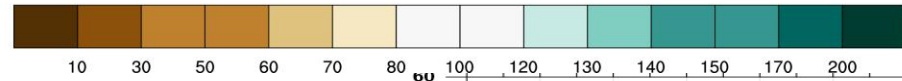
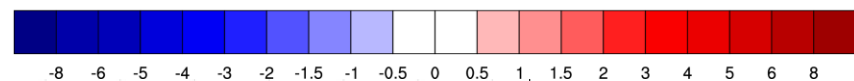
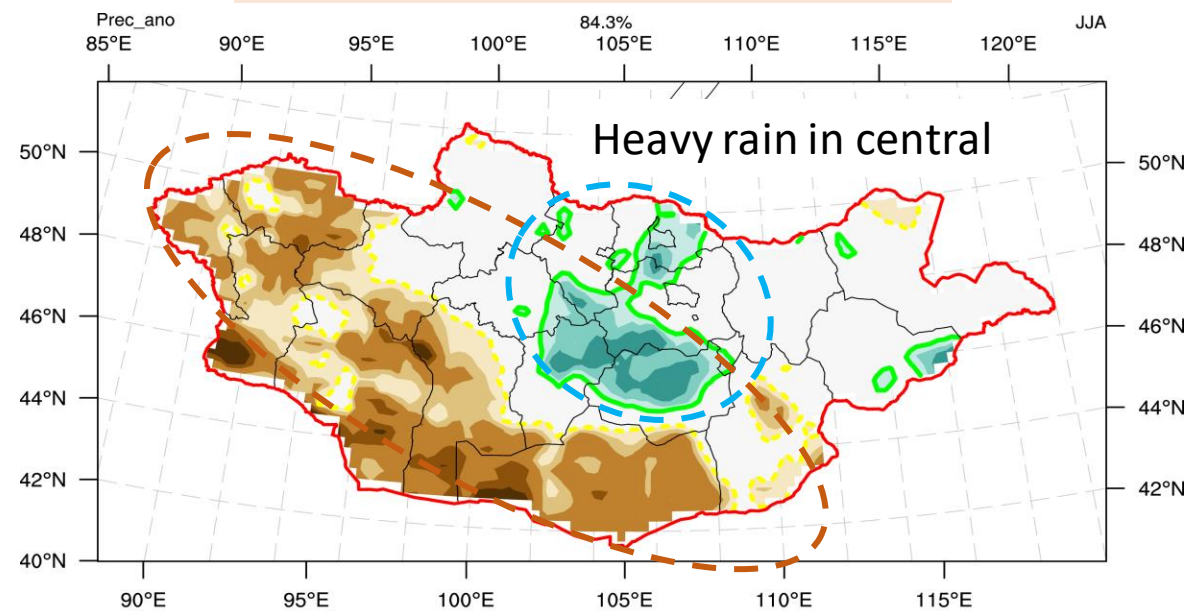
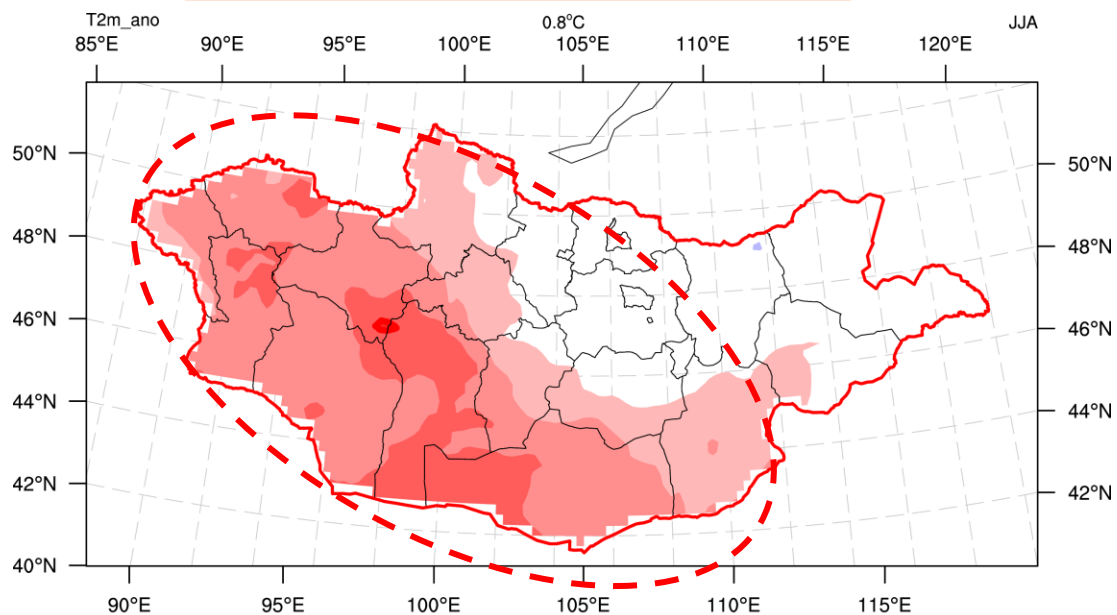
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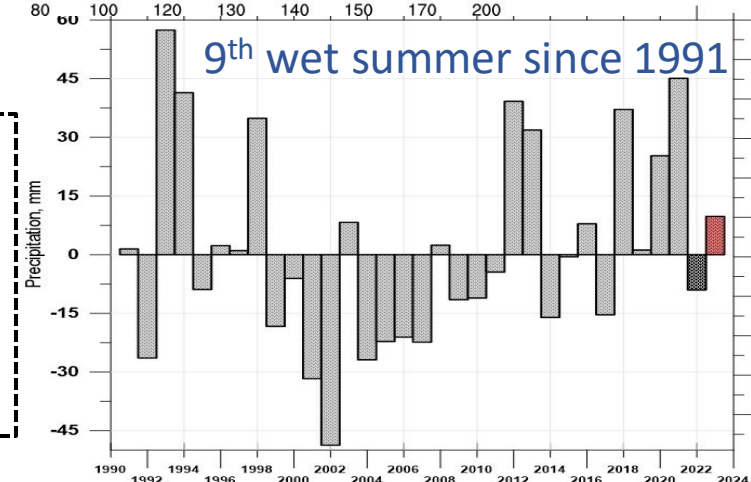
Temperature Anomaly [°C]

Jun-Aug

Precipitation anomaly, [mm]



- **Warm & dry:**
 - West and South regions of Mongolia: dominated by warm and dry conditions in June and August
- **Wet:**
 - Central region of Mongolia: rainfall in July

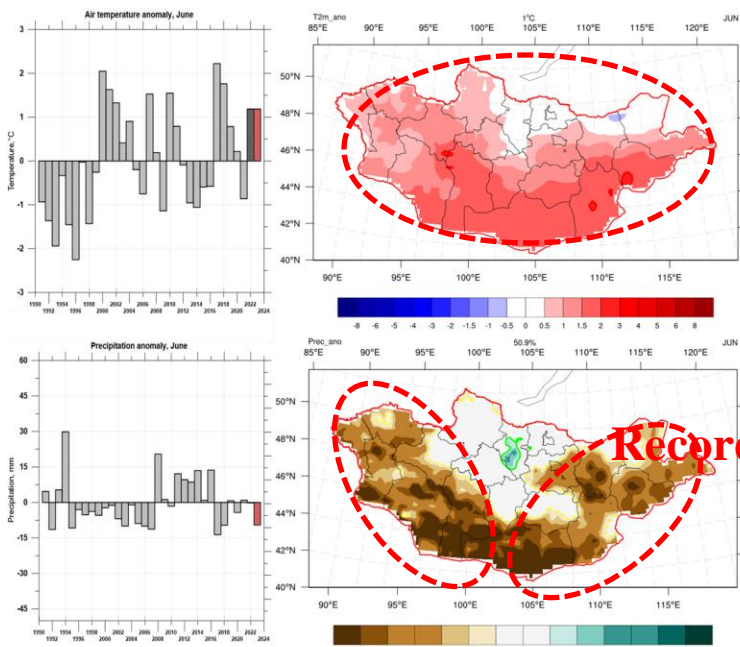


2. Review of last summer, 2023

Drought occurred in the western side of Mongolia

June

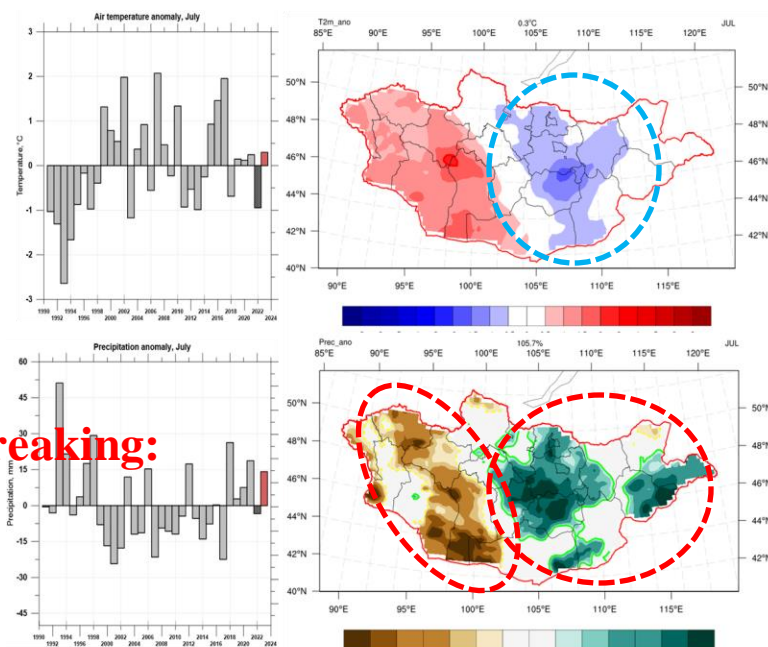
Warm in entire



Dry in the west & east

July

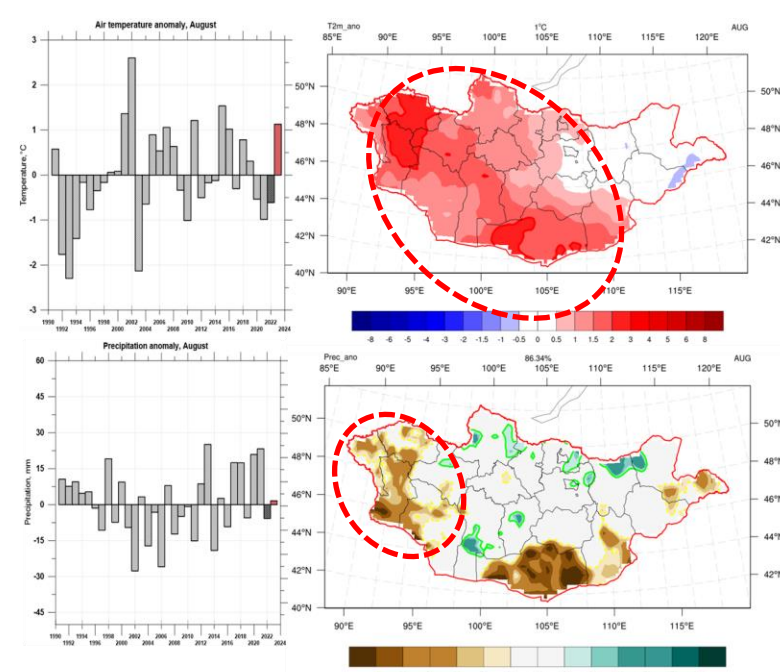
cold in central



Wet month in central

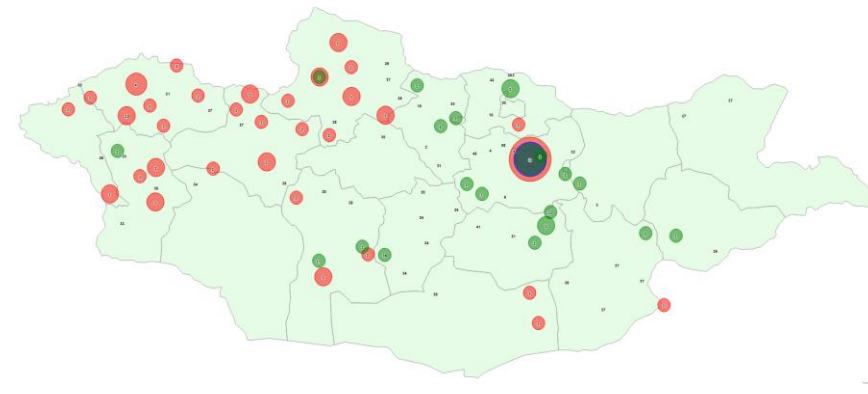
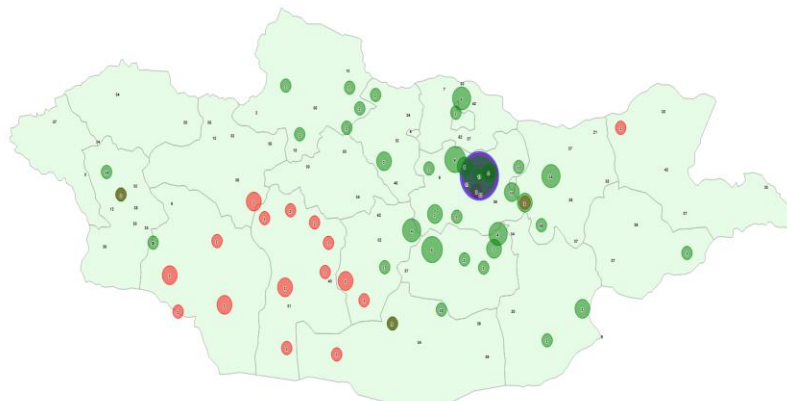
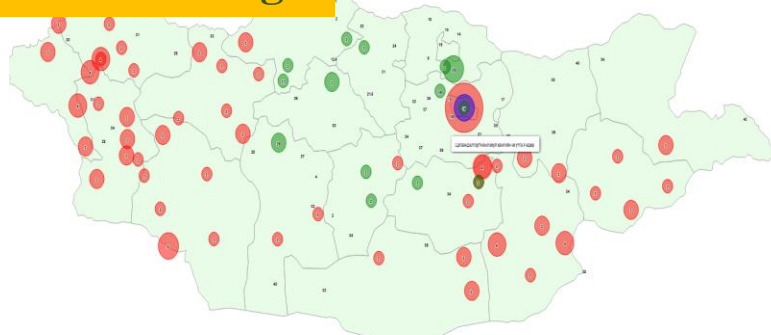
August

Warm in west



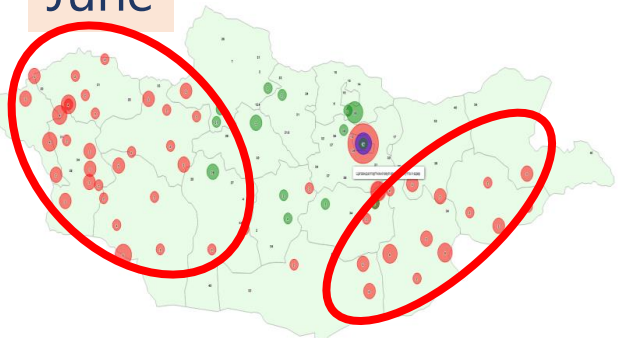
Record-breaking:

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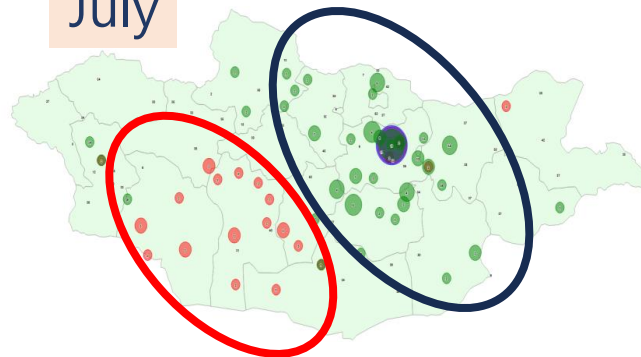


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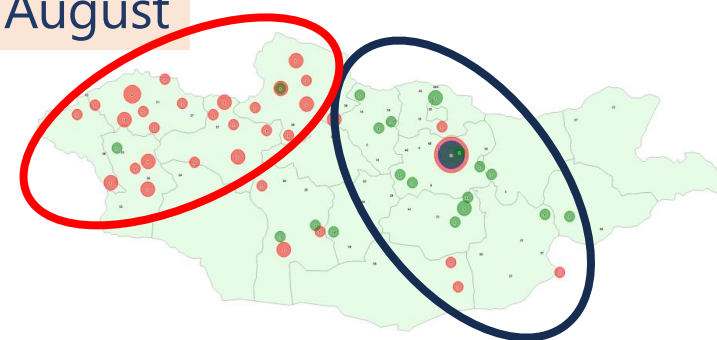
June



July



August



Record-breaking:

Daily MAX Temperature
West and South most of stations;
max Tem = 41.0°C
min Tem = -6.0°C
max RR= 80mm (18, Jun)

Daily precipitation

Central station;
max Tem = 41.7°C
min Tem = -2.0°C
max RR= 86mm (23, Jul)

Daily MAX Temperature and precipitation

West stations; 1-5 times
Central station:
max Tem = 39.4°C
min Tem = -1.7°C
max RR= 80mm (6, Aug)

Extreme events impact

Capital city; Ulaanbaatar



2. Review of last summer, 2023

Weather-related hazards

Month	Day	hazards	Area
June	16-18	Hail > 1.3cm: heavy rain maxRR= 32mm	Northern west and central
	25-27	squall WS>23-27m/c, heavy rain=max 24mm: hail =0.3-0.9cm	central
July	3--6	Heavy rain < 52mm: flood	Center: Ulaanbaatar
	10--12	Heavy rain < 78mm: flood	Central area
	22--23	Heavy rain < 86mm: flood	Central area
August	1--2	Thunderstorm < 58mm, squall, flash flood	Central area
	5--6	Thunder	Northern west
	16	heavy rain RR=15-26 mm	Central

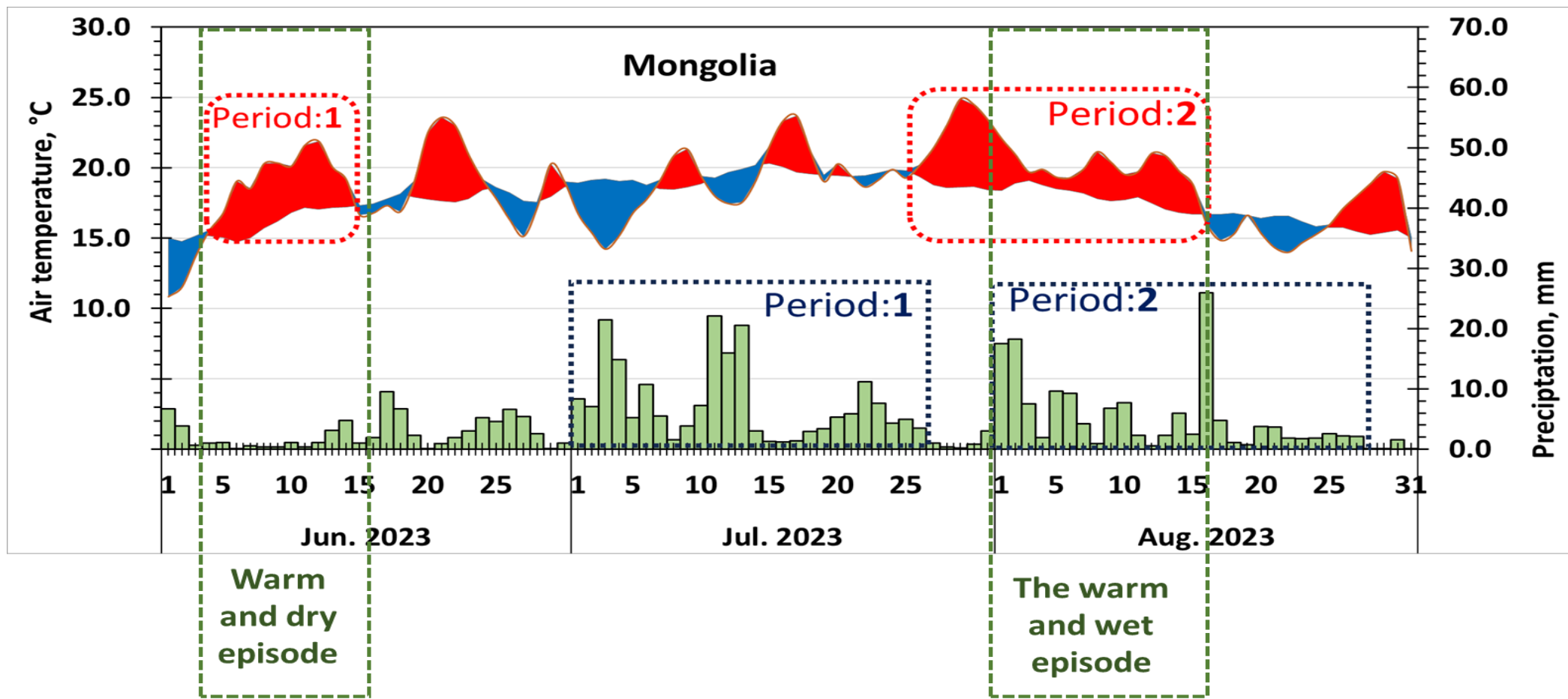
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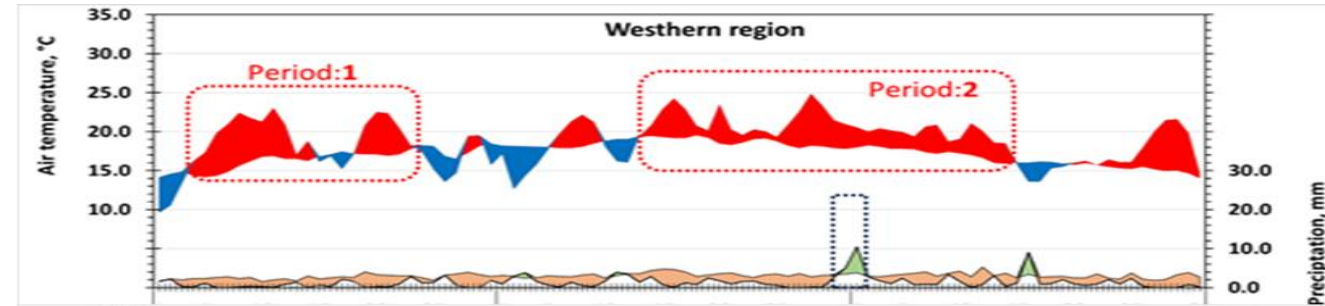
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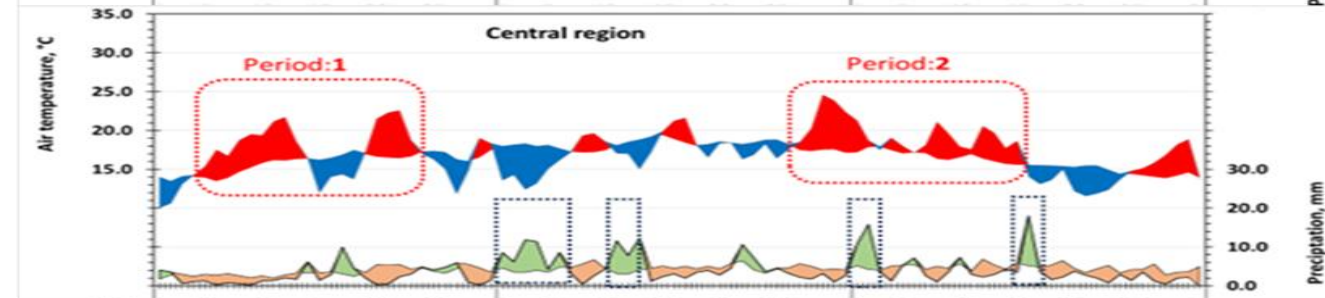
Summer season, 2023	Warm episode	Wet episode
Episode 1	5-14, Jun	1-13, Jun
Episode 2	27. Jun - 15. Aug	1- 15. Aug (1-6; 15-16)

3. Characteristic of atmospheric circulation

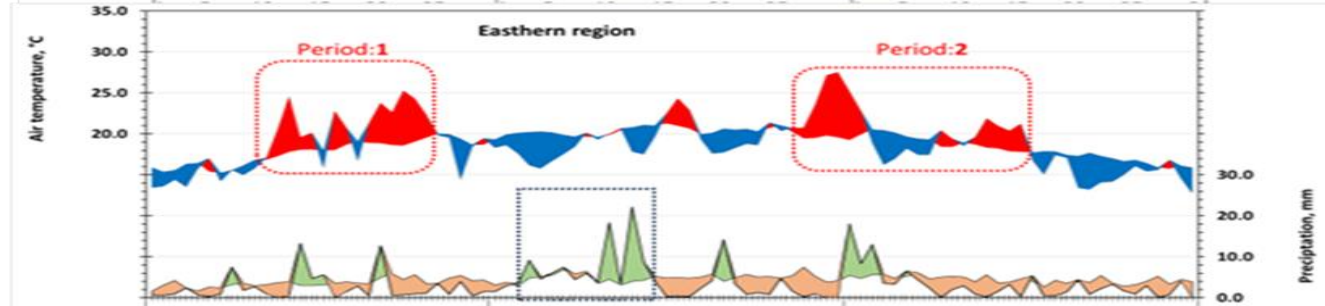
Western Region



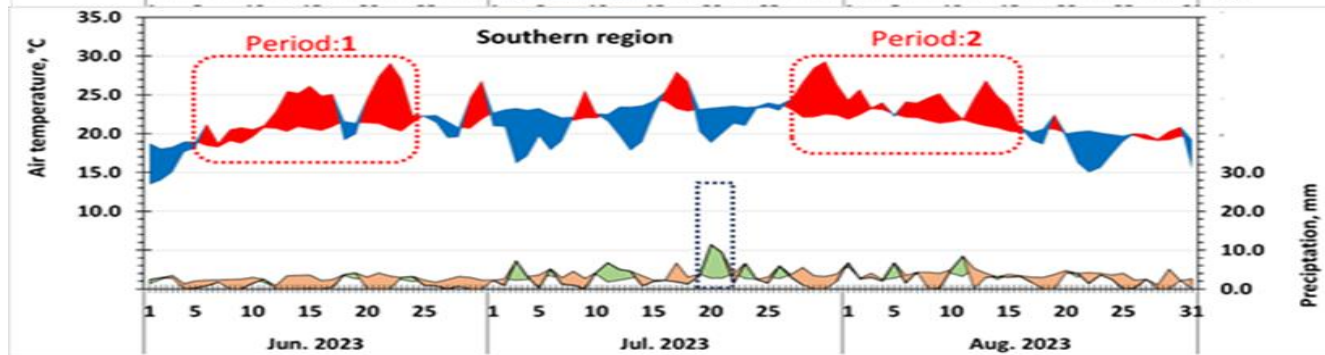
Central Region



Eastern Region



Southern Region



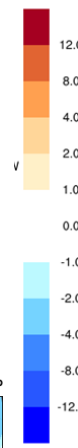
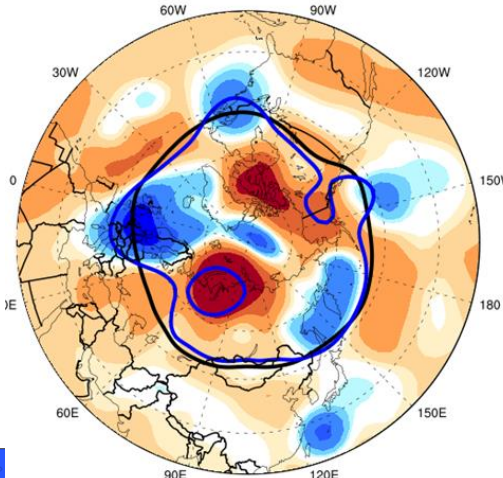
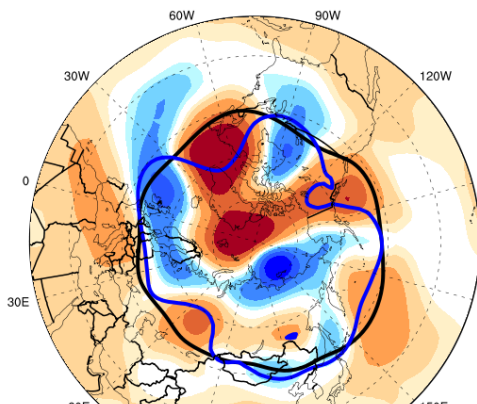
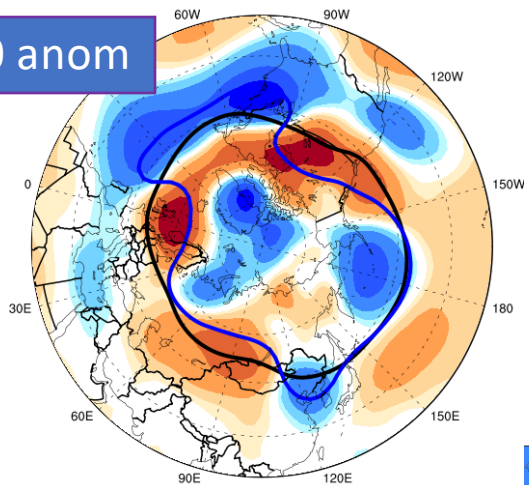
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Episode 1: 5-14, Jun: Warm and Dry

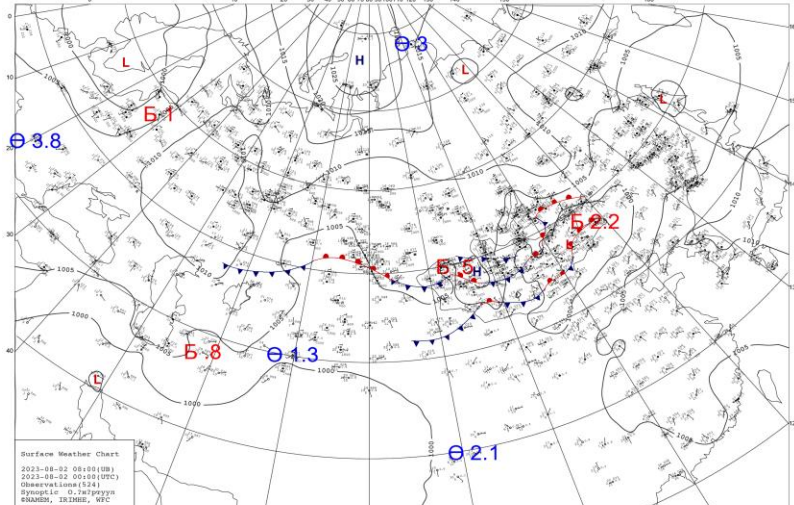
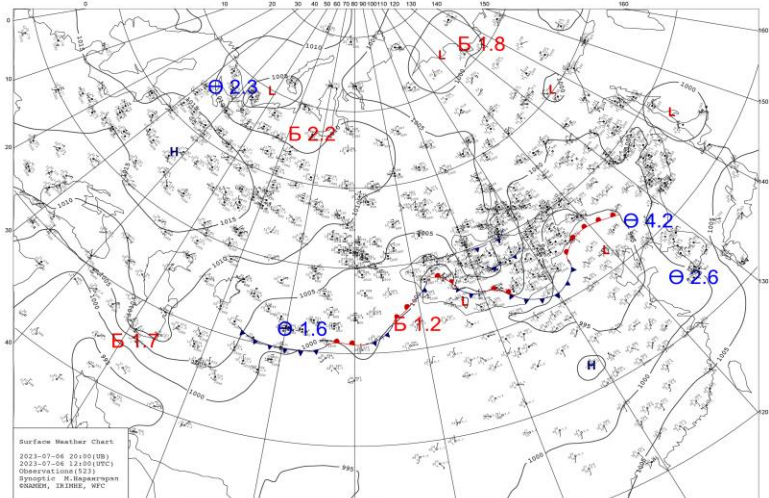
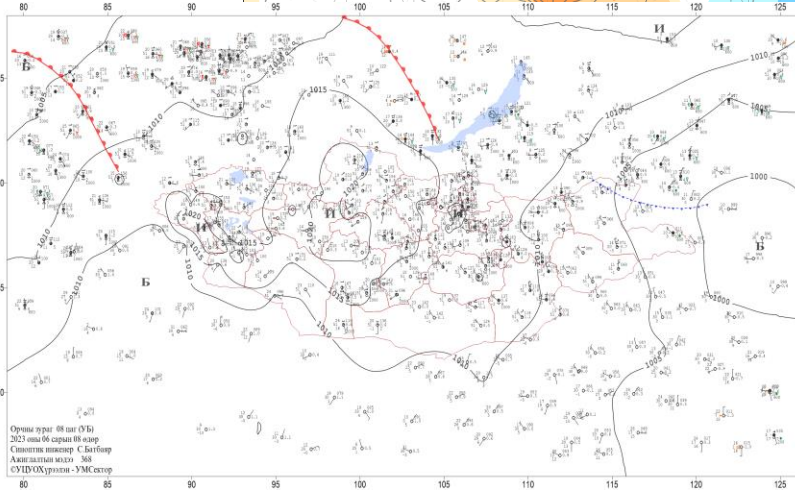
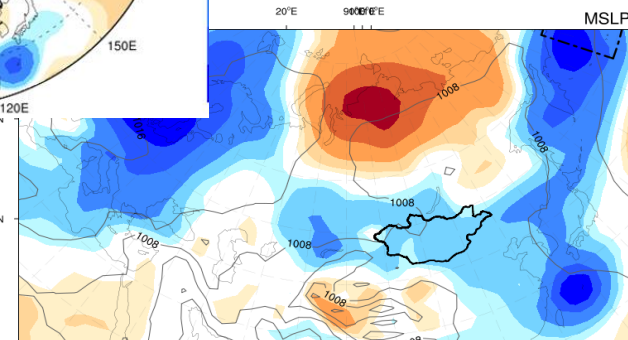
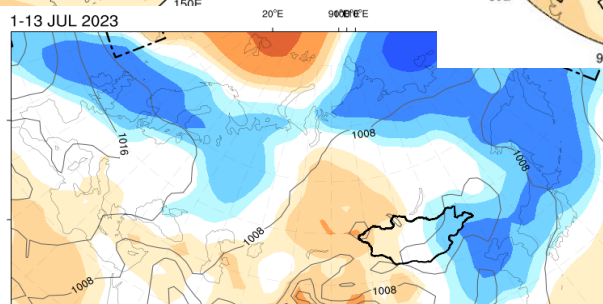
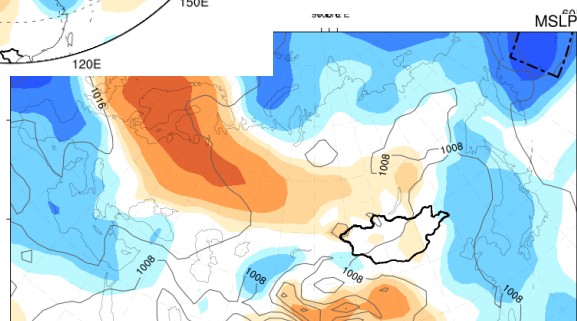
Episode 2: 5-14, Jul: Wet

Episode 3: 1-6, Aug: Warm and Wet

z500 anom



SLP anom.



Орени при 08 ил 07 б
2023-07-08 20:00 (UTC)
Синтези метеоро С. Басар
Автоматски модел 368
СУДНУХурлик-УМСистор

Surface Weather Chart
2023-07-08 20:00 (UTC)
2023-07-08 22:00 (UTC)
Observations (524)
Synopsis: H. Basmakov
08AMSL, 181MSL, 3FC

Surface Weather Chart
2023-08-02 08:00 (UTC)
2023-08-02 09:00 (UTC)
Observations (524)
Synopsis: H. Basmakov
08AMSL, 181MSL, 3FC



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Thank you

