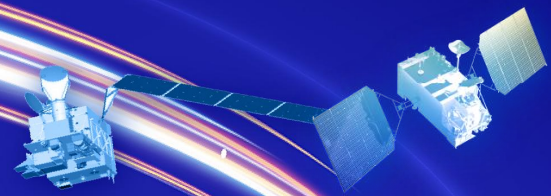
AOMSUC-15 FYSUC-2025

FIFTEENTH ASIA-OCEANIA METEOROLOGICAL SATELLITE USERS' CONFERENCE

THE JOINT 2025 FENGYUN SATELLITE USER CONFERENCE

CLIMATE SERVICE BASED ON SATELLITE DATA

Presenter: Ms. JAVZMAA



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SATELLITE DATA RECEIVER

1. Aqua/Terra
2. NOAA series
3. Suomi NPP
4. MetOp series
5. HIMAWARI-8/9
6. FY-4/3

Terra, Aqua/MODIS satellite
Resolution: 250m , 500m and 1km
November 2007 - recent

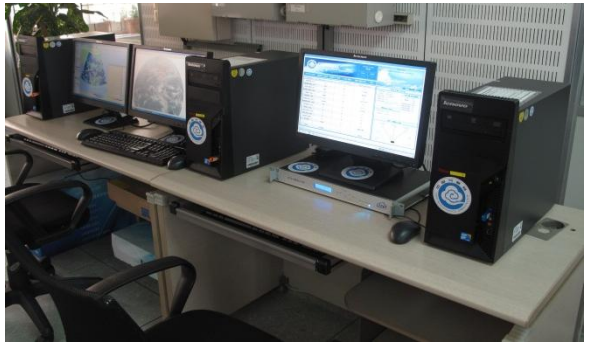
Applications: Cloud movement , Snow cover, Wildfire, Vegetation, Land surface temperature, Drought, Dust storm, Land cover.

FY2D satellite
Resolution: 4km
May 2007 - recent

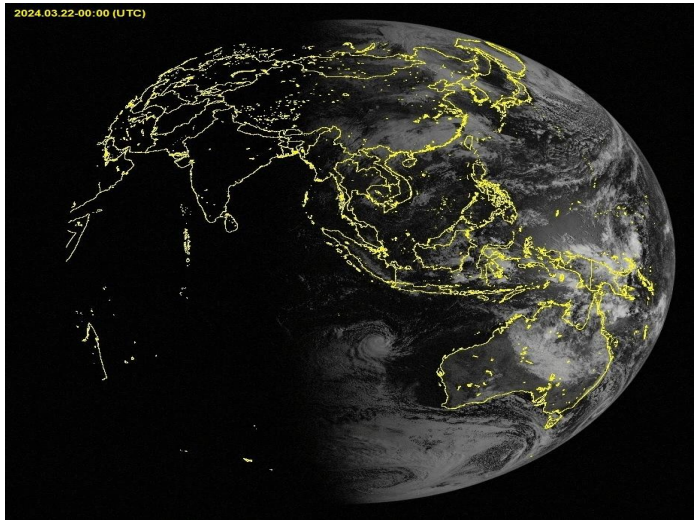
Applications : Cloud movement, Air temperature, Precipitation.

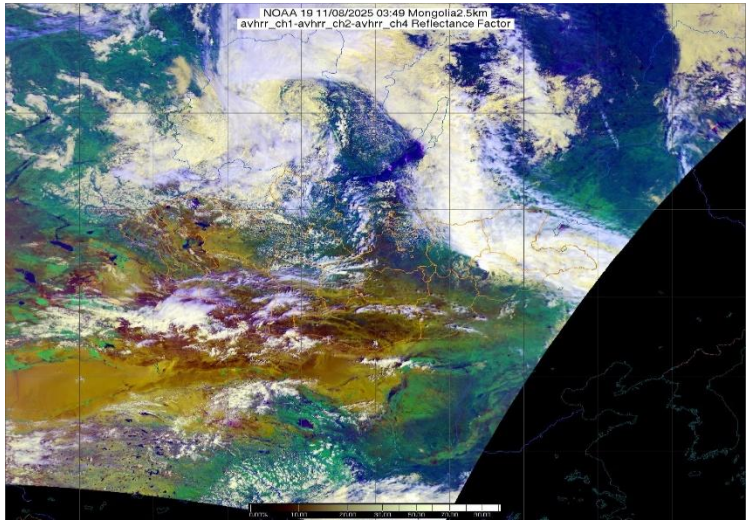
AsiaSat-4 satellite
Jan 2012 - recent
CMACast reception system

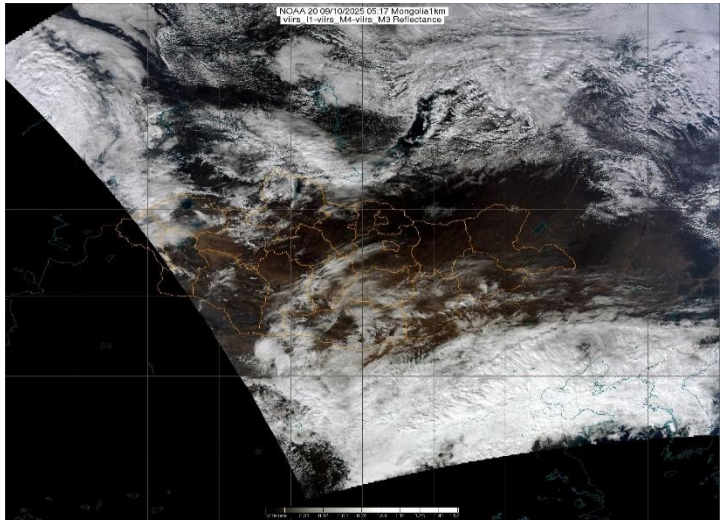
Applications : Cloud movement



GENERAL PURPOSE OF SATELLITE DATA



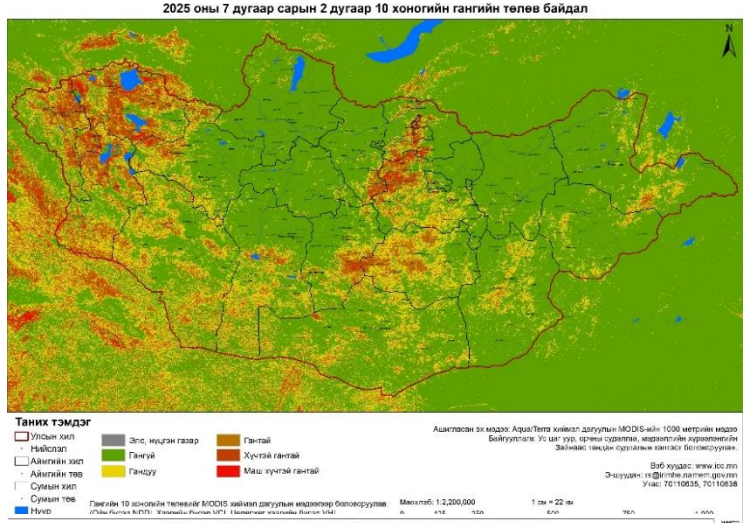




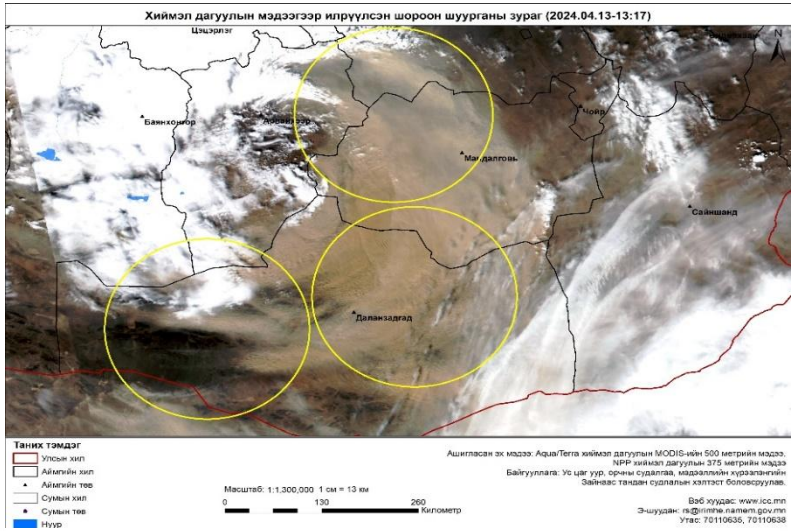
In Mongolia, several geostationary satellites, including the FY-4/3 series, Himawari, MODIS, and NOAA series, are utilized to monitor the position, development, and dissipation of mid-latitude cyclones, steppe-fire, drought, vegetation cover and snow cover. In addition, satellite-based mapping and derived indices are employed to identify seasonally characteristic, localized convective developments, particularly in residential areas, for the purposes of nowcasting and early warning.

PRODUCTS FOR PUBLIC USE

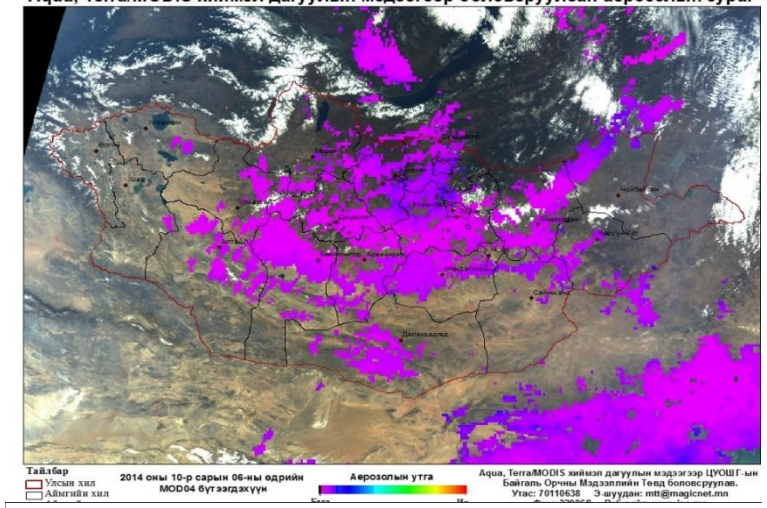
2025 оны 7 дугаар сарын 2 дугаар 10 хоногийн гангийн төлөв байдал



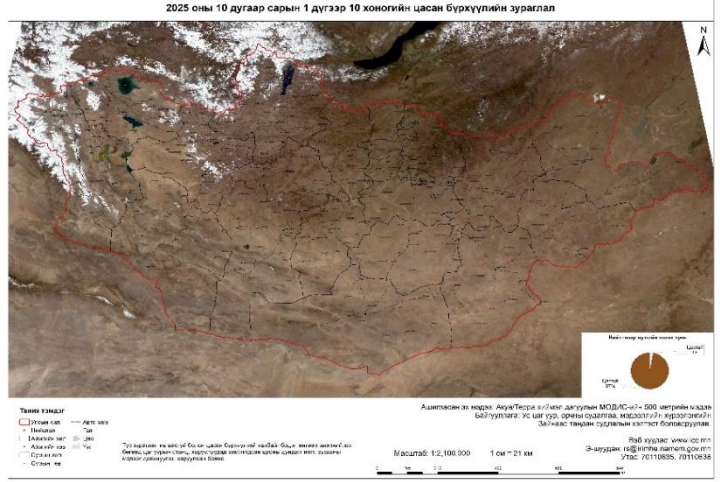
Хиймэл дагуулын мэдээгээр илрүүлсэн шороон шуурганы зураг (2024.04.13-13:17)



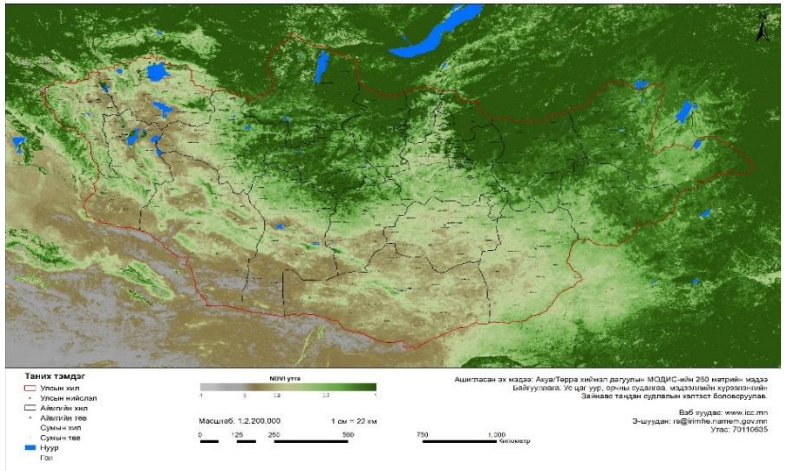
Aqua, Terra/MODIS хиймэл дагуулын мэдээгээр боловсруулсан аерозолын зураг



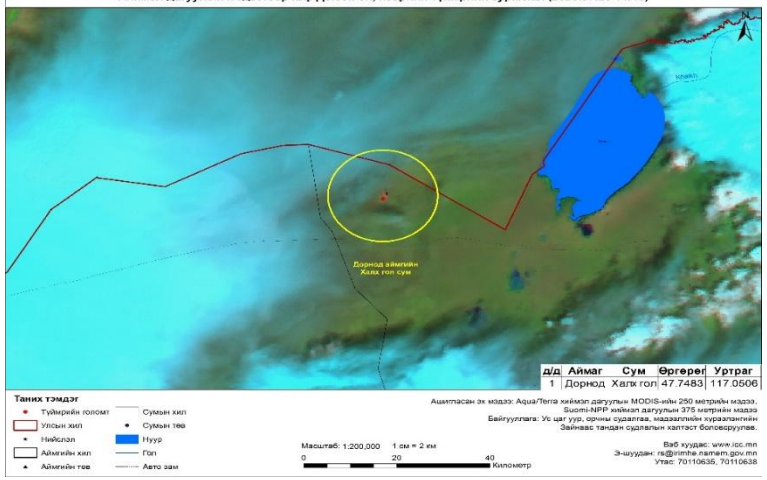
2025 оны 10 дугаар сарын 1 дүгээр 10 хоногийн цасан бүрхүүлийн зураглал



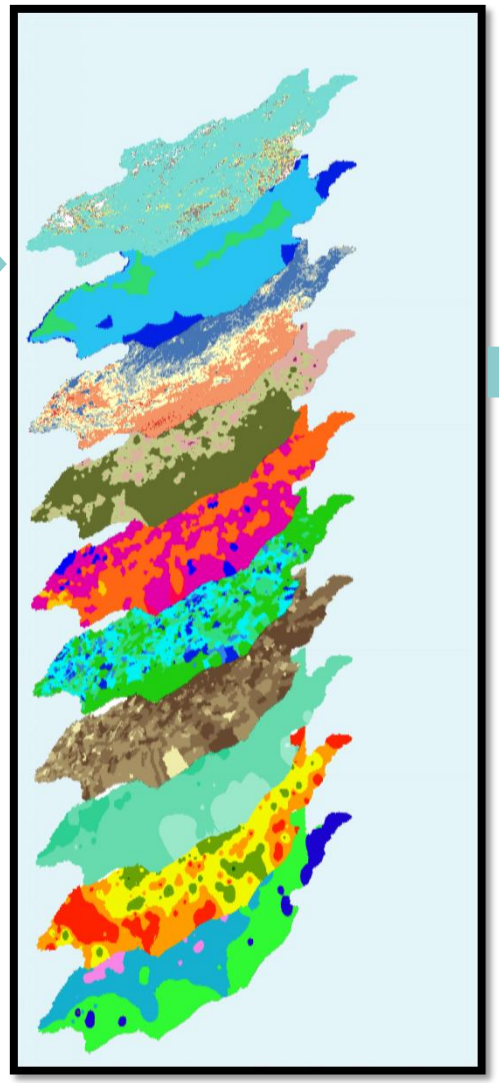
2025 оны 7 дугаар сарын 3 дугаар 10 хоногийн ургамалжилтын төлөв байдлын зураглал



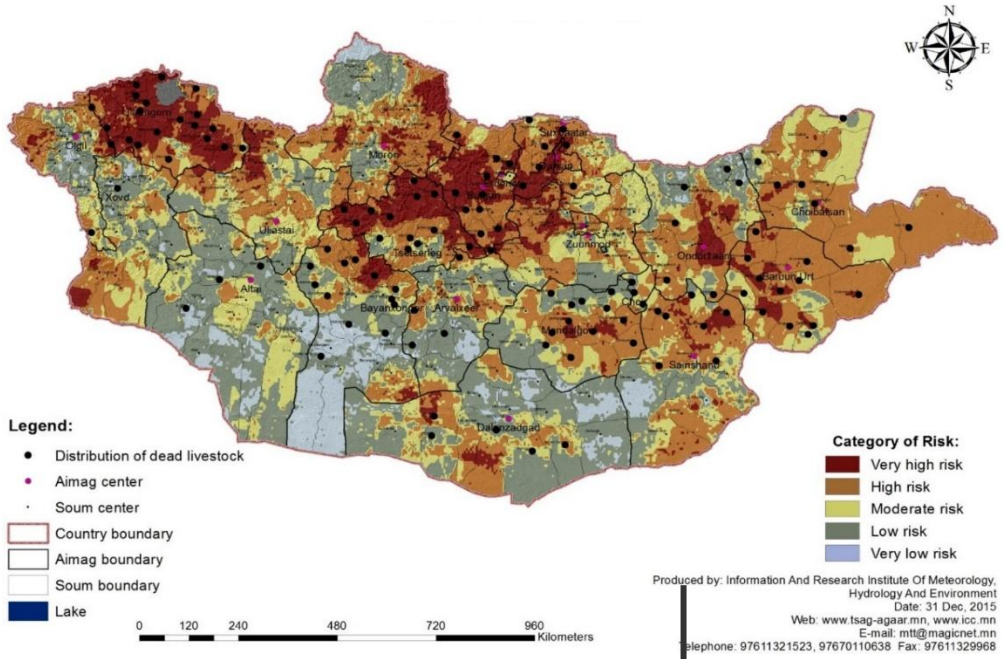
Хиймэл дагуулын мэдээгээр илрүүлсэн ой, хээрийн түймрийн зураглал (2025.07.28 14:48)



ID	Data group	Data
1	Weather forecast	Air temperature
2		Precipitation
3	Agricultural forecast	Snow hight
4		Snow density
5		Anomal precipitation
6		Anomal temperature
7		Biomass
8		Livestock density
9		Pasture carrying capacity
10		Summer condition
11		Summer: number of days +30c > Winter: number of days -30c >
12	Remote Sensing data	Biomass/NOAA
13		Snow cover days/MODIS
14		Snow cover/MODIS
15		Snow depht/AMSR
16		Drought index/MODIS



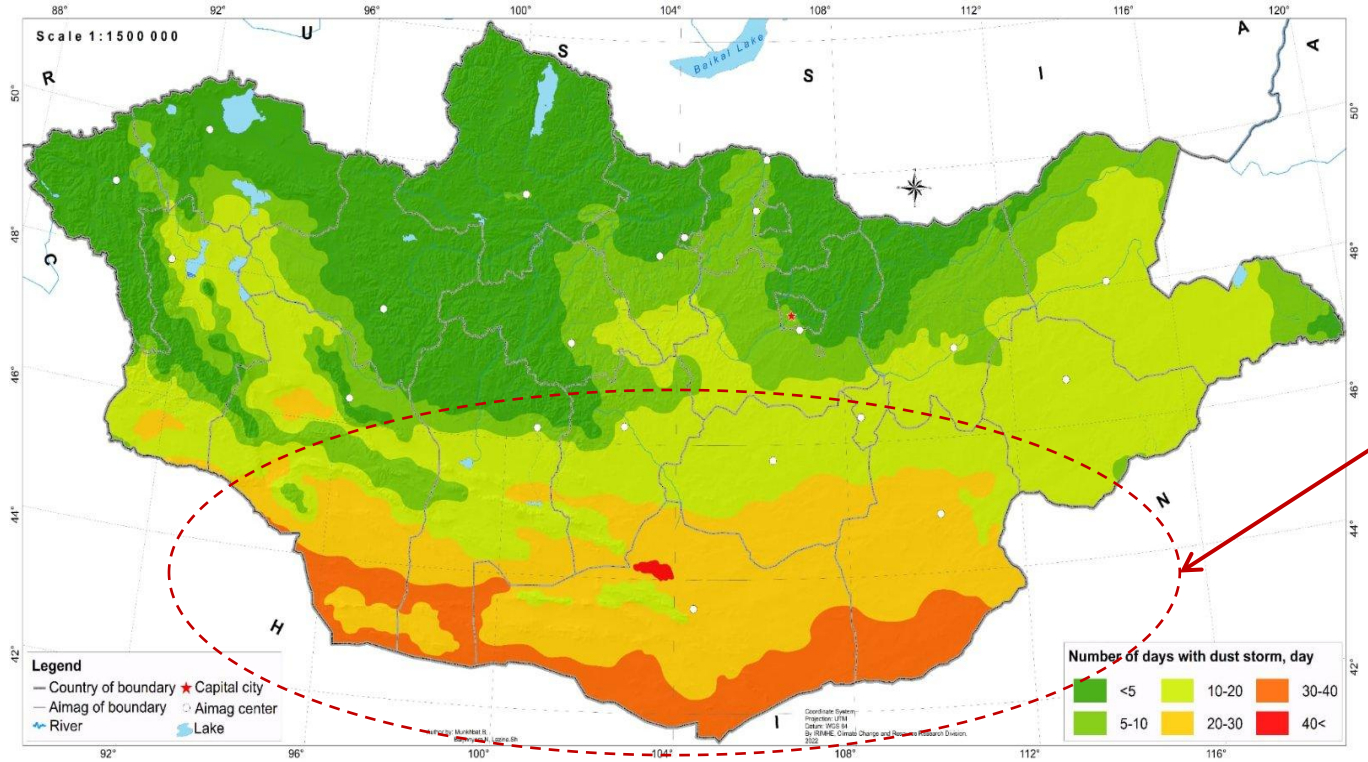
Winter condition and Dzud Risk Map of Mongolia



Herders | Decision maker | Public

CASE STUDY 1:
DUST STORM EVENT – 21 MARCH 2023

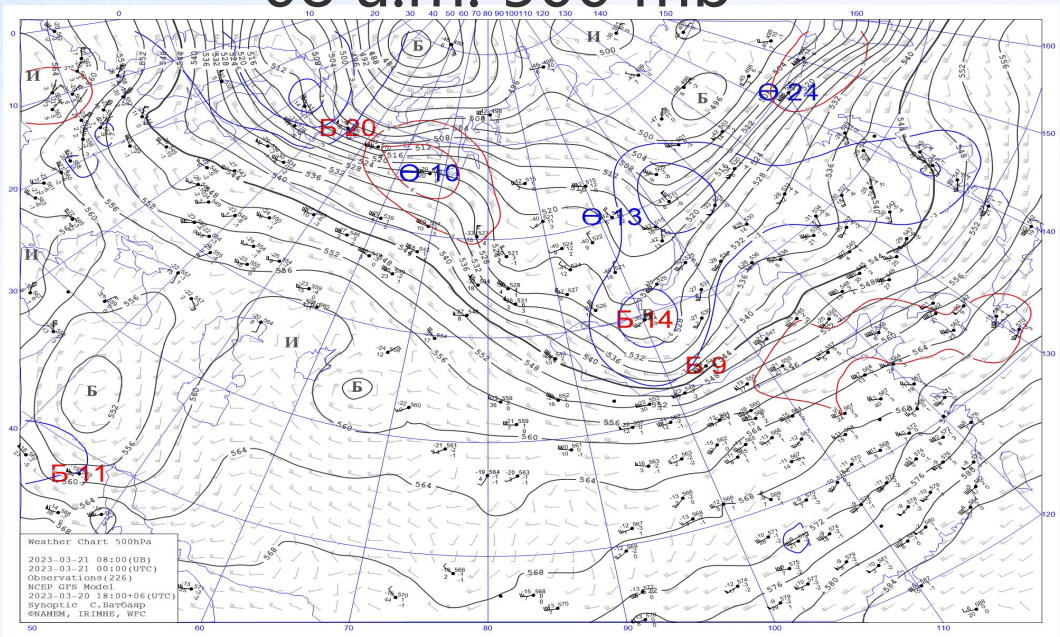
Dust storms in Mongolia are primarily driven by mid-latitude cyclones, often intensified by the incursion of extremely cold air masses from the north and northwest, which enhance wind speeds and contribute to the mobilization of surface dust.



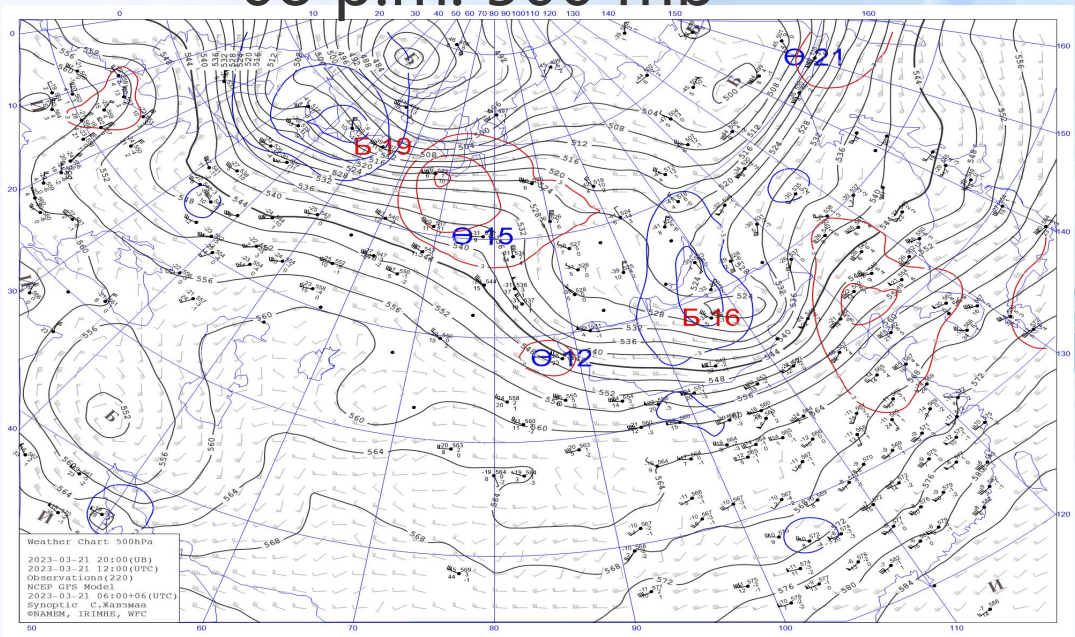
Dust storms in Mongolia primarily occur during transitional seasons, notably in late winter to spring (March–May) and in late autumn (September–October)

SYNOPTIC CONDITIONS (UPPER AIR AND SURFACE WEATHER)

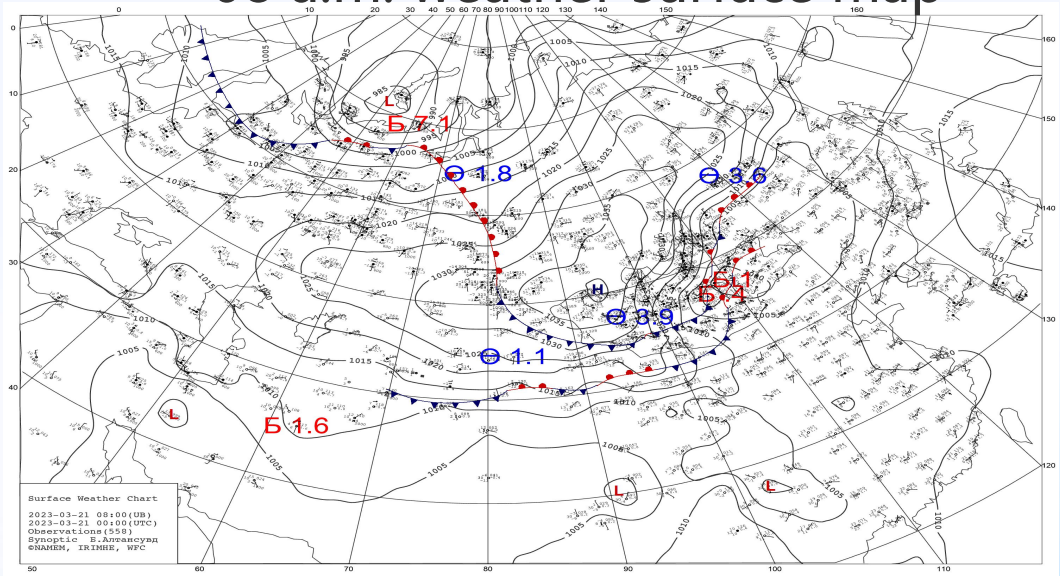
08 a.m. 500 mb



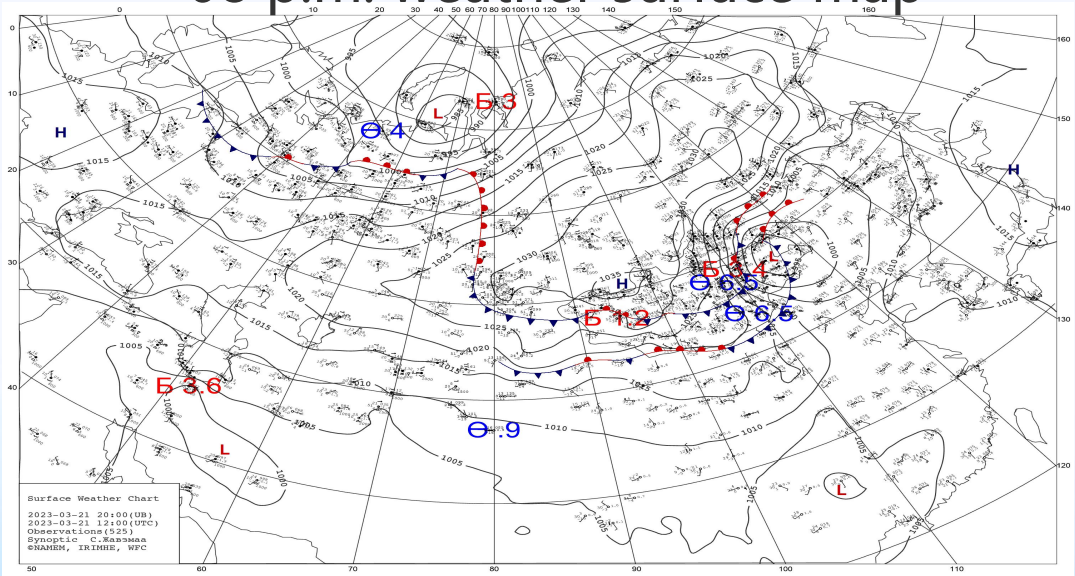
08 p.m. 500 mb



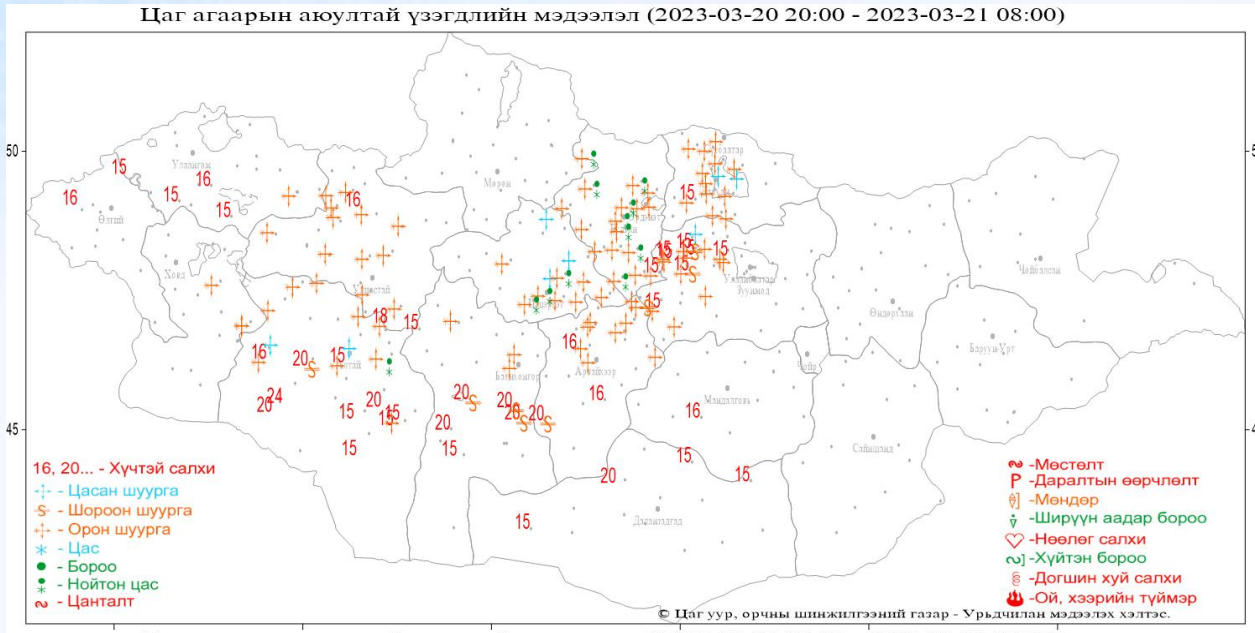
08 a.m. weather surface map

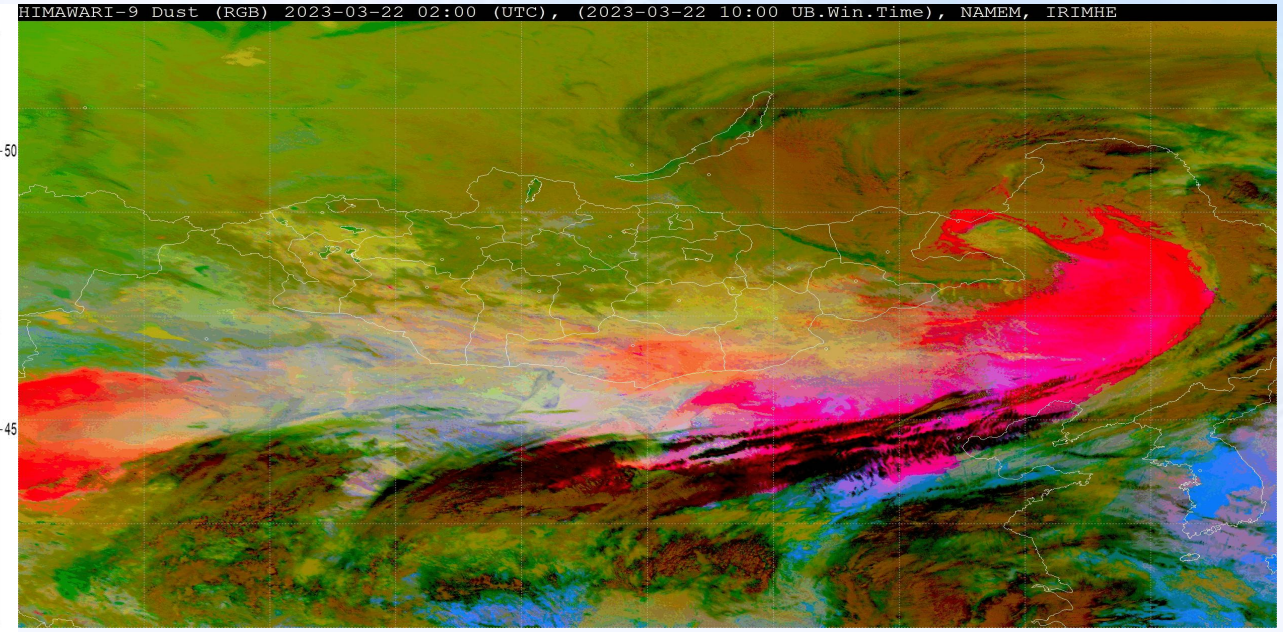


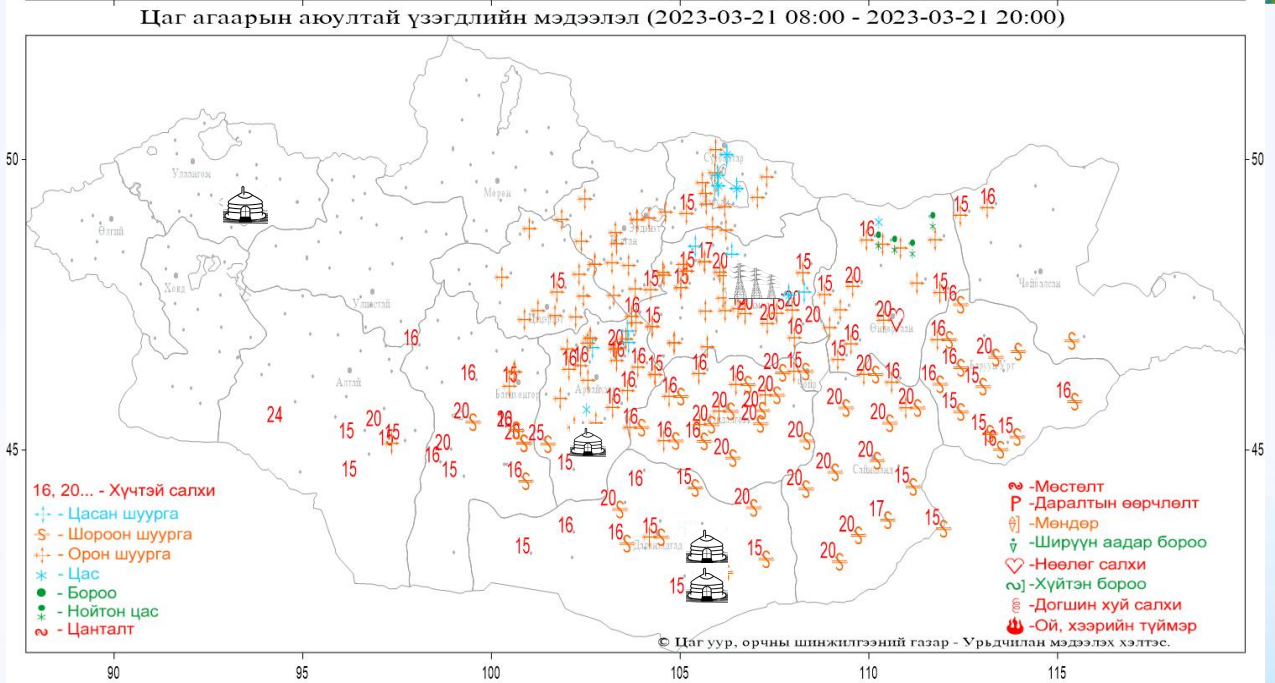
08 p.m. weather surface map

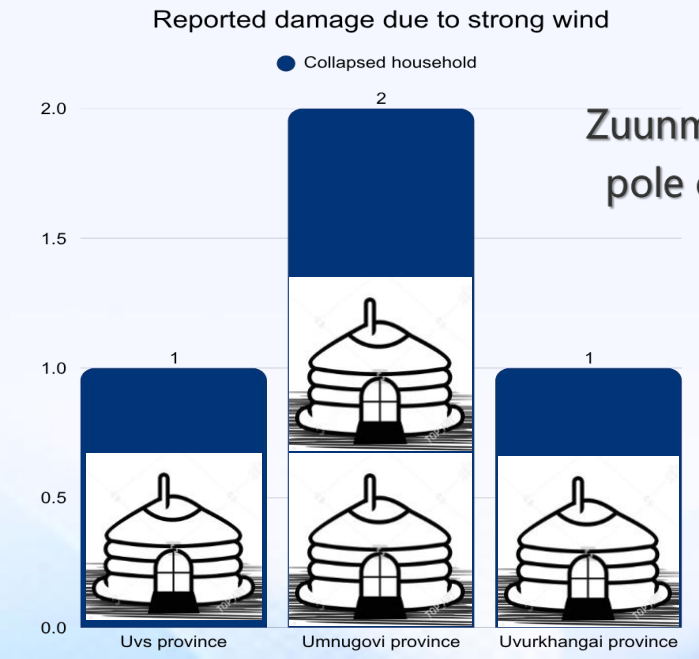


REAL TIME HAZARDOUS WEATHER INFORMATION

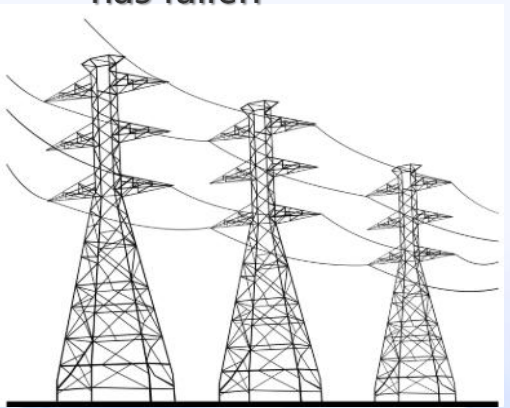








Zuunmod power transmission line pole of the overhead power line has fallen



CASE STUDY 2:
SATELLITE-DERIVED CONVECTIVE INDICES FOR ASSESSING ATMOSPHERIC INSTABILITY
02 SEPTEMBER 2025

METHODS TO ESTIMATE CONVECTIVE INSTABILITY INDICES

SI

$$SI = \frac{T_o - T_v}{T_o}$$

Identifies atmospheric instability

KI

$$KI = T_o - (T_{600} + T_{700})$$

Measures atmospheric instability

TTI

$$TTI = (T_o - T_v) + T_d - T_a$$

Assesses the potential for thunderstorms

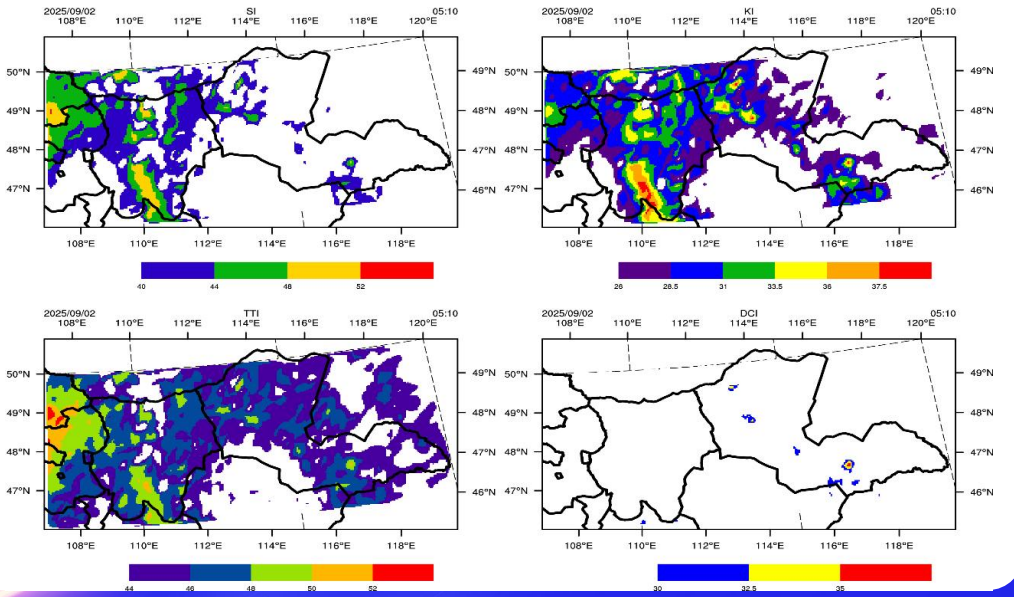
DCI

$$DCI = T_o - T_w$$

Evaluates the potential for downdrafts

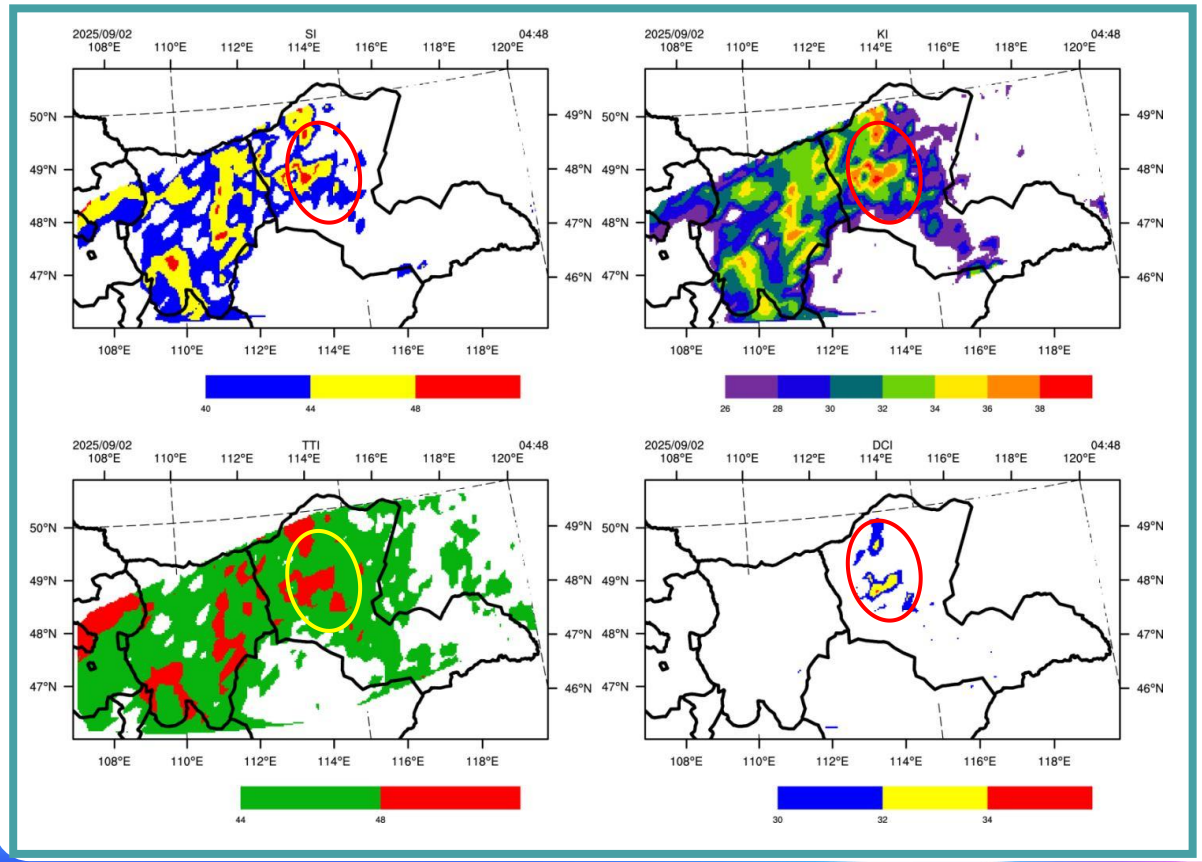
Surface-based Index

K-Index

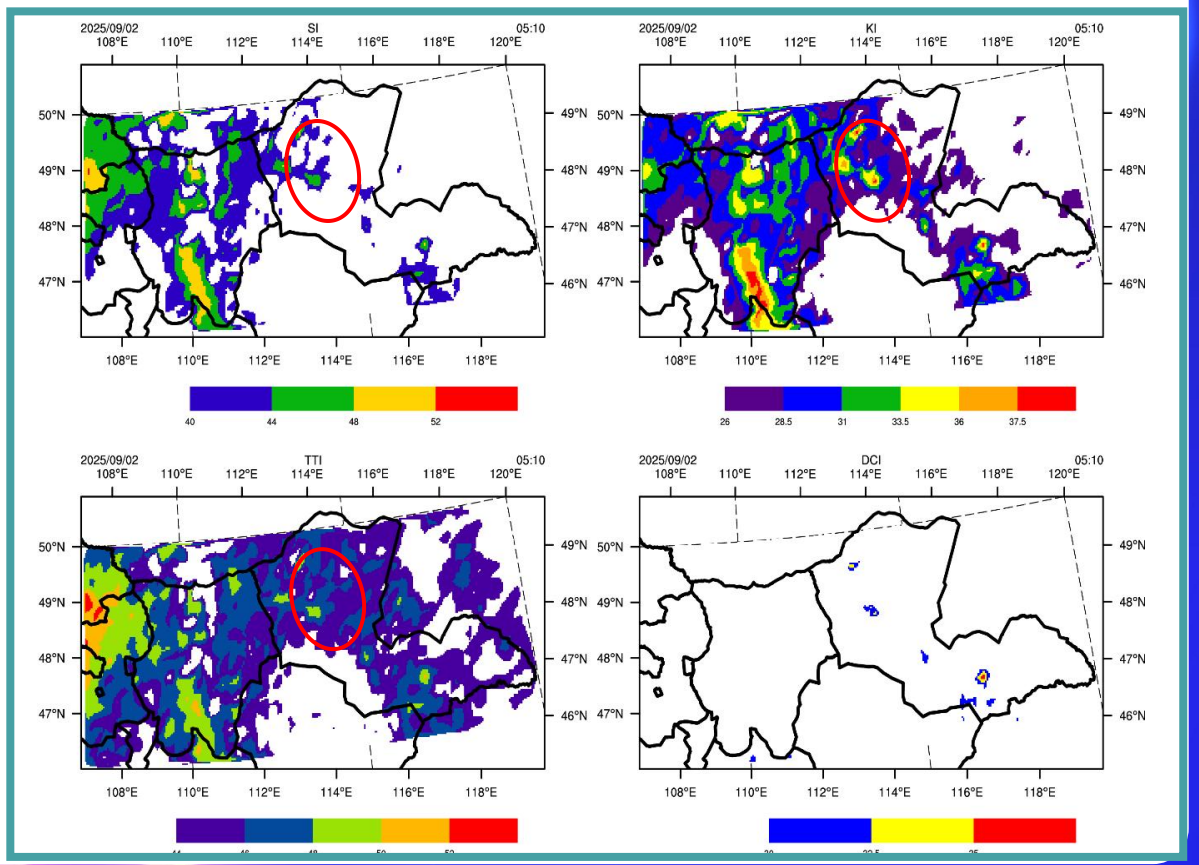


CONVECTIVE INSTABILITY INDICES

Suomi NPP: 12 hour 48 minute

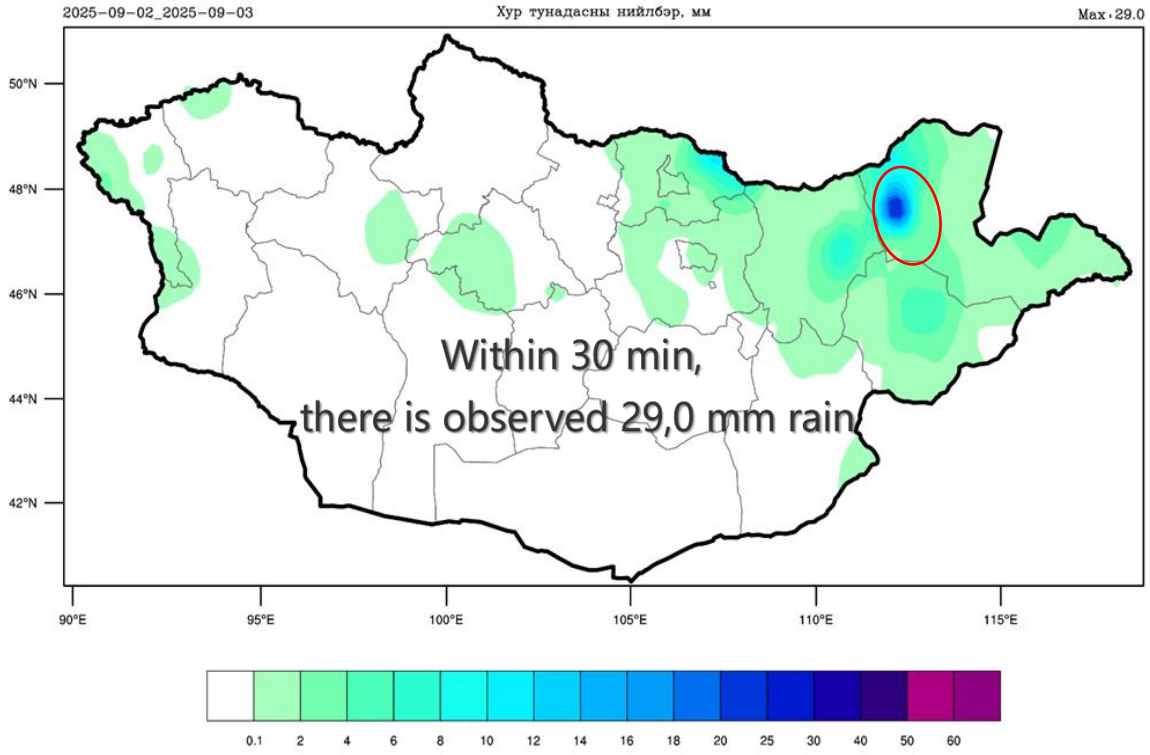


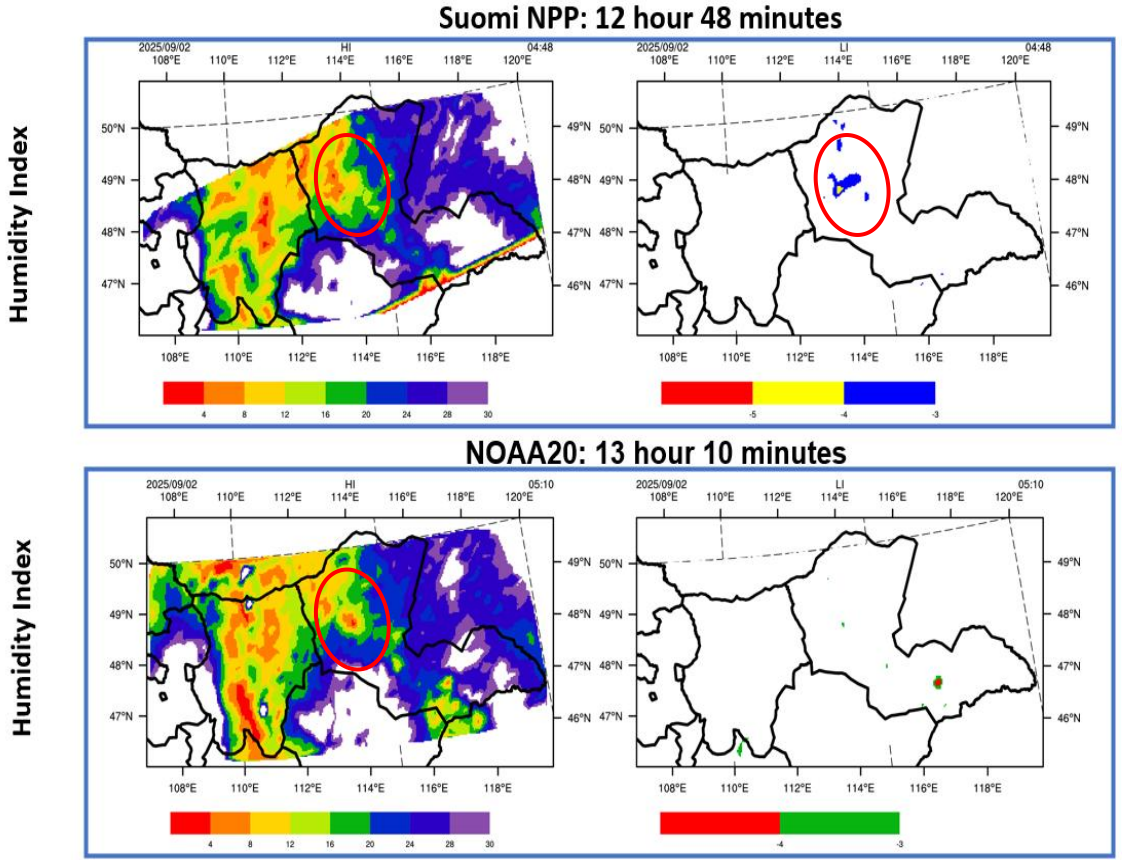
NOAA 20: 13 hour 10 minute



Observed precipitation corresponds closely to these regions, confirming the presence of thunderstorms. Therefore, **these satellite-derived indices are essential for identifying areas with the highest probability of convective thunderstorms**, which typically develop in the afternoon during the warm season in Mongolia.

REAL OBSERVATION DATA





CONCLUSION

- Satellite imagery and satellite-derived indices play a crucial role in monitoring and analyzing meteorological phenomena, particularly in tracking the evolution and structure of mid-latitude cyclones, as well as in detecting and assessing large-scale dust storms and steppe fires.
- In particular, the application of satellite-derived atmospheric instability indices has proven to be indispensable for identifying and characterizing convective activities, as demonstrated in this study.
- Overall, the utilization of satellite data encompasses a broad spectrum of applications ranging from mesoscale event detection to long-term climate monitoring, thereby underscoring its significance in modern meteorological observation, forecasting, and research practices.

FUTURE COOPERATION WITH CMA

Climate change and global warming have intensified drought and dry seasons in Mongolia, especially in the Gobi region bordering China. To address this, we aim to strengthen cooperation with the China Meteorological Administration (CMA) and other partners in weather modification by sharing knowledge, technology, and expertise. Moreover, to better evaluate precipitation enhancement activities, we kindly request access to Low-Earth Orbit (LEO) satellite data from the FY-3 series for future assessment of precipitation.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Thank you for your attention!