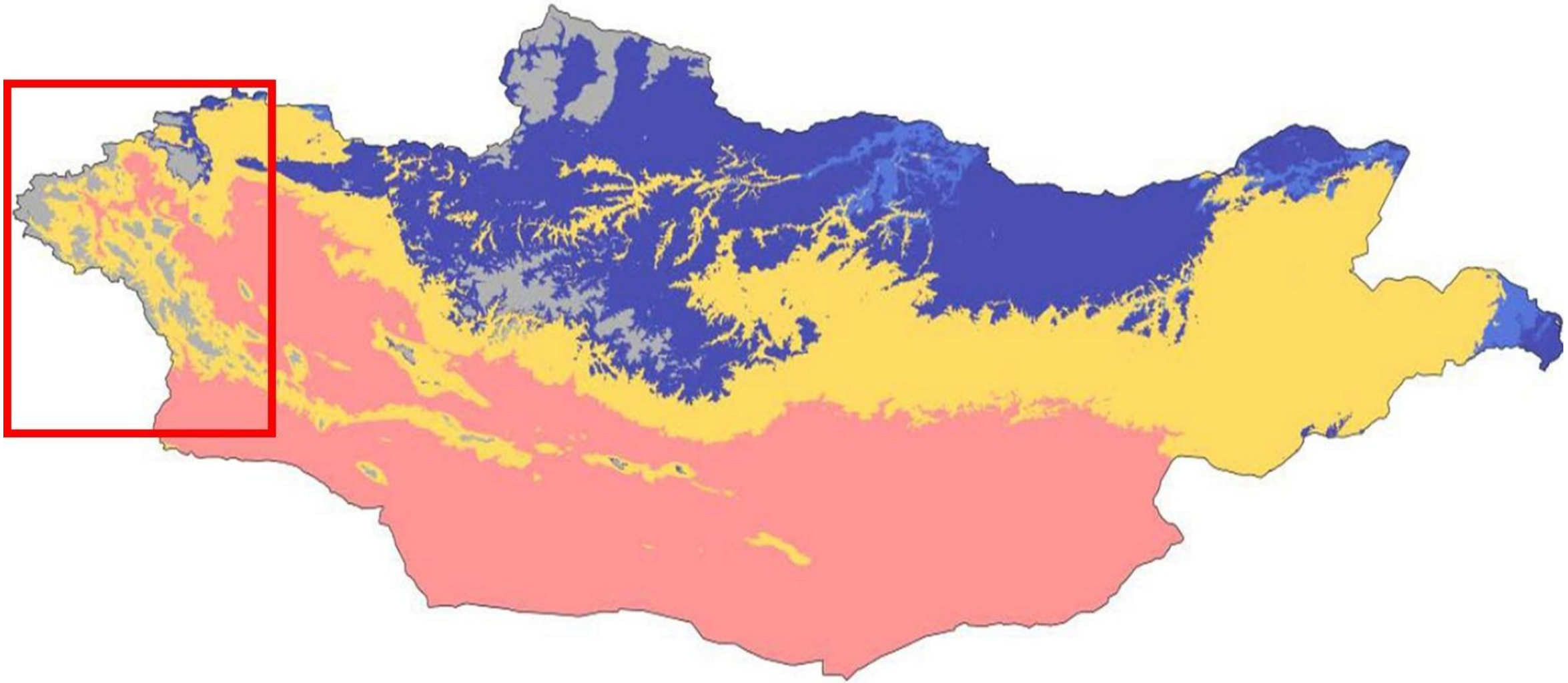
THE 3rd SESSION OF THE THIRD POLE CLIMATE FORUM and
MEETING OF THE THIRD POLE RCC-NETWORK TASK TEAM

Overview of last winter's climate and SEASONAL OUTLOOK for 2025 SUMMER in Mongolia

Khalzan Purevdagva, IRIMHE, MONGOLIA

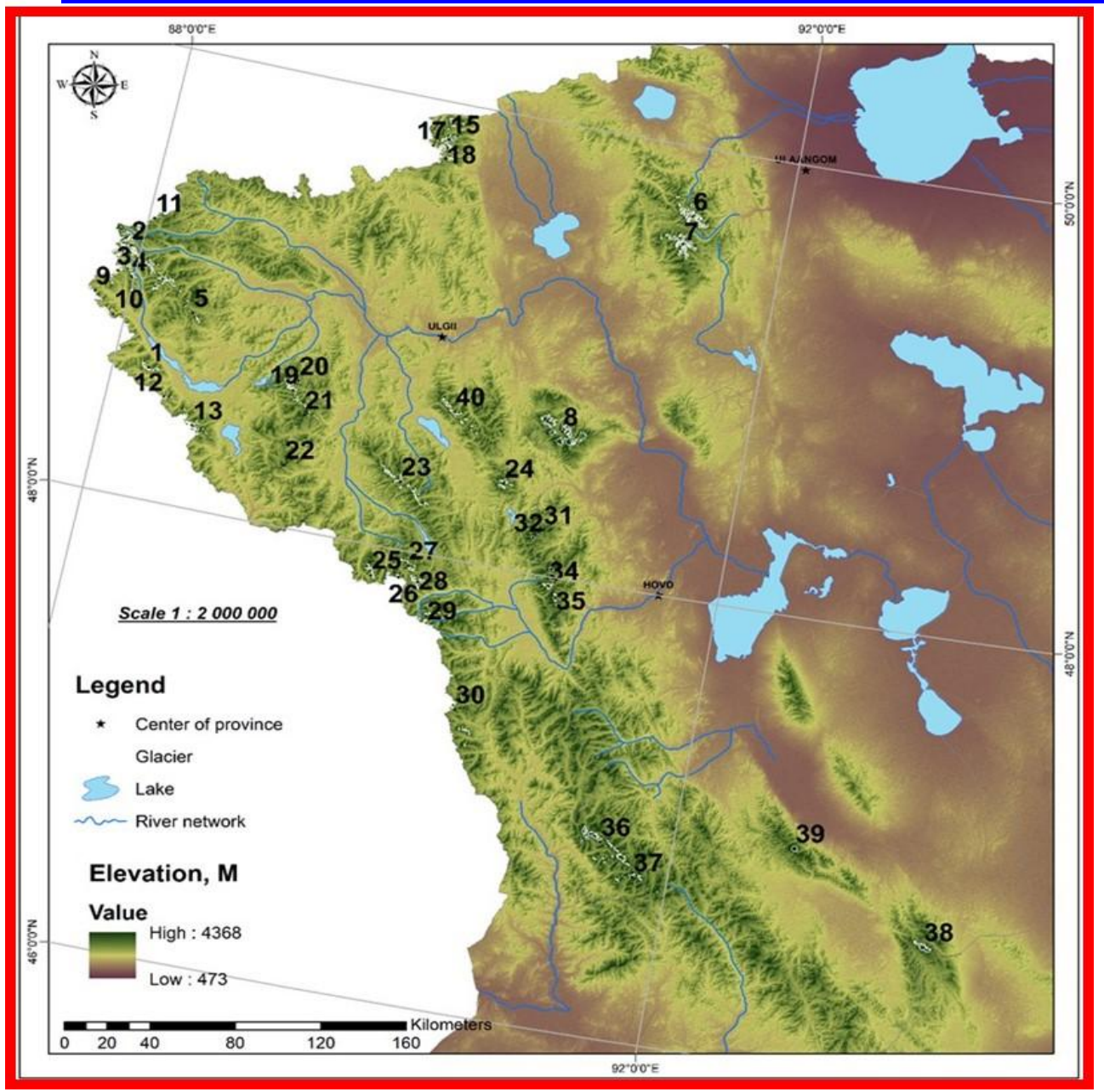
3-5 June 2025

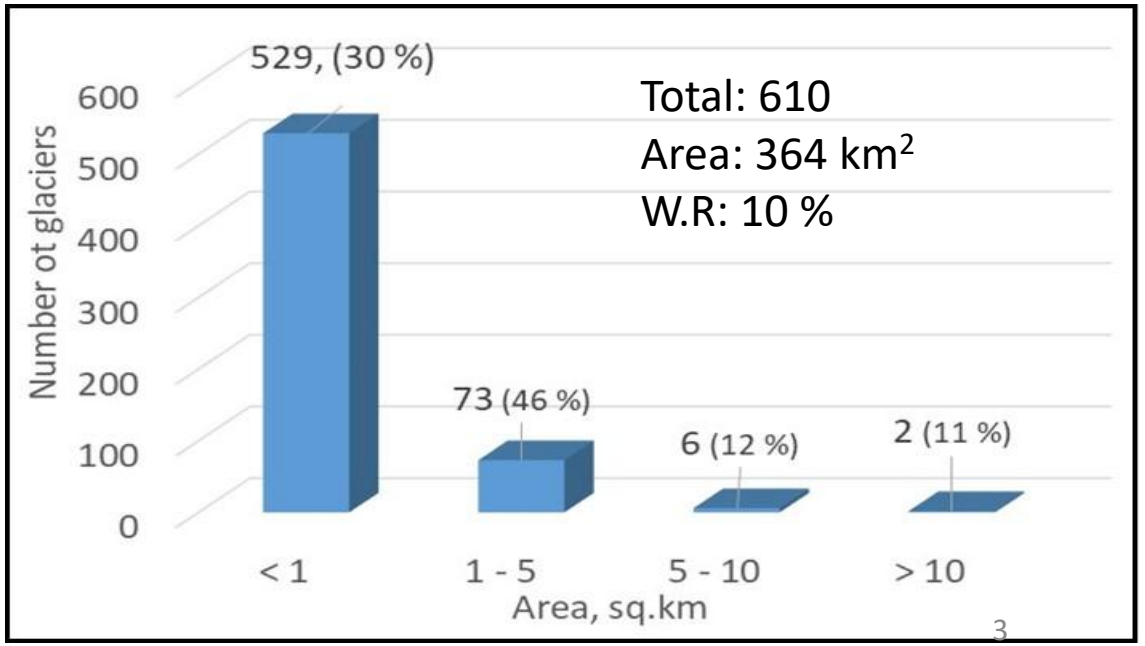
Köppen-Geiger climate (1980-2016): Climate of Mongolia



Arid, desert, cold
Arid, steppe, cold
Cold, dry winter, warm summer
Cold, dry winter, cold summer
Cold, no dry season, warm summer
Cold, no dry season, cold summer
Polar, tundra
Polar, frost

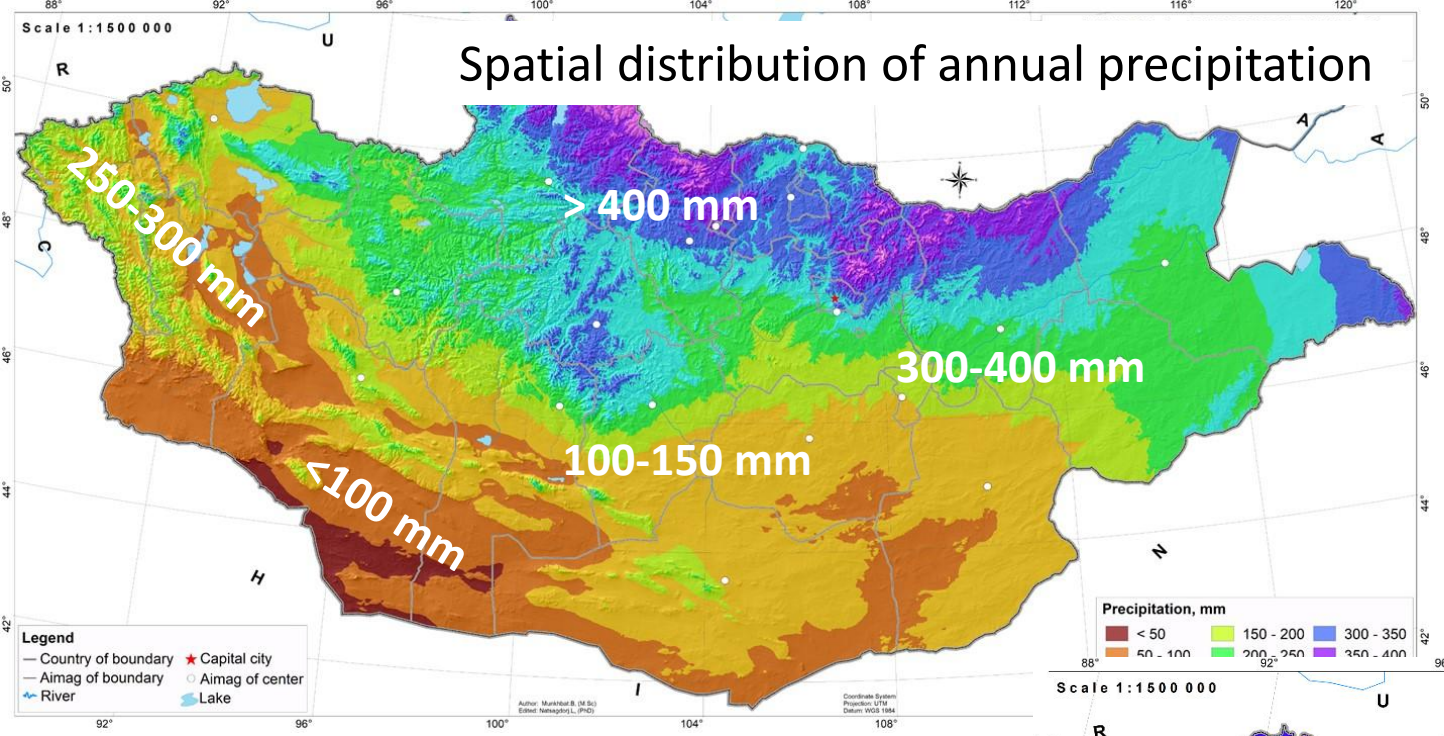
Glaciers in Mongolia





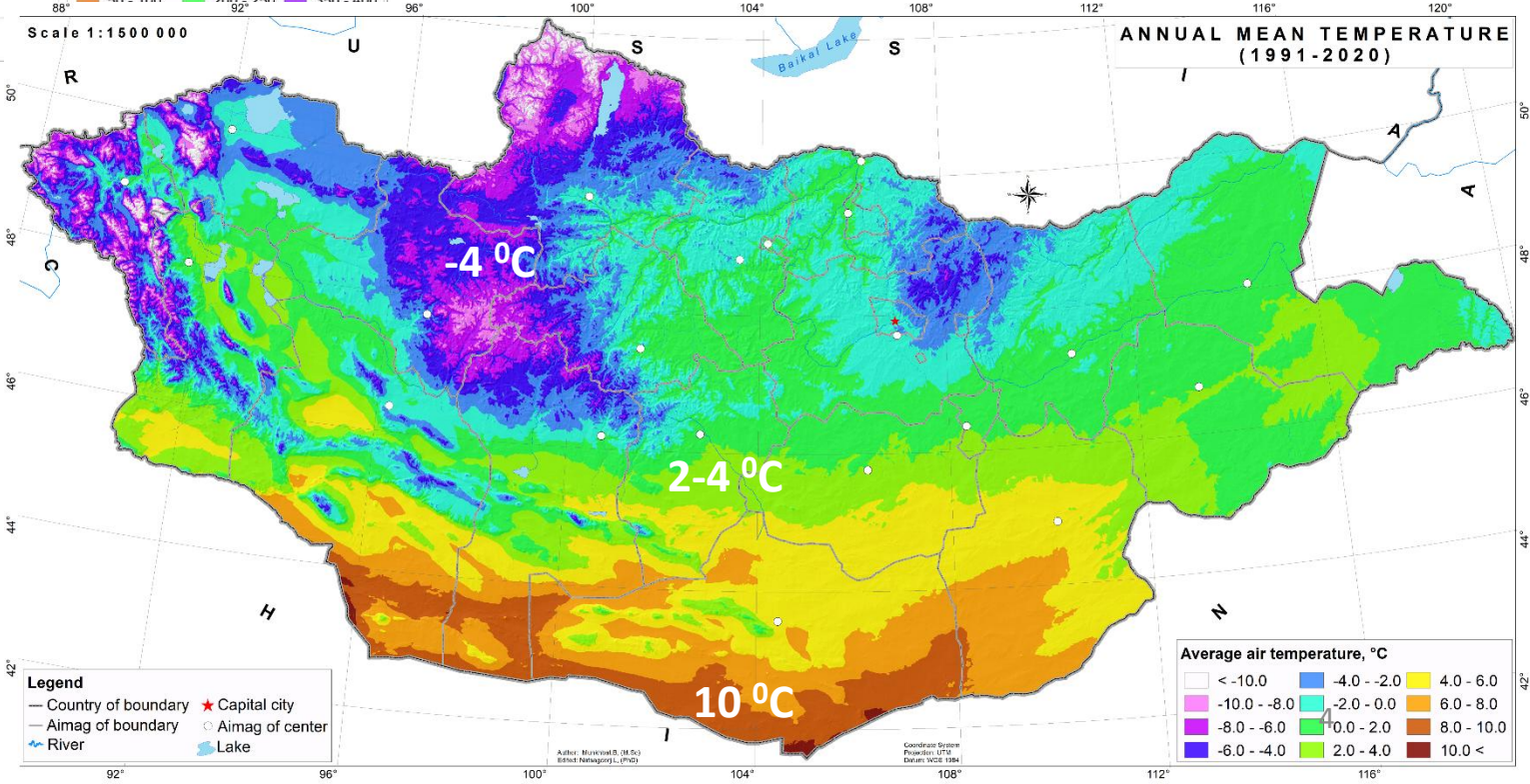
Institute of Meteorology and Hydrology of Mongolia, 2020

Spatial distribution of annual precipitation

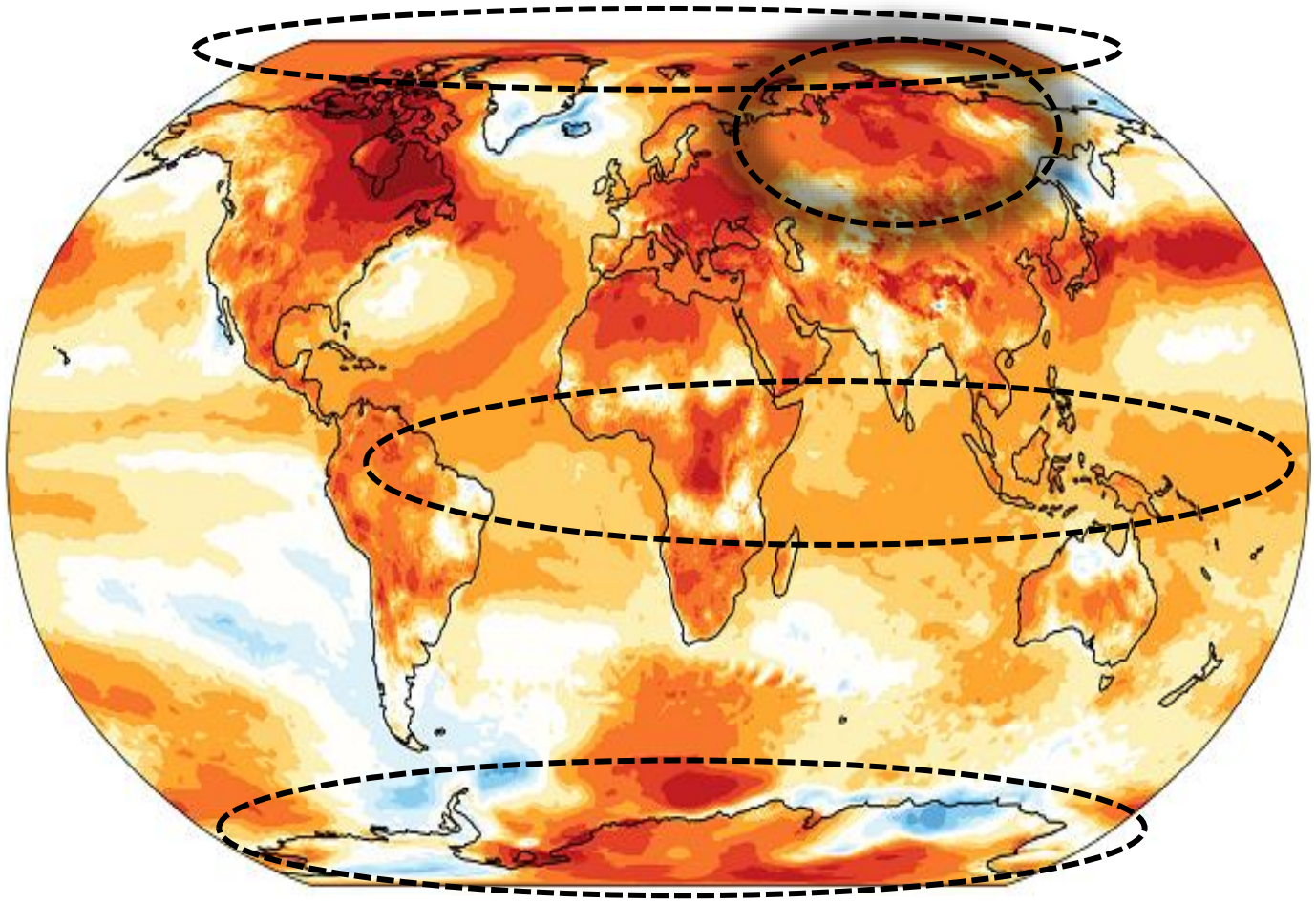


Munkhbat et al.(2022)

Spatial distribution of annual mean temperature (1991-2020)



➢ Global and Mongolian Climate Context



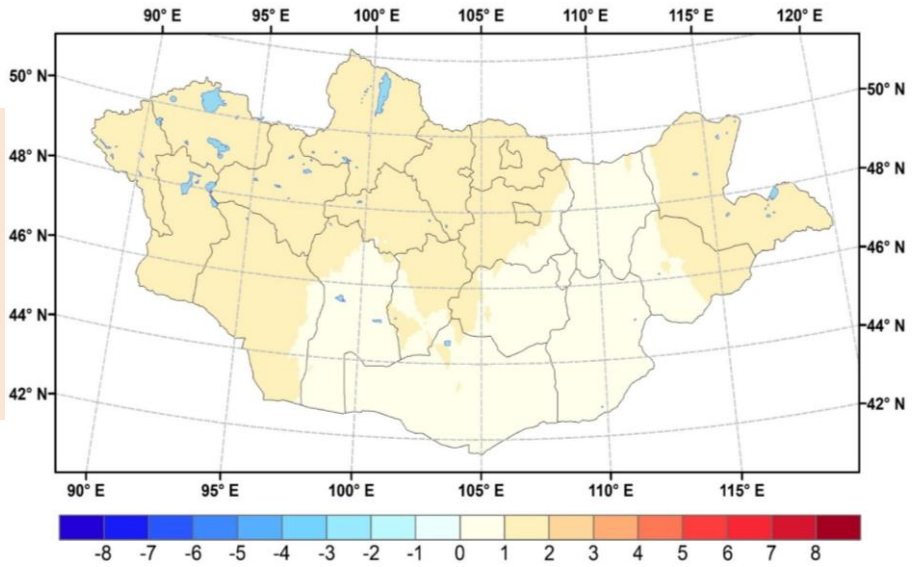
Zurgiin tailbar

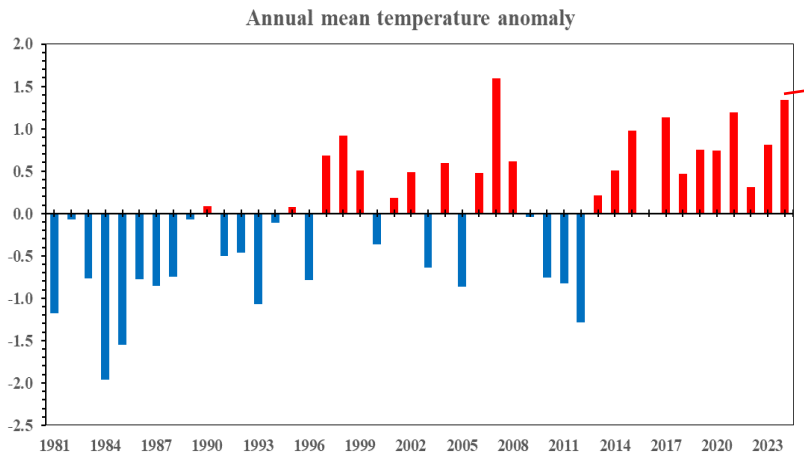
- **WMO**: **2024 was the warmest year**
- **NAMEM:** **Second warmest year since 1940**
- **Extreme Continental Climate:**
  - Winter: **-30°C…-40°C**
  - Summer: **+20°C…+30°C**
- **Black dashed line:** **Annual air temperature was warmer than 2023.**

Source: 1. https://climate.copernicus.eu/global-climate-highlights-2024
2. https://public.wmo.int/en/our-mandate/climate/wmo-statement-state-of-global-climate

➢ Annual temperature and precipitation anomaly in 2024

Air temperature, °C

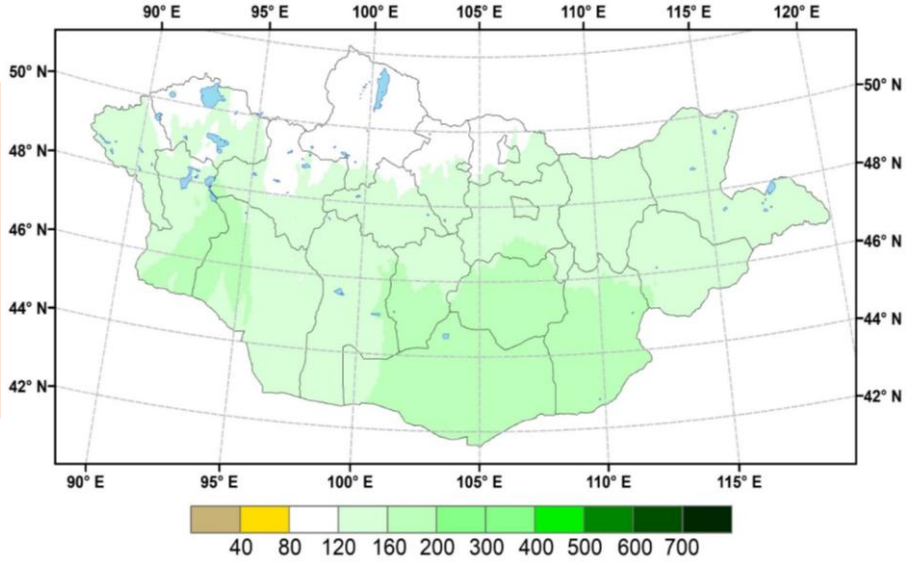


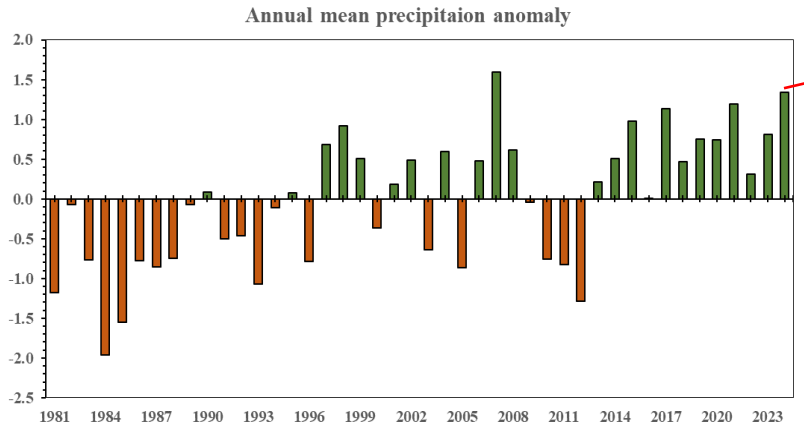


2nd warmest year

- Average temperature: 1.9°C
- Anomaly: 1.2°C
- Second warmest year since 1981

Precipitation, mm



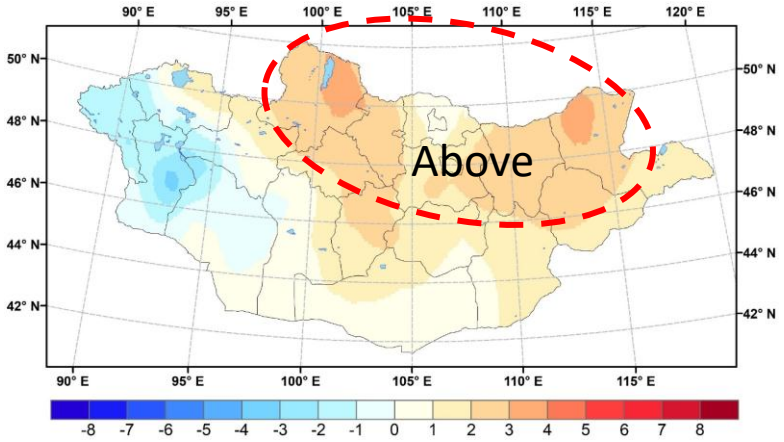


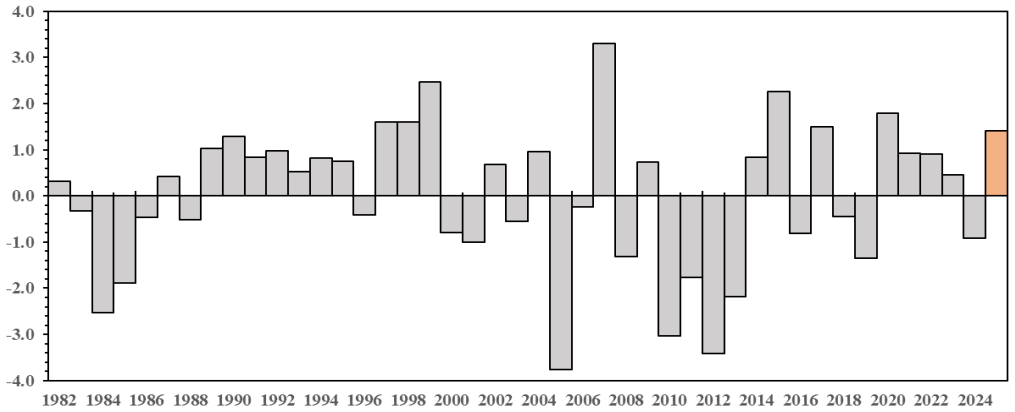
2nd wet year

- Total precipitation: 261.6 мм
- Anomaly: 1.4
- Second wet year since 1981.

➢ Winter temperature and precipitation anomalies

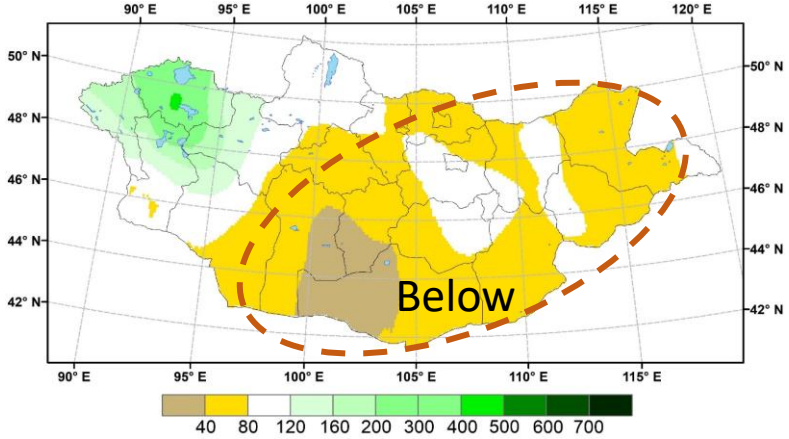
Air temperature anomaly [ºC]

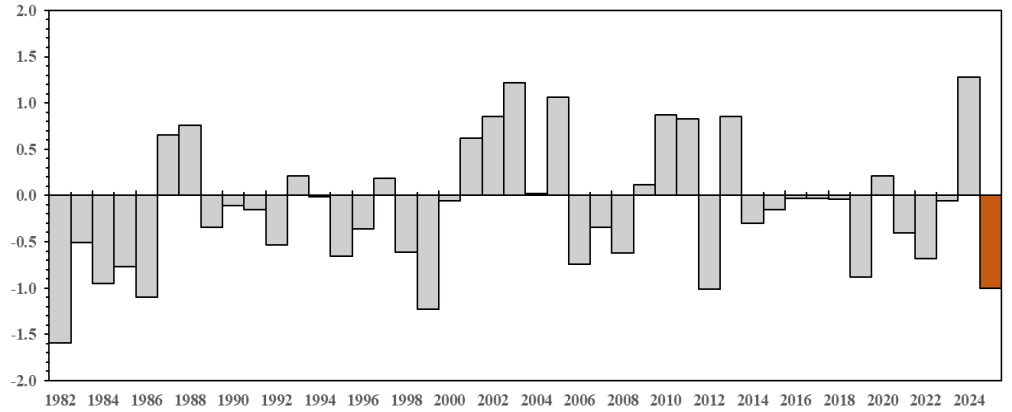




- **Average temperature: -17°C**
- **Anomaly: 1.4°C above normal**
- **Record: 8th warmest winter**
- **Especially the central and eastern parts**

Precipitation anomaly, [mm]



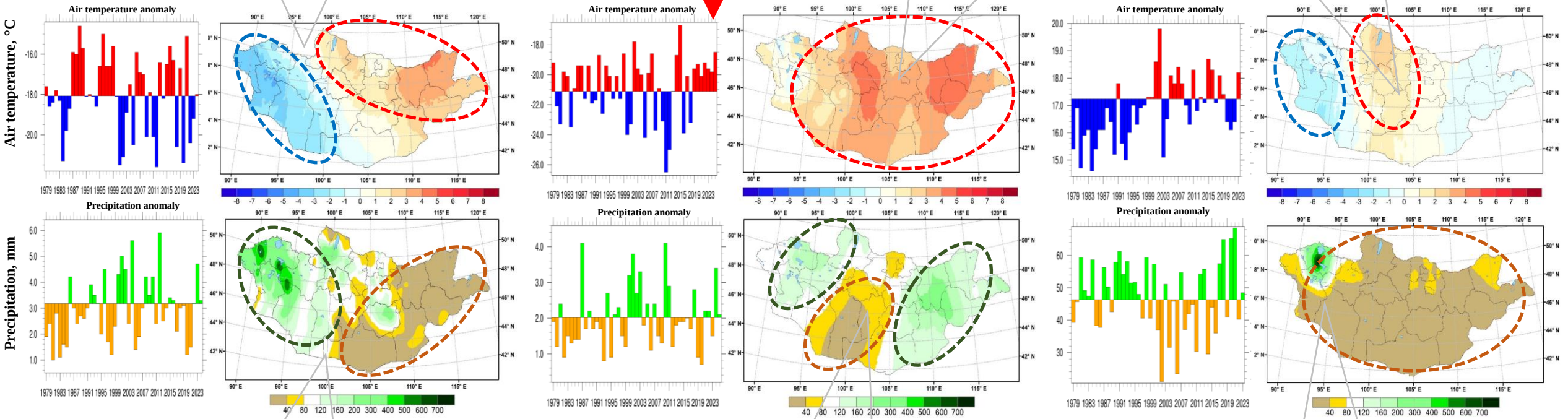


- **Total amount: 1.8**
- **Anomaly: 20% below normal**
- **Record: 5th dry winter**
- **Especially southern and eastern parts**

➢ KEY: 4th warmest in January (Warm and dry winter)

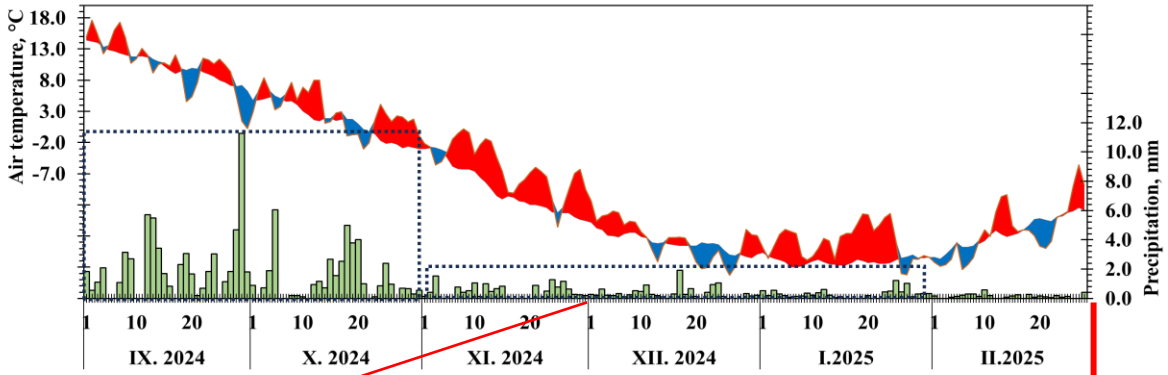
4th warmest January

December	January	February
Warm in east Cold in west	Warm in entire	Warm in the central
Wet in west Dry in the south & east	Dry in the south Wet in the west and east	Dry in the whole

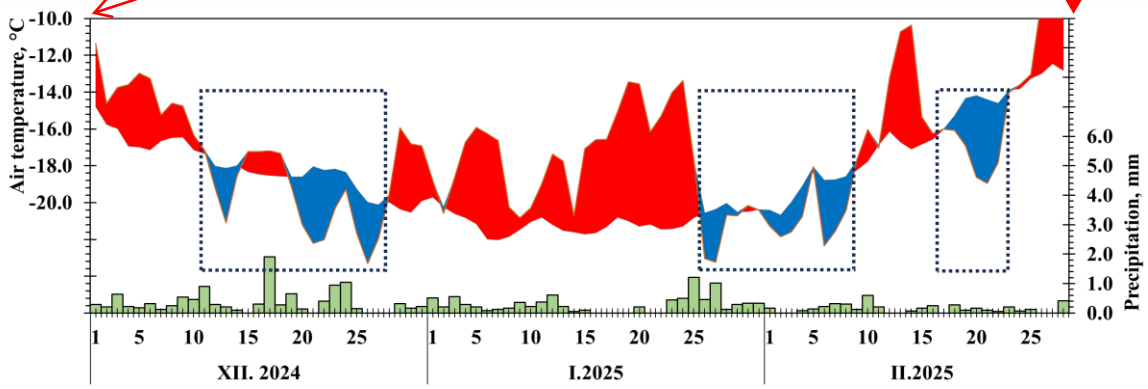


➢ Timeseries of air temperature and total precipitation for Mongolia

Sep - Feb

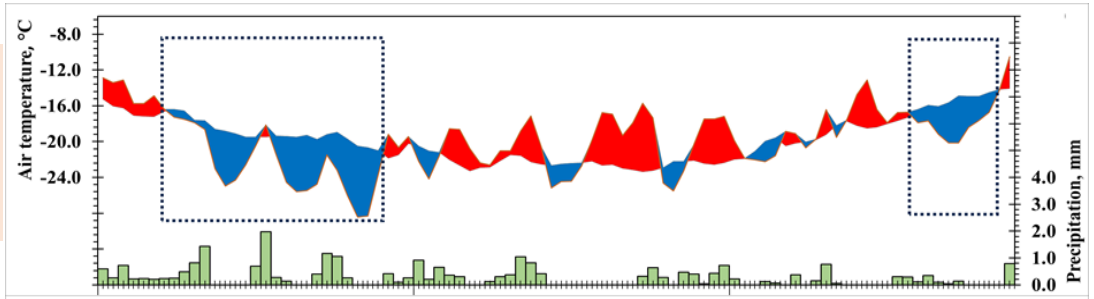


Dec - Feb

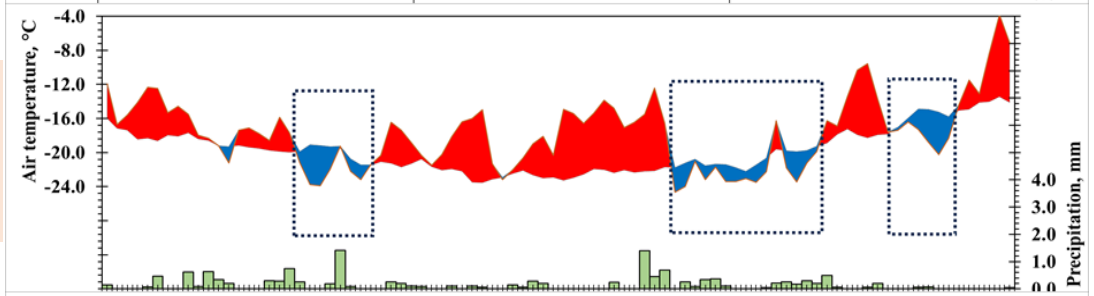


- **Extreme Cold Events (Tmin in December):**
  - -40°C…-43°C in western regions, December 2024
  - -18°C…-24°C in eastern regions, December 2024
- **Extreme Cold Events (Tmin in January):**
  - -43°C…-45°C in western regions, January 2025
  - -32°C…-37°C in eastern regions, last January 2025
- **Reduced Snowfall:**
  - 20% less snow cover in central Mongolia
- **Dzud Risk**: Increased due to ice layers

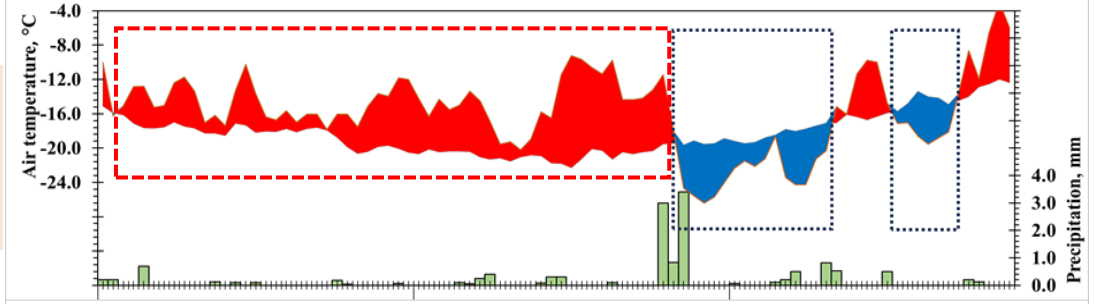
Western



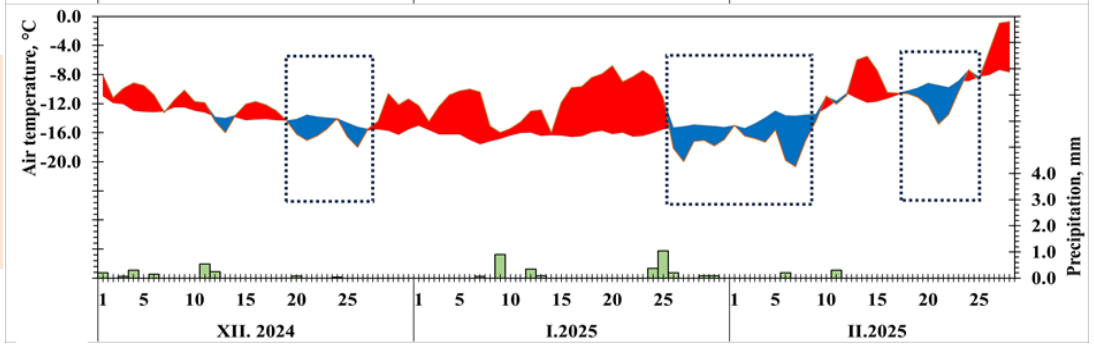
Central



Eastern



Southern

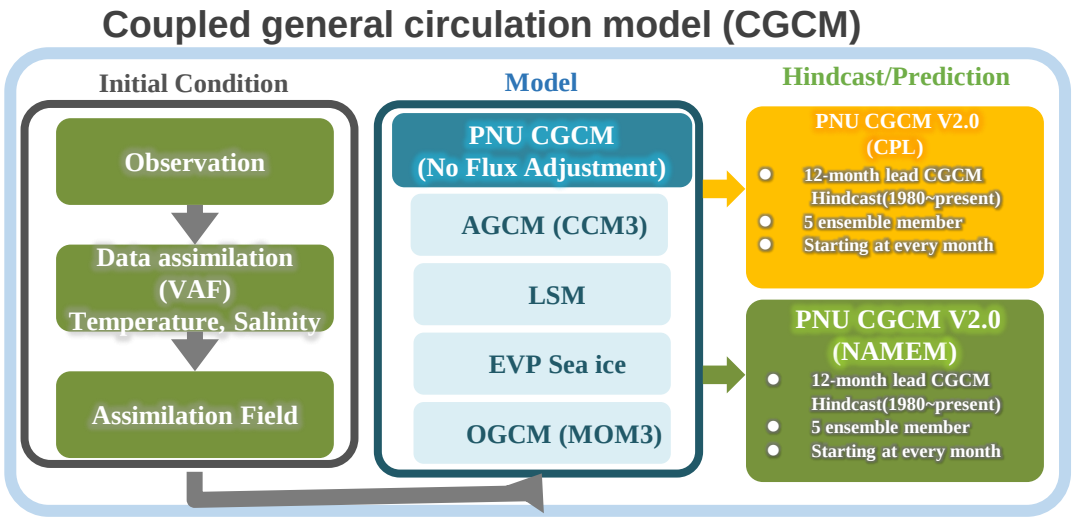


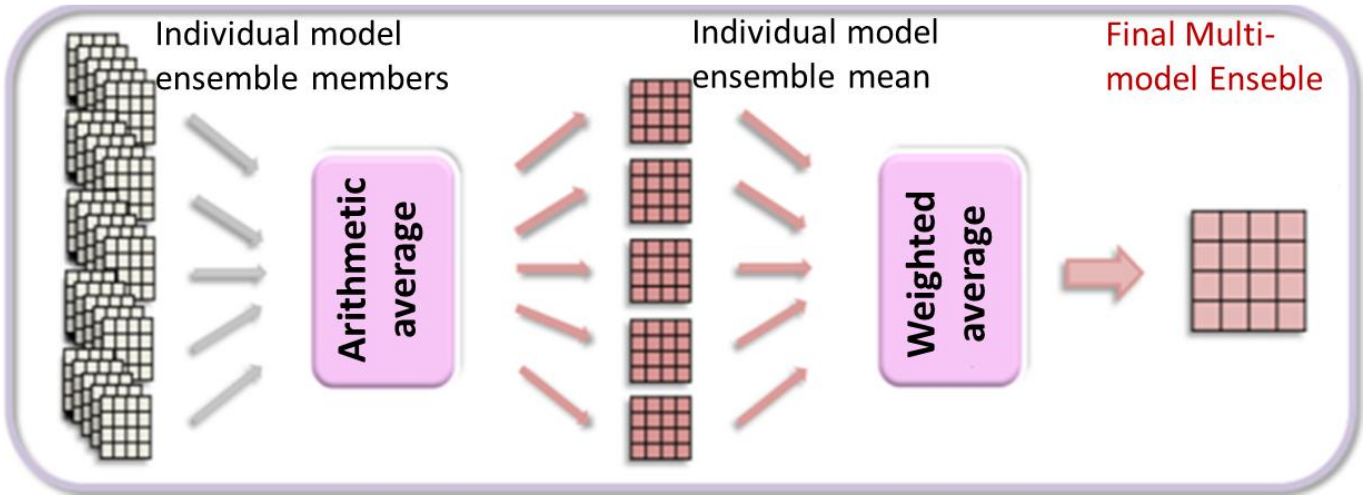
OUTLINE

- Introduction for 2024
- Winter 2024-2025: Key Characteristics
- **Summer seasonal outlook**

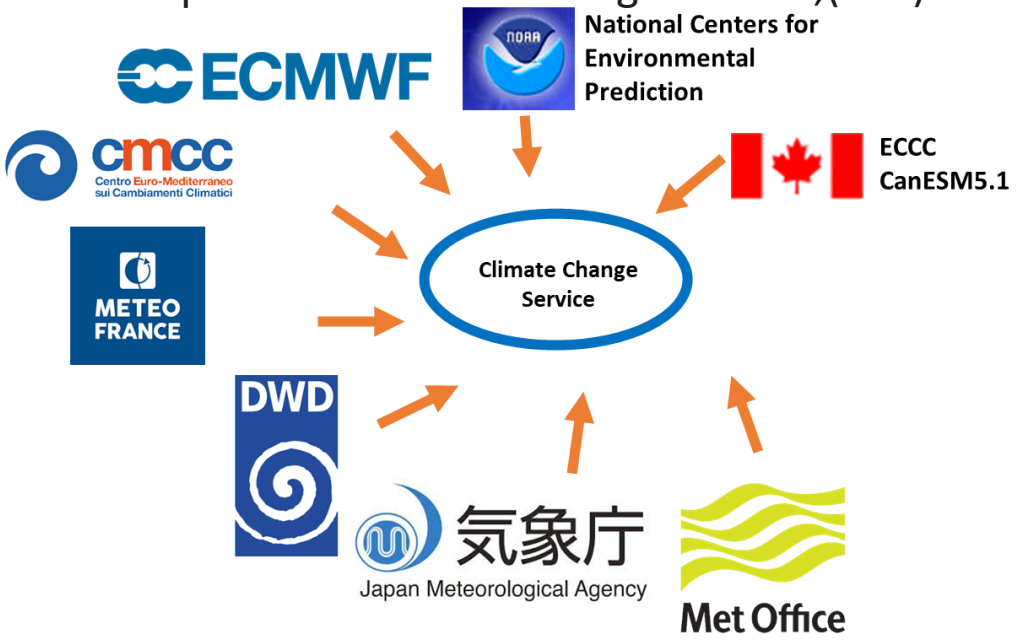
➢ Monthly and seasonal outlook

- Dynamical models from Multi-system seasonal forecast service.
- Run the coupled general circulation model on NAMEM with initial condition from PNU/RDA





The Copernicus Climate Change Service,(C3S)

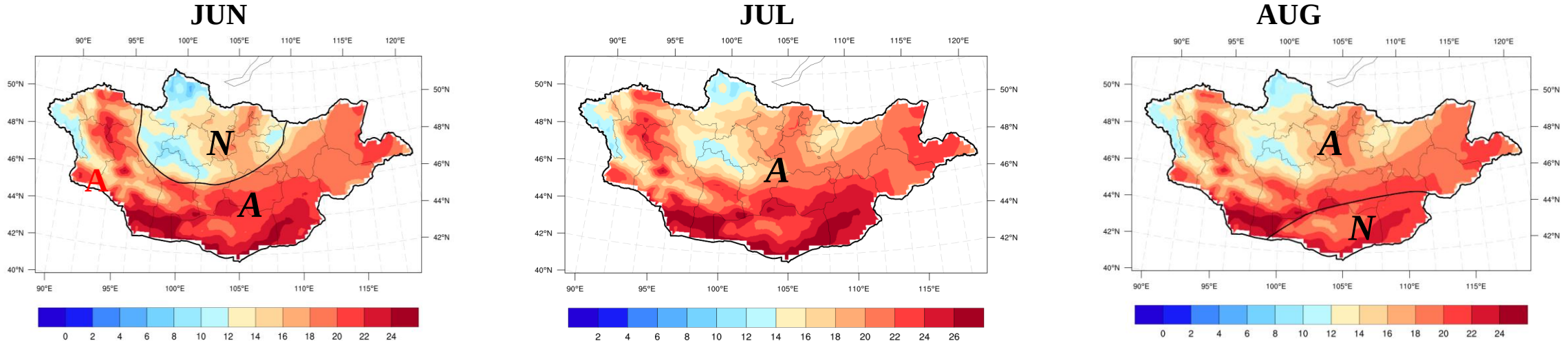


- **Monthly outlook: 25th in every month**
  - Temperature anomaly
  - Precipitation anomaly
  - 30 days temperature anomaly and precipitation amount
- **Three months seasonal outlook: 28th in every month**
  - Temperature anomaly
  - Precipitation anomaly
- **Agriculture sector:**
  - Dzud risk map
  - Drought risk map

Data source: https://cds.climate.copernicus.eu/cdsapp#!/dataset/seasonal-postprocessed-pressure-levels?tab=form

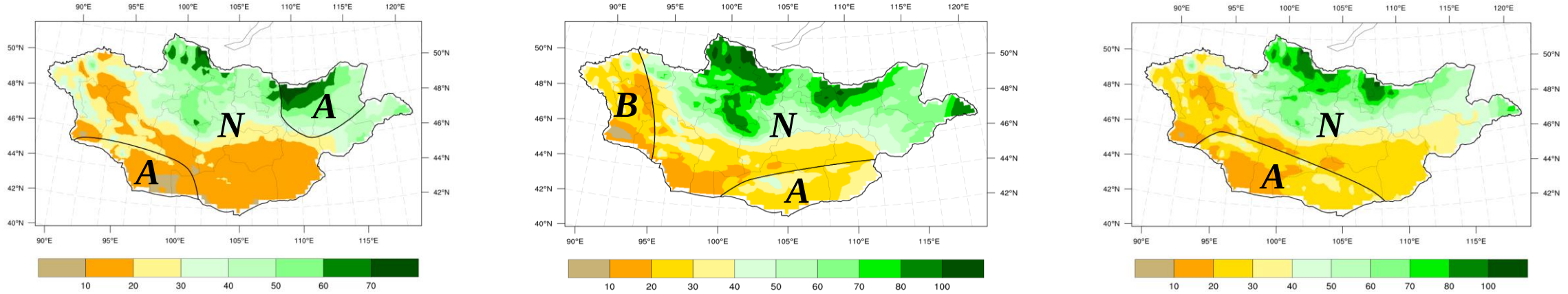
➢ Summer outlook for 2025

Air temperature



A–Above normal, N–Normal,

Precipitation

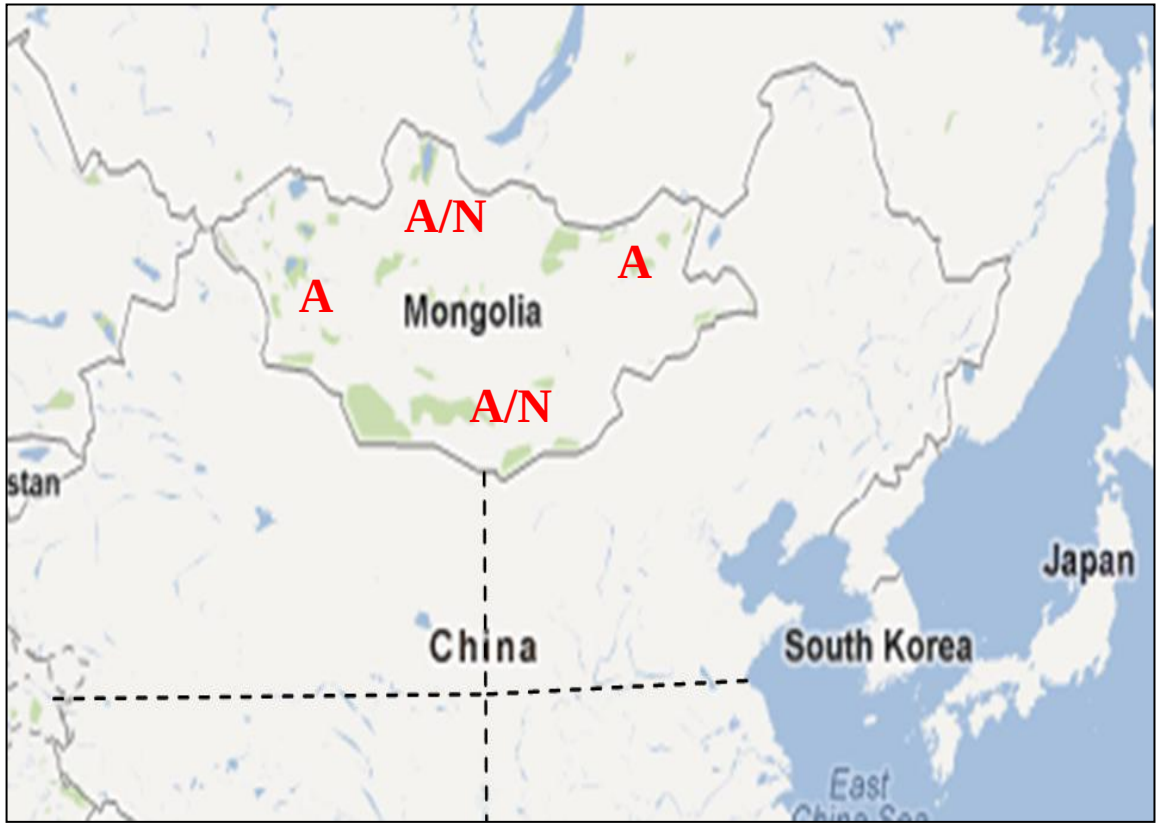


A – Above than normal, N – Normal, B – Below than normal

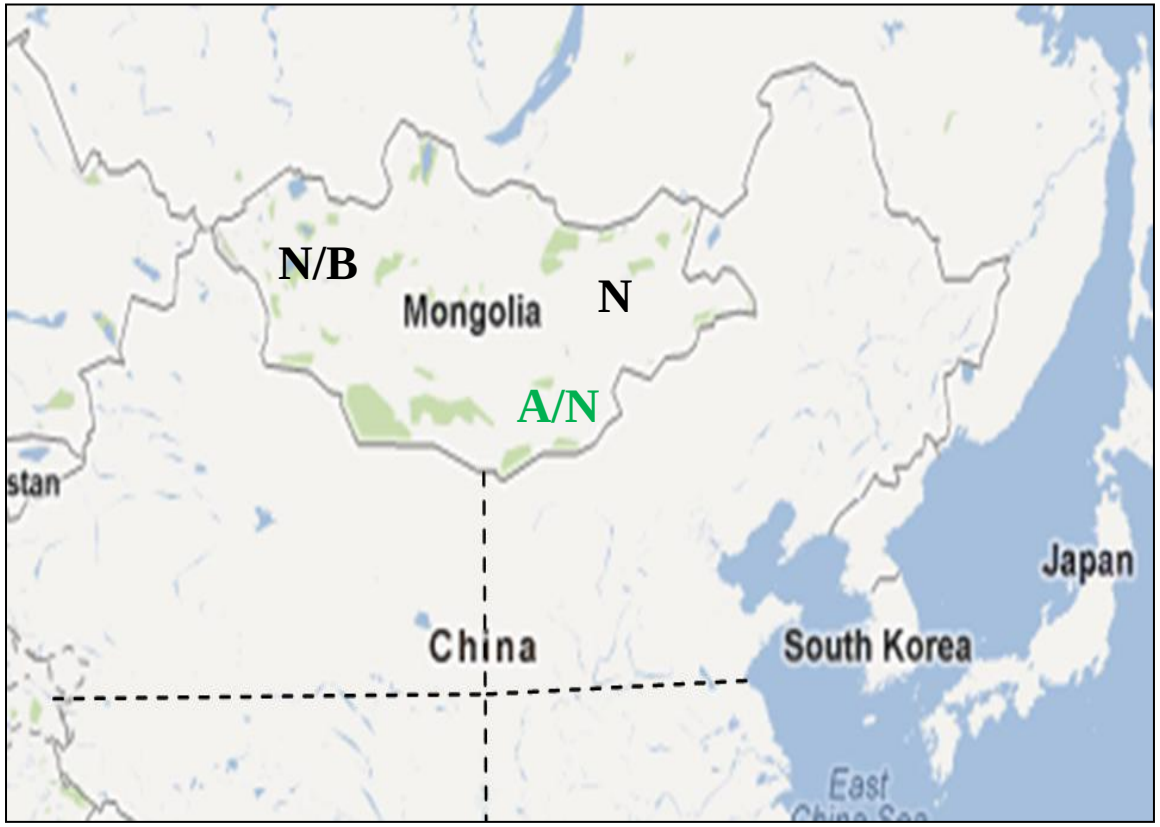
- Temperature: 1-2°C above Normal
- Precipitation: Near normal, with regional variation

- Warmer summers in recent decades
- Increased risk of heatwaves

Air temperature:



Precipitation:



Thank you for attention