The First Session of East Asian winter Climate Outlook Forum

REVIEW OF RECENT EXTREME WEATHER AND CLIMATE EVENTS IN MONGOLIA

Doljinsuren Myagmar, Altantulga Chuluun

Institute of Meteorology, Hydrology and Environment of Mongolia

Ulaanbaatar, Mongolia

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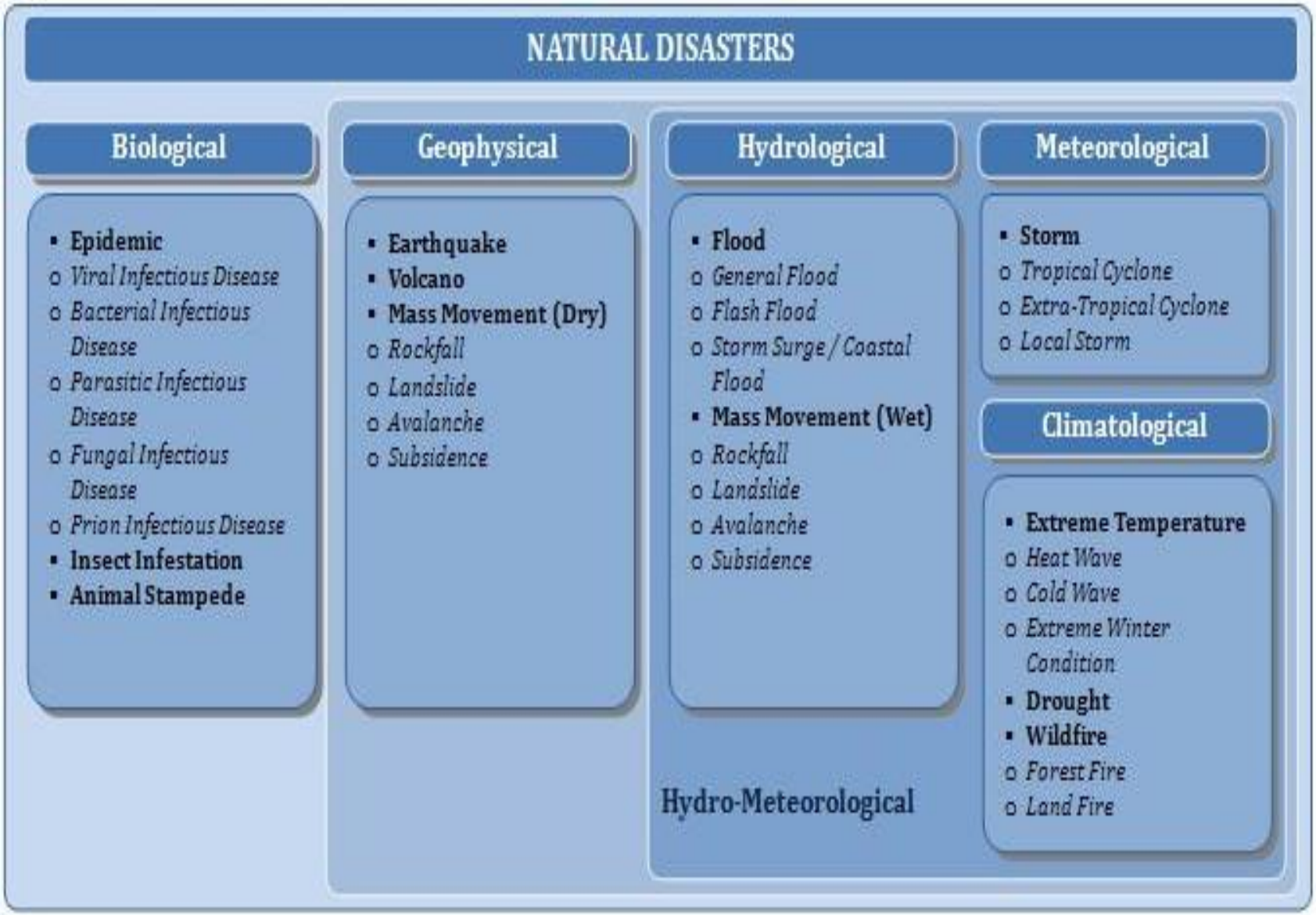
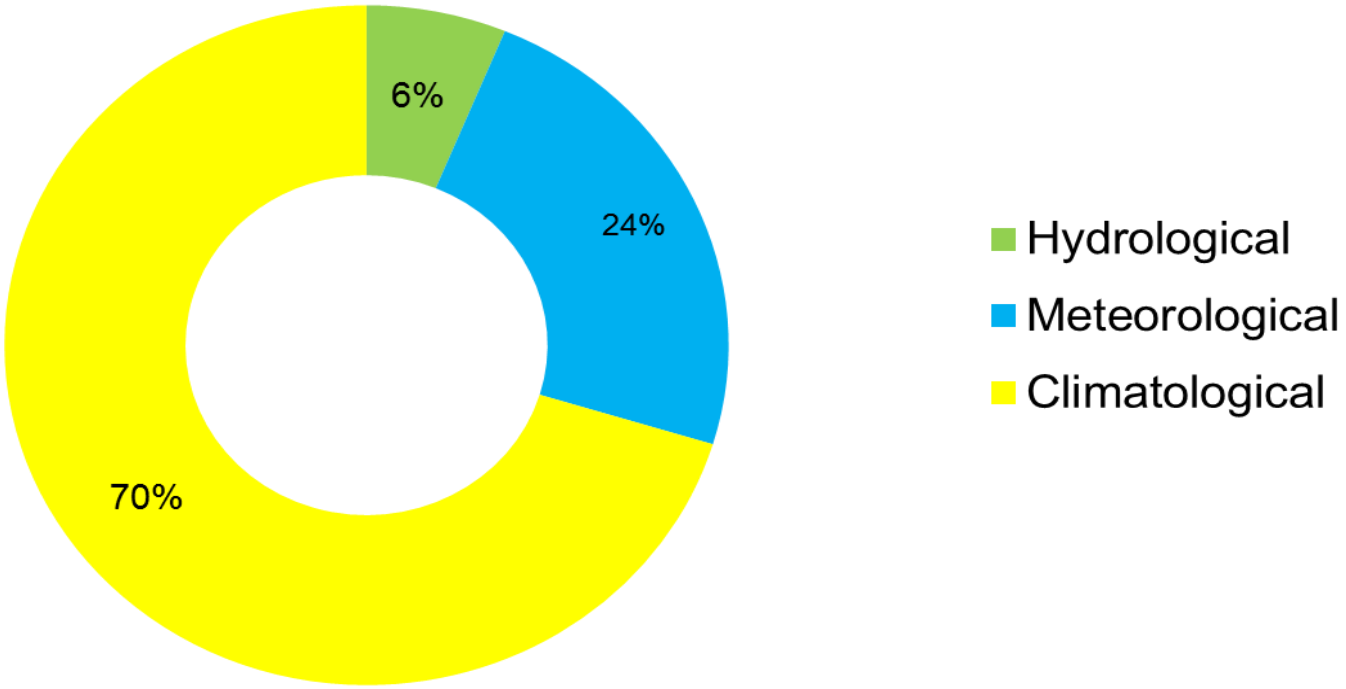
OUTLINE

- Occurrence, trends and economical losses of weather and climate related extreme events.
- Climate condition of extreme harsh winter 2009-2010 and its damages.

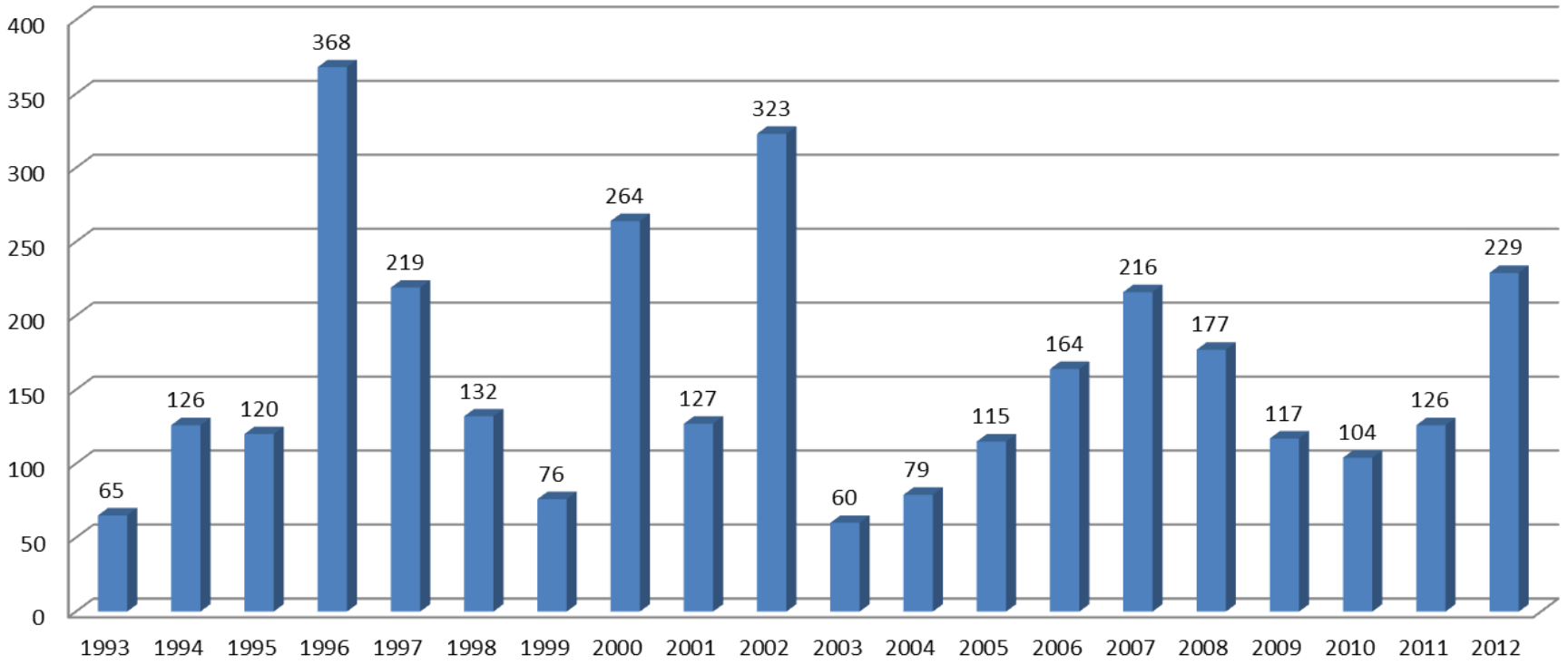

NATURAL DISASTERS
Biological
Epidemic
Viral Infectious Disease
Bacterial Infectious Disease
Parasitic Infectious Disease
Fungal Infectious Disease
Prion Infectious Disease
Insect Infestation
Animal Stampede
Geophysical
Earthquake
Volcano
Mass Movement (Dry)
Rockfall
Landslide
Avalanche
Subsidence
Hydrological
Flood
General Flood
Flash Flood
Storm Surge / Coastal Flood
Mass Movement (Wet)
Rockfall
Landslide
Avalanche
Subsidence
Meteorological
Storm
Tropical Cyclone
Extra-Tropical Cyclone
Local Storm
Climatological
Extreme Temperature
Heat Wave
Cold Wave
Extreme Winter Condition
Drought
Wildfire
Forest Fire
Land Fire
Hydro-Meteorological

Reported disasters by sub-groups



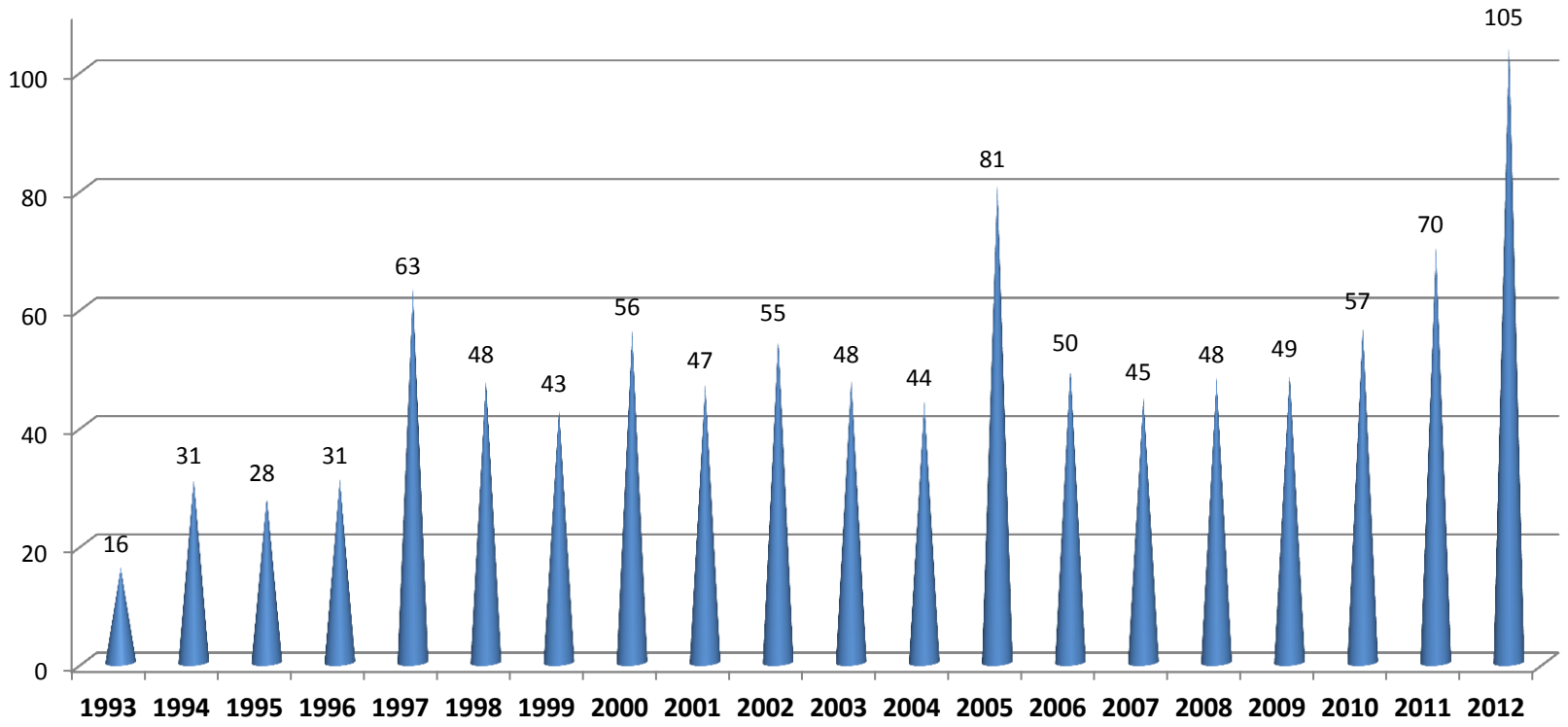
According to latest 12 year's studies climatological disasters accounted for 70% of all hydro meteorological disasters and forest and wildfire is about 99.7% of climatological disasters.

The frequency of forest and wildfire



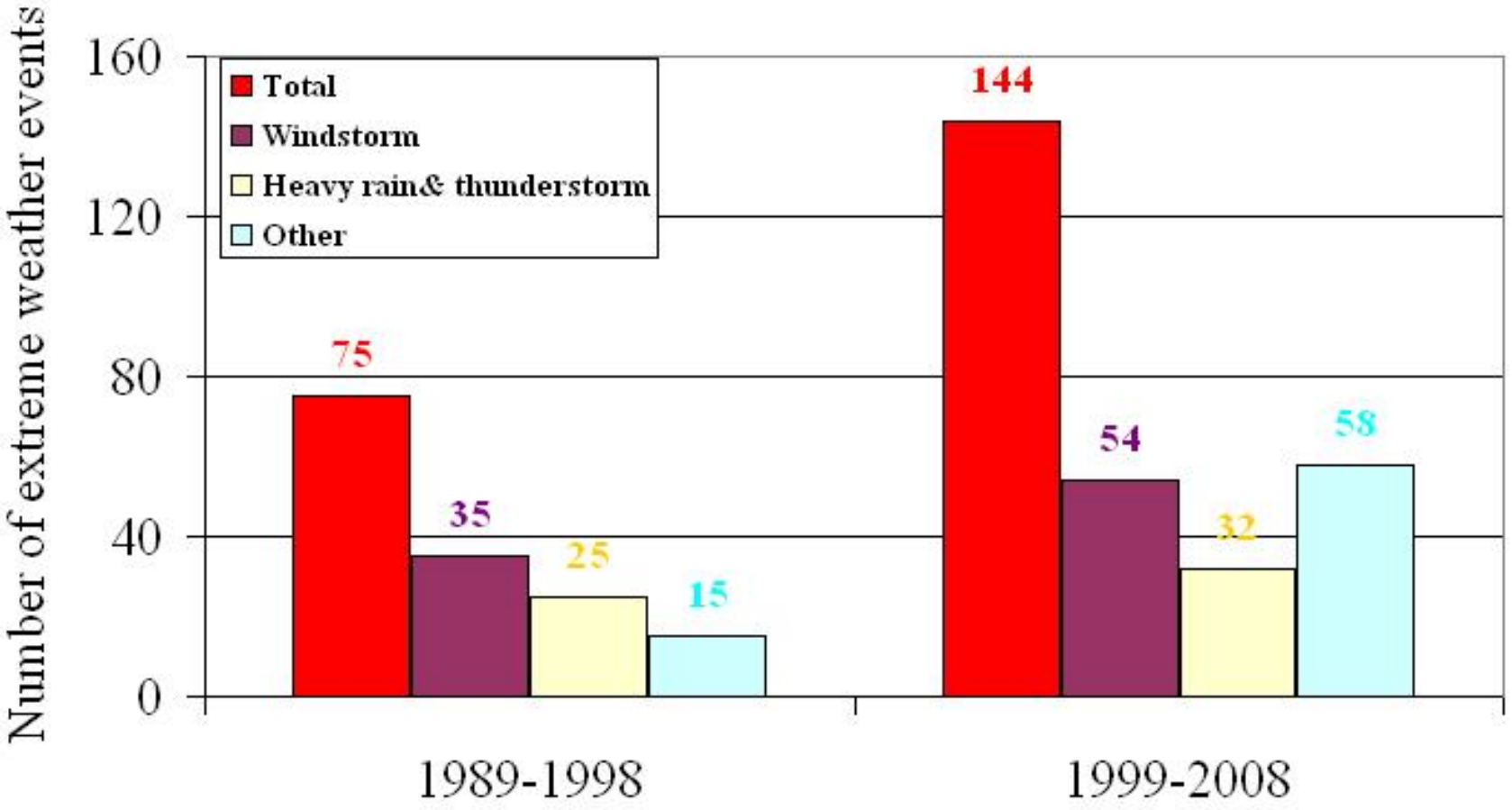
Forest and wildfire which occurs about 160 times per year while other hydro-meteorological extreme events are about 51 times per year which is the largest contributor to the increasing depletion of natural resources and economical losses.

The number of Meteorological and Hydrological disasters in Mongolia



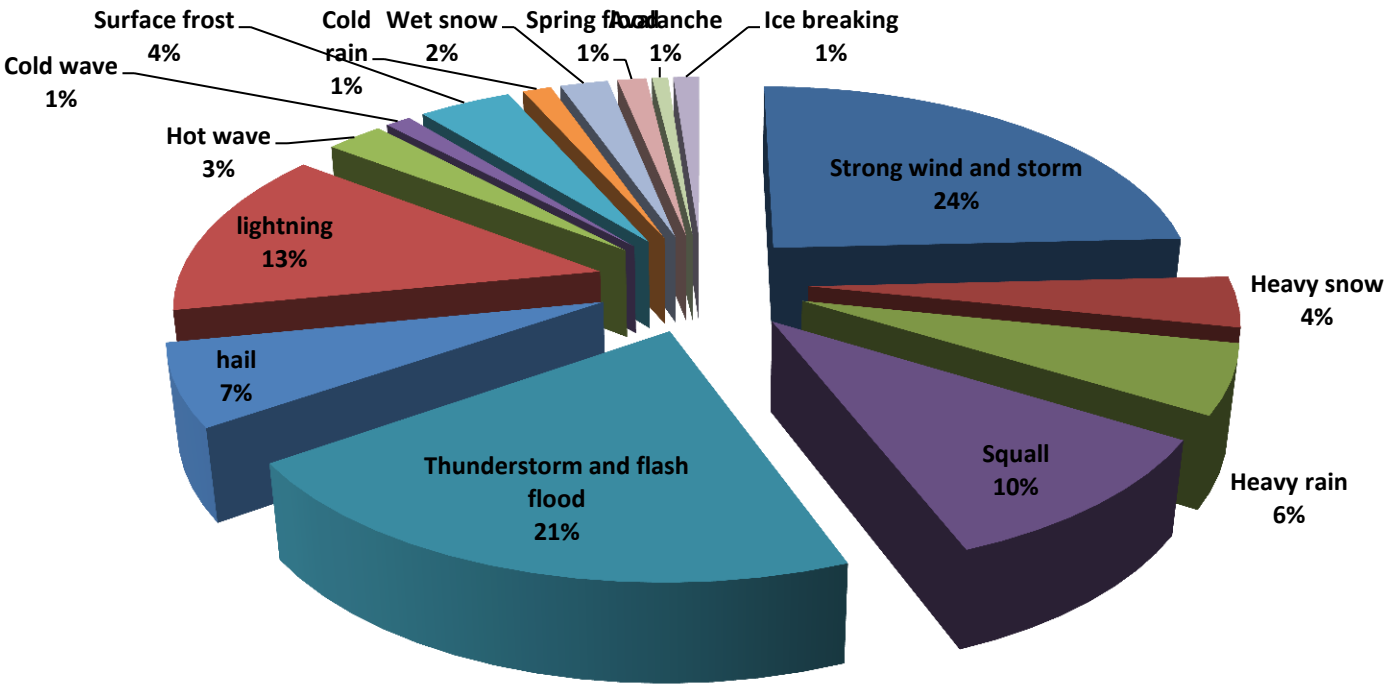
Hydro-meteorological disasters has been increasing dramatically in last several years.

Frequency of all EWE in the last two decades



In particular, severe windstorm and drought are the most destructive extreme events which are a significant impact on the economy of Mongolia (IMHE, 2009).

The percentage of type of extreme weather events

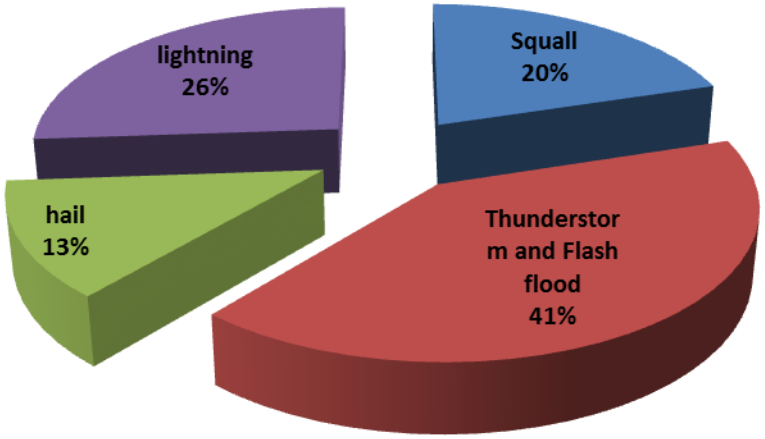


Which type of disasters occurs more common in Mongolia?

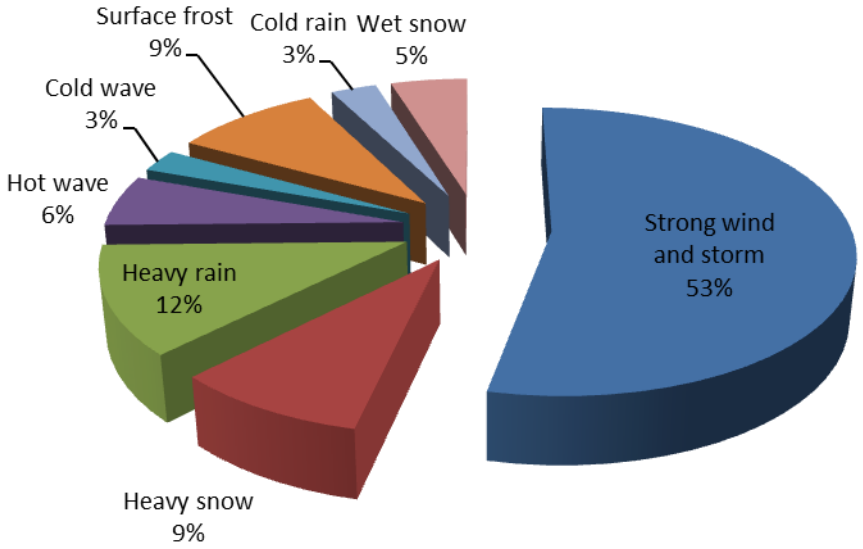
In Mongolia, strong wind and strong storm accounted for 24% of total, while thunderstorm and lightening is 21% and 13% respectively. Those convective weather phenomena are totally more than 53% among all type of disasters.

Convective and cold front related extreme events

Convective related



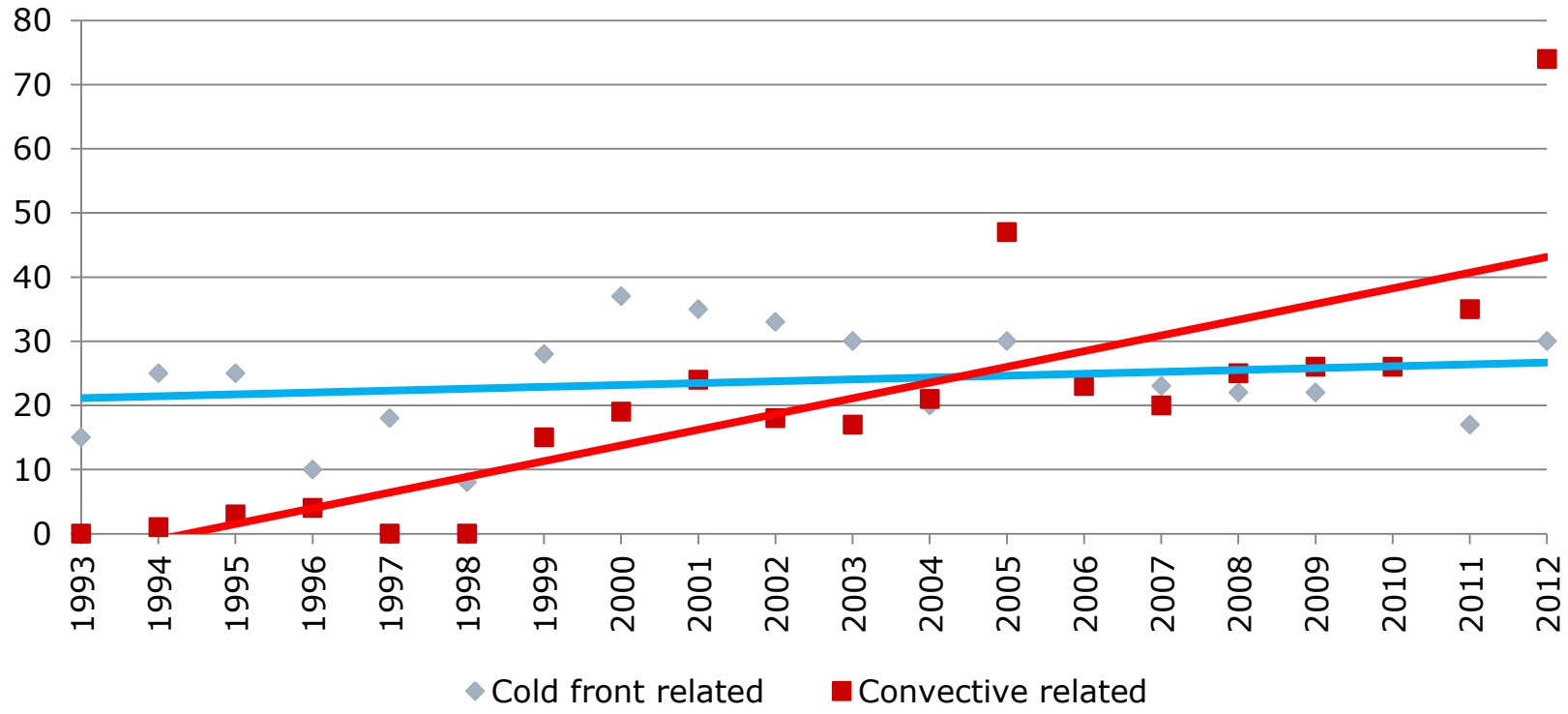
Cold front related



Convective related disasters counted for 53.3% of all hydro-meteorological disasters in last 12 years and flash flood is about 41.1% of all convective related extreme events, which occurs about 12 times per year.

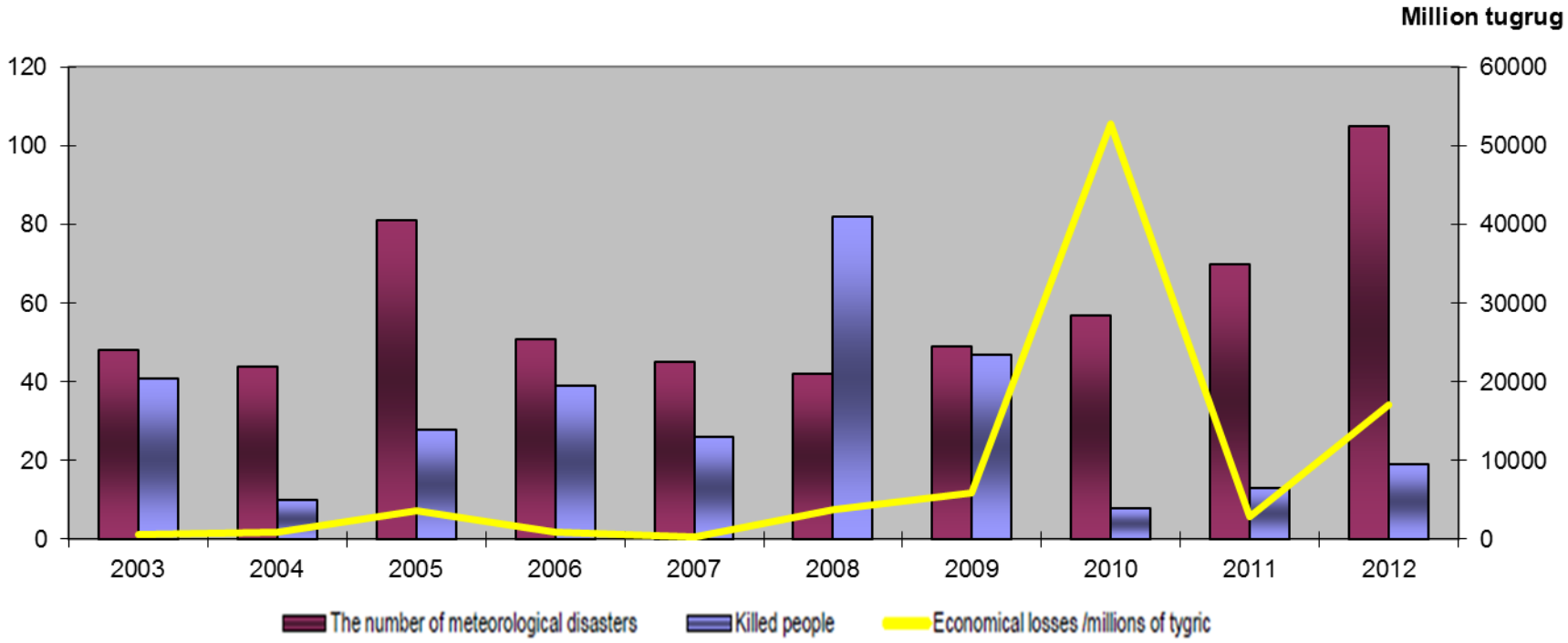
Cold front related severe weather such as strong wind, snow storm, heavy snow and rain, surface frost, cold rain and wet snow can cover large area and it causes huge damage on agricultural products. Among these types of disasters, severe storms occur more frequently which is about 14 times per year.

Convective related and cold front related weather disasters in last 20 years



Cold front related weather disasters increased steadily while convective related disasters rose up dramatically in last several years.

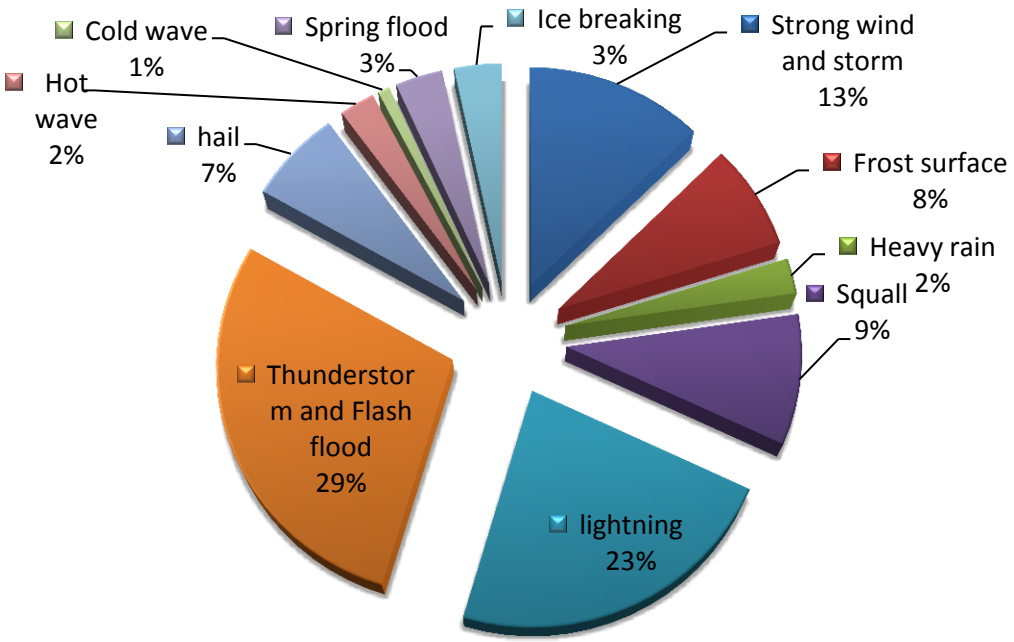
Losses of meteorological and hydrological disasters /2003-2012/

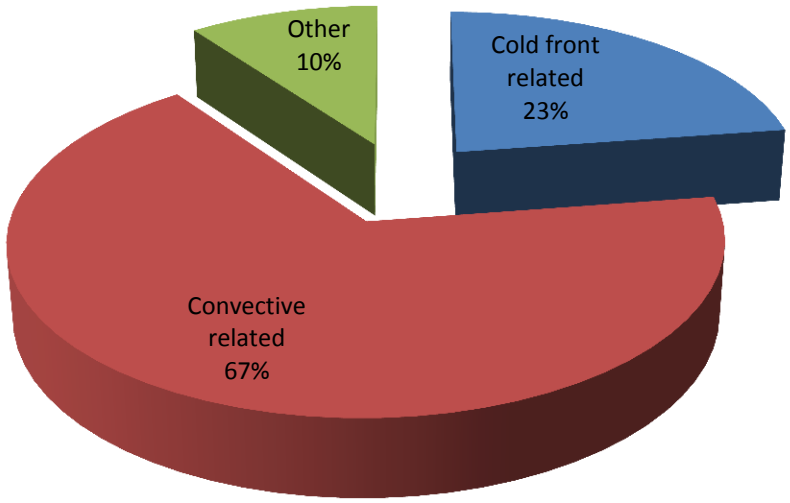


According to the damage statistics over the past 10 years, the the maximum economical losses occurred in 2010. In that year, the losses was valued at 61.5 billons of tugrug. /US$310.1 millions of dollar/ Furthermore, in 2008 there were 82 deaths from disasters, which has never reported for last 20 years, while 2004 and 2007 were the years which have the lowest number of disasters and economical losses.

Weather related disasters in 2013, Mongolia

Exretme events	Strong wind and storm	Heavy snow	Heavy rain	Frost surface	Squall	Thunderstorm and Flash flood	hail	lightning	Hot wave	Cold wave	Spring flood	Cold rain	Wet snow	Avalanche	Ice braeking	Totally
Number of occurance	15	1	3	9	11	34	8	27	3	1	3				4	**119**



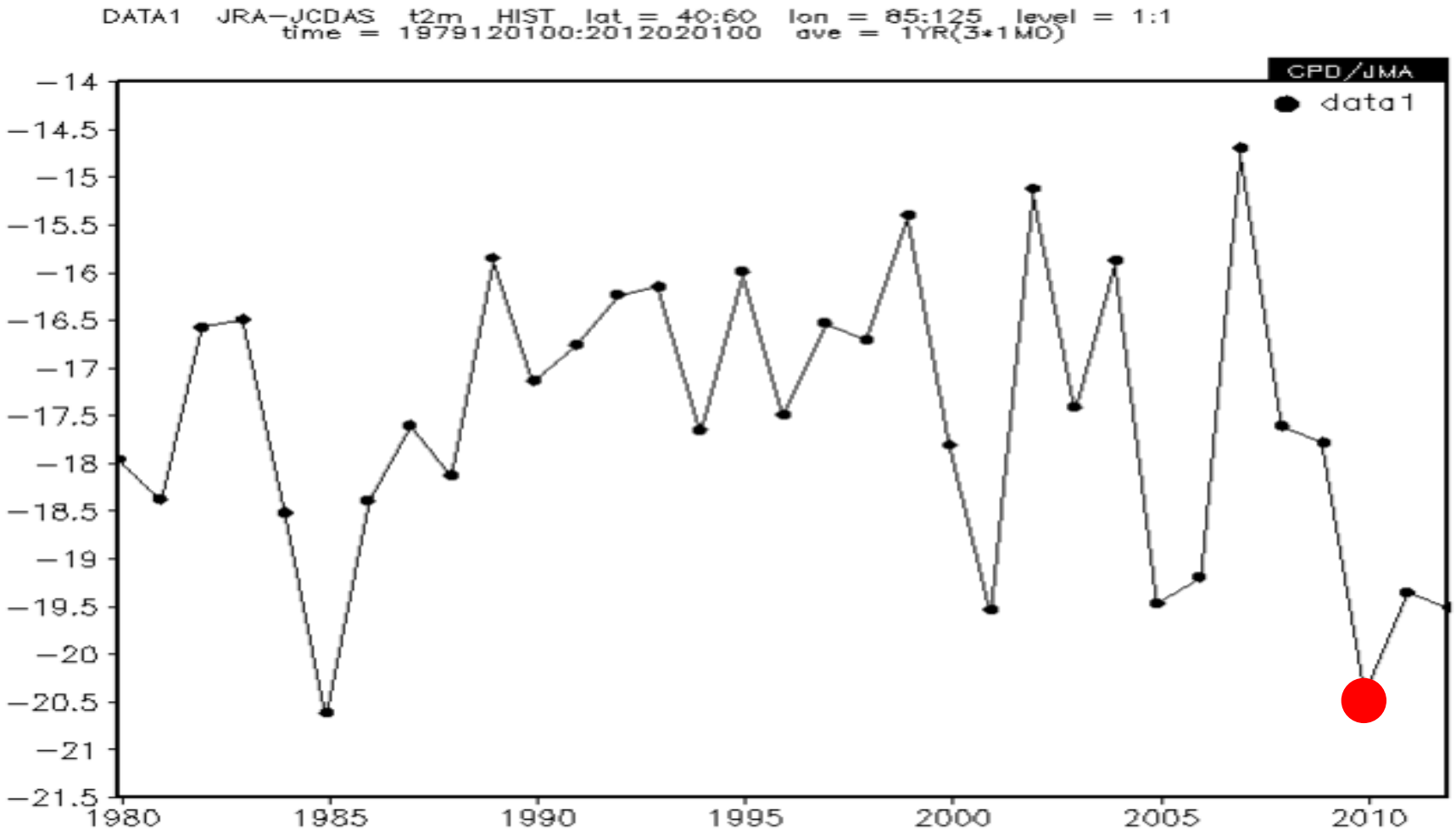


- The sever thunderstorm with hail events reported on 4 July 2013 in Tushig sum Of Selenge province. During heavy rainfall, 61.3 mm of rain fell within one hour and half. This convective related extreme event caused $250.000 losses.

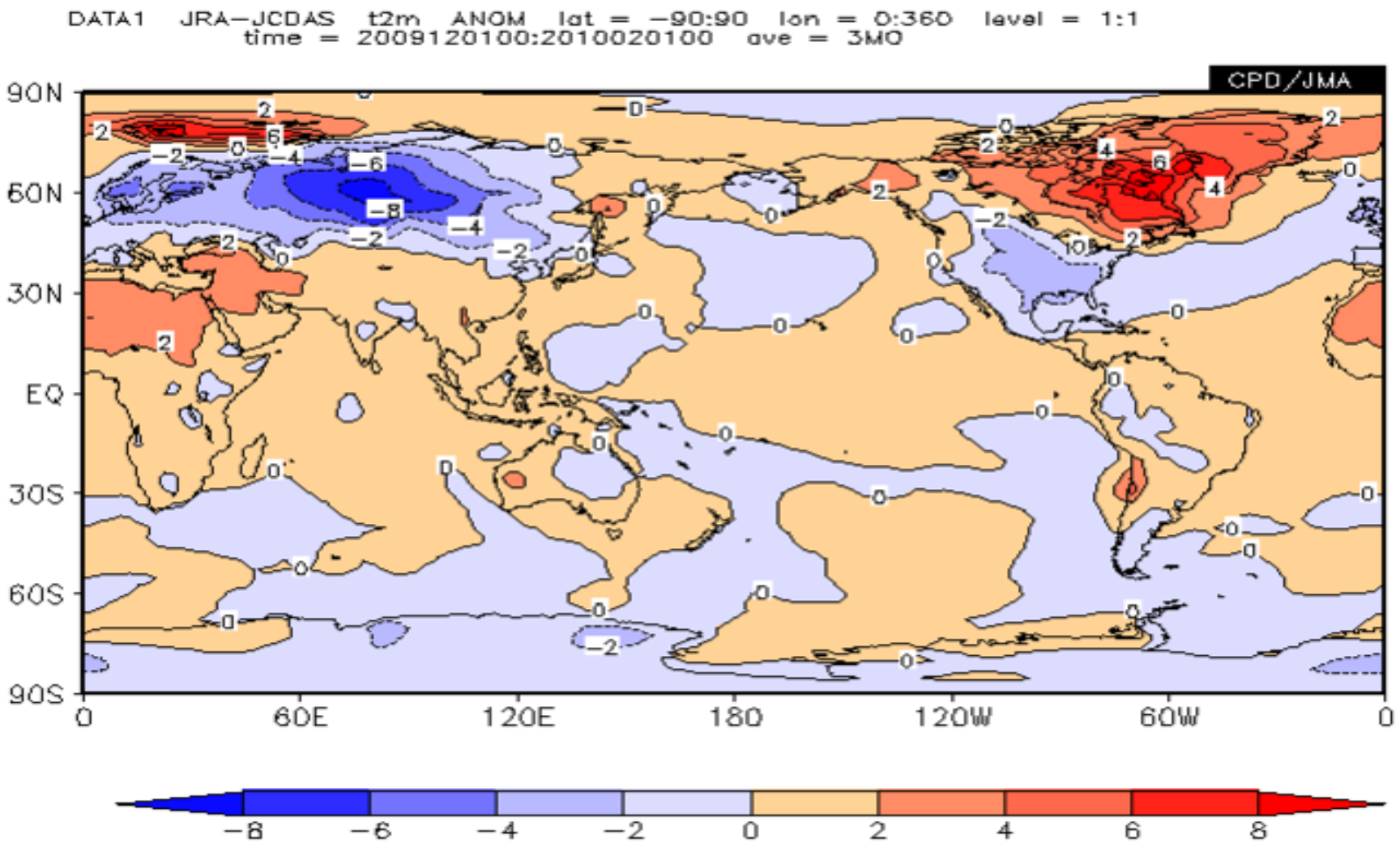
Extreme Harsh winter 2009-2010

- During the winter of 2009-2010 a rare combination of known factors in earth's climate variability systems. According to records going back to 1950, this winter saw one of the strongest El Nino events, combined with the most negative Arctic Oscillation (and also with a negative North Atlantic Oscillation) yet seen during a winter. These climate variability's influenced the Northern Hemisphere winter from North America, across Europe to eastern Eurasia - as far east as Mongolia, China and Korea.
- The winter of 2009-2010 was harsh for Mongolia, with persistent snowfall blanketing more than 60 percent of total land mass with 20-40 centimeters of snow depth. This winter was extremely cold reaching -40-50 degree of Celsius for consecutive ten and more days, which is the condition to announce Dzud situation.
- In 2010 winter about 9.000 families lost their entire herds which means more than 9.7 million animals, nearly a sixteenth of all livestock in Mongolia, have died in a winter of snow, cold and gales. Mongolia totally faced heavy losses of 310.1 million dollars.

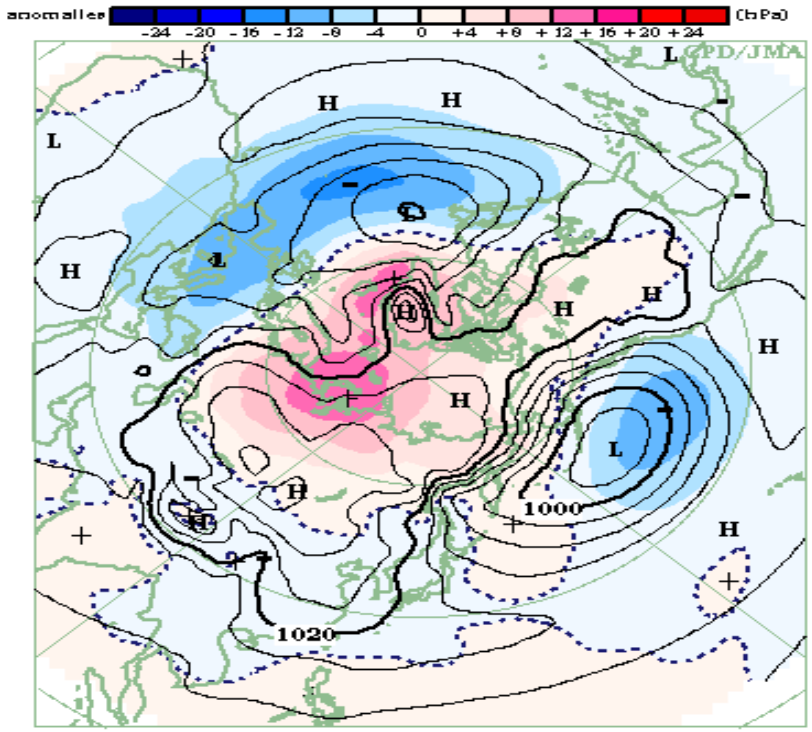
Average temperature of Central Asia in 1979/1980 – 2011/2012 winter.



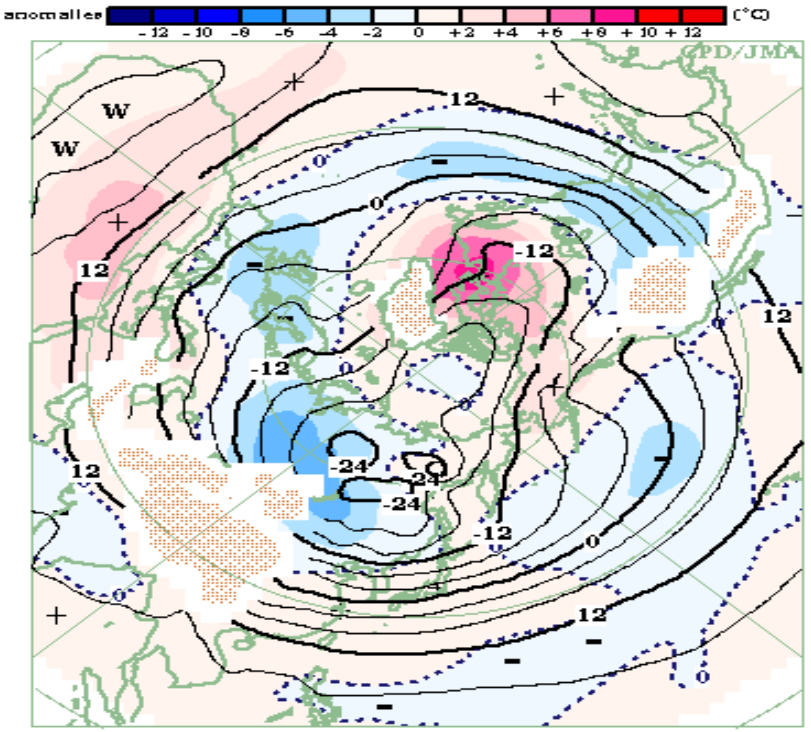
Anomalies of three-month mean temperatures in 2009/2010



SLP and T850 Anomalies in 2009 – 2010 winter



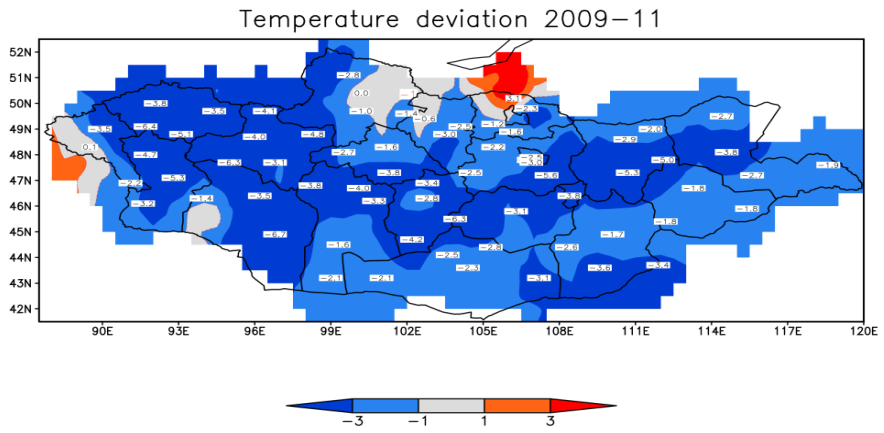
THREE-MONTH MEAN SEA LEVEL PRESSURE AND ANOMALY
IN THE NORTHERN HEMISPHERE (Dec.-Feb. 2010)
The contours show sea level pressure at intervals of 4 hPa.
The shading indicates sea level pressure anomalies.
The base period for the normal is 1981-2010.

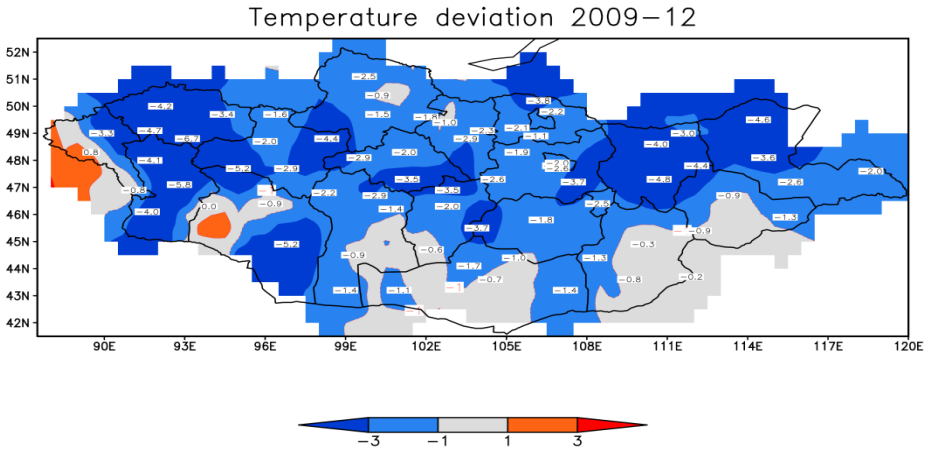


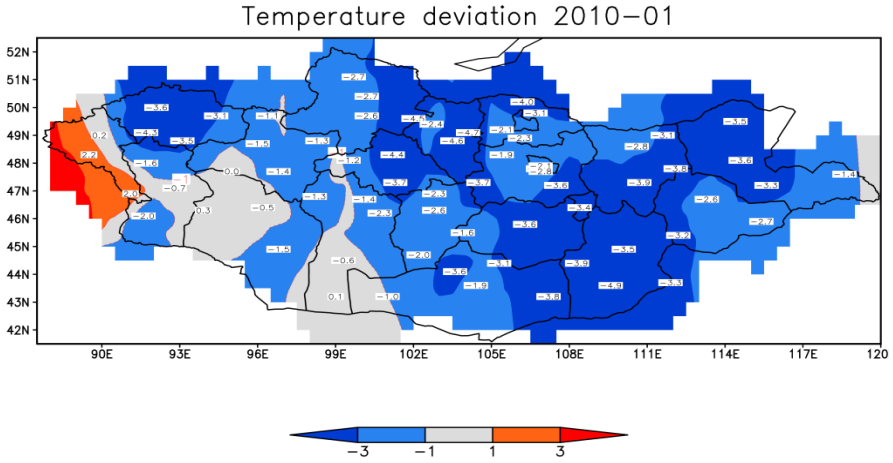
THREE-MONTH MEAN 850hPa TEMPERATURE AND ANOMALY
IN THE NORTHERN HEMISPHERE (Dec.-Feb. 2010)
The contours show temperature at intervals of 4 °C.
The shading indicates temperature anomalies.
The wavy hatch patterns indicate areas with altitudes higher than 1,600 m. The base period for the normal is 1981-2010.

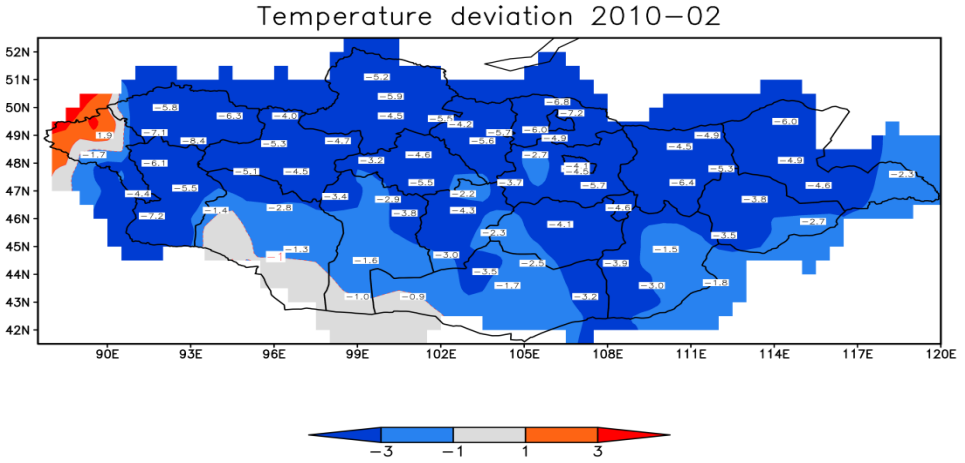
During this winter Siberian high was stronger than normal. And Mongolia covered by the strong Siberian high. Second picture shows temperature anomalies at 850hPa. In Association with strong Siberian high, there are below normal temperature spread in this region.

Strong negative temperature anomalies









GrADS: COLA/IGES

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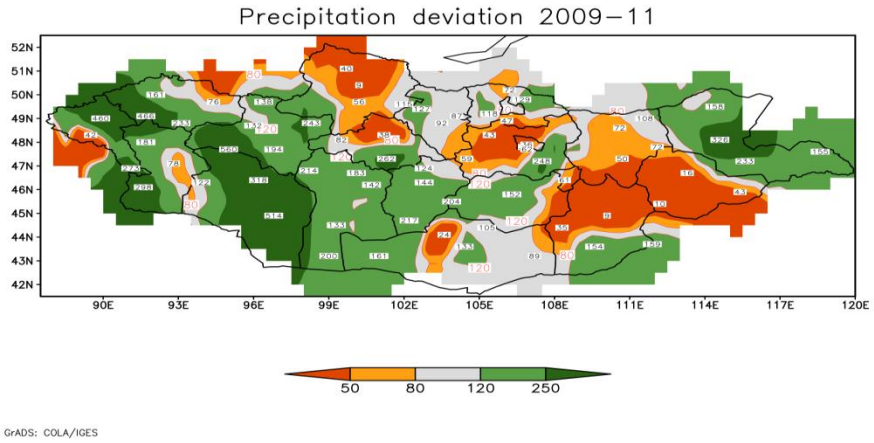
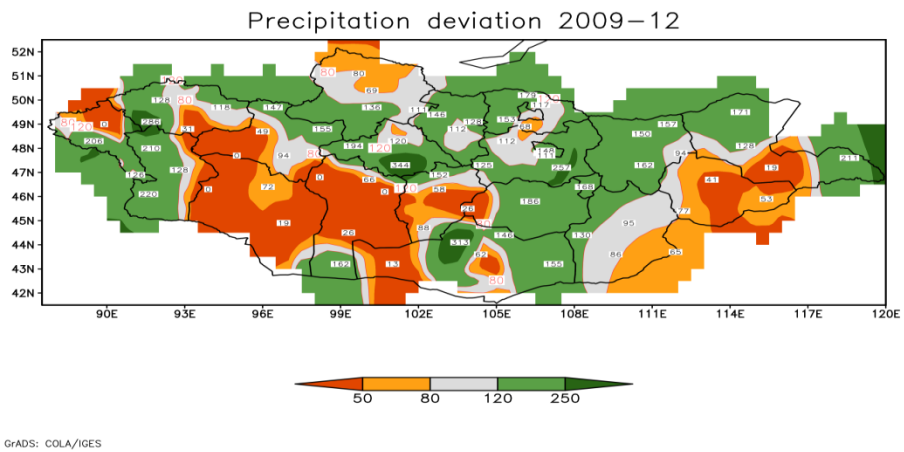
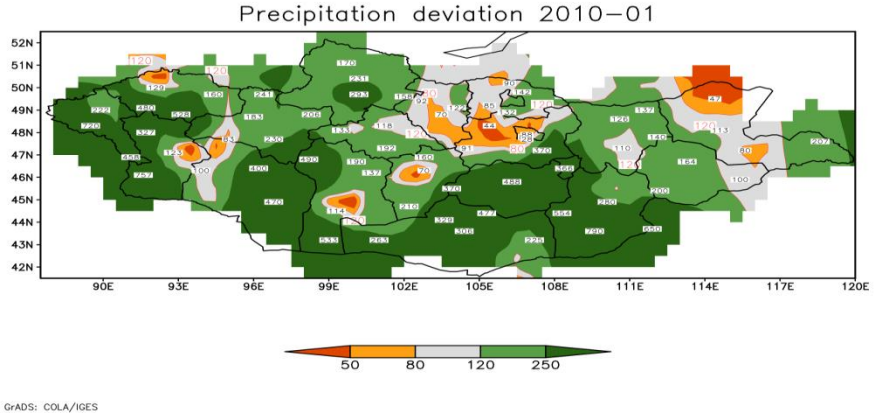
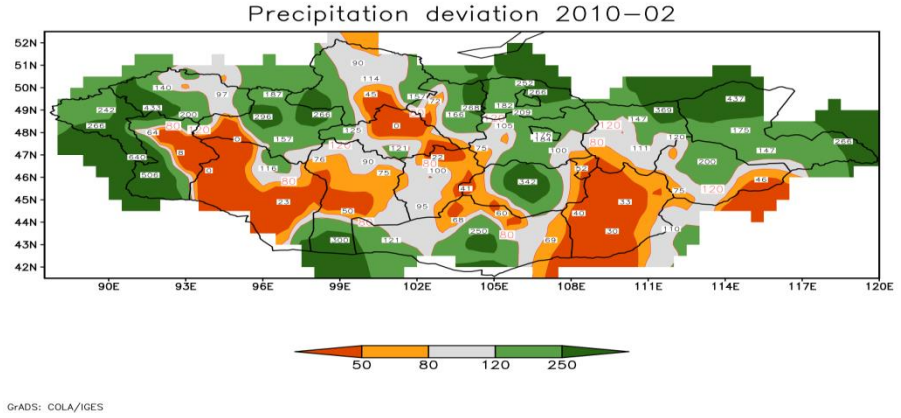
Heavy and prolonged snow conditions

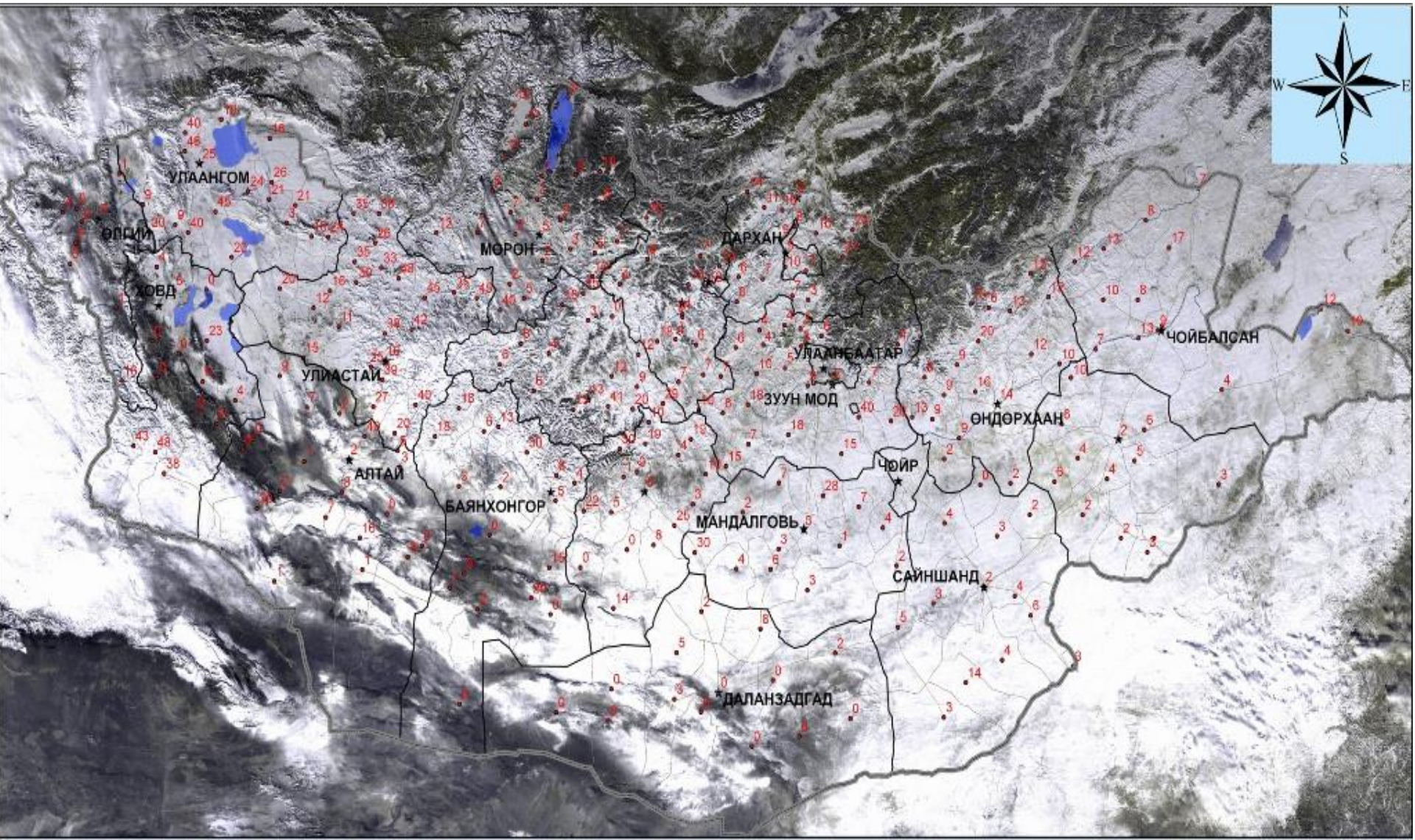


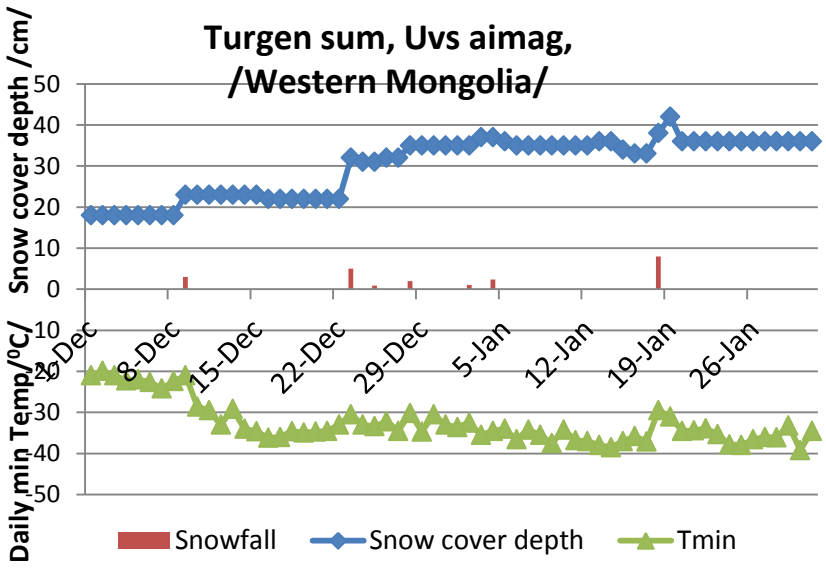


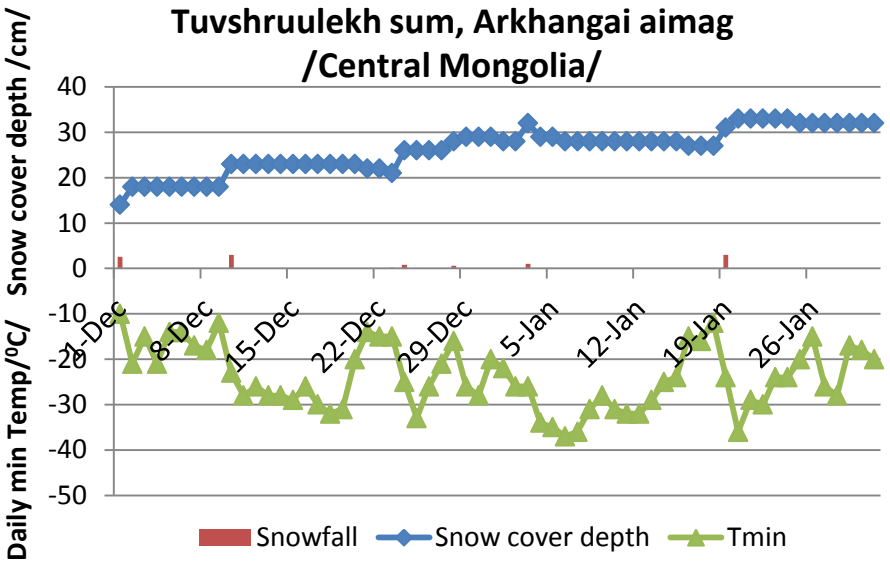


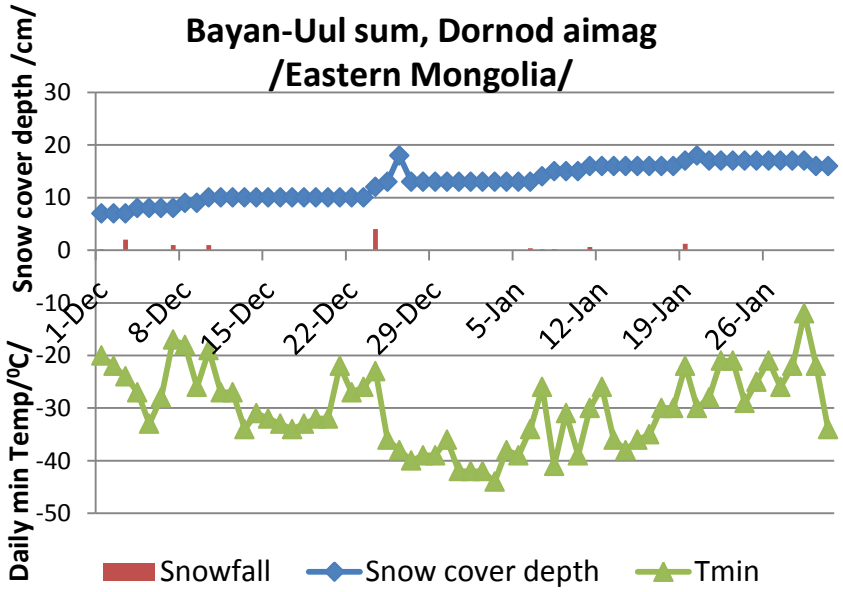


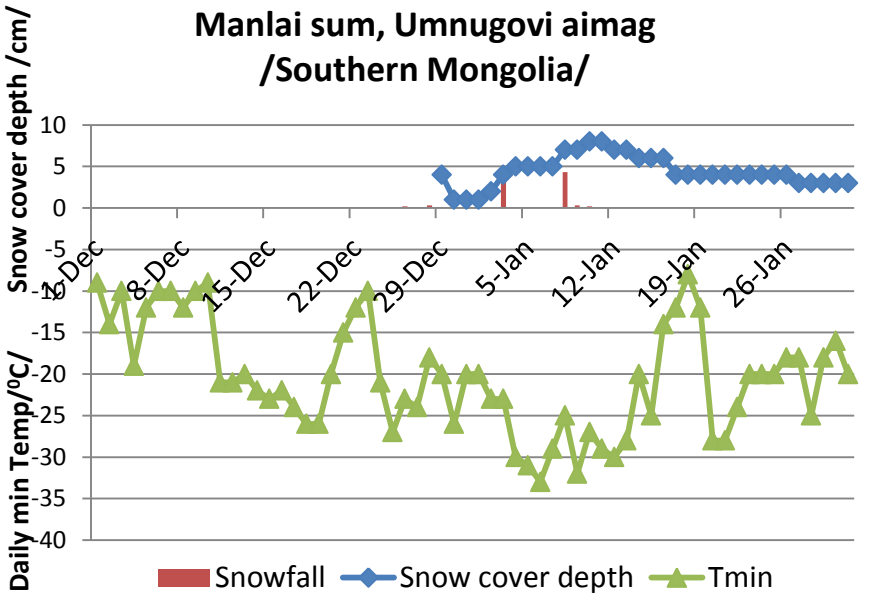
Snow cover depth by MODIS /02.Jan.2010/




Turgen sum, Uvs aimag,
/Western Mongolia/
Snow cover depth /cm/
Daily min Temp/°C/
1-Dec
8-Dec
15-Dec
22-Dec
29-Dec
5-Jan
12-Jan
19-Jan
26-Jan
Snowfall
Snow cover depth
Tmin


Tuvshruulekh sum, Arkhangai aimag
/Central Mongolia/
Snow cover depth /cm/
Daily min Temp/°C/
1-Dec
8-Dec
15-Dec
22-Dec
29-Dec
5-Jan
12-Jan
19-Jan
26-Jan
Snowfall
Snow cover depth
Tmin


Bayan-Uul sum, Dornod aimag
/Eastern Mongolia/
Snow cover depth /cm/
Daily min Temp/°C/
1-Dec
8-Dec
15-Dec
22-Dec
29-Dec
5-Jan
12-Jan
19-Jan
26-Jan
Snowfall
Snow cover depth
Tmin


Manlai sum, Umnugovi aimag
/Southern Mongolia/
Snow cover depth /cm/
Daily min Temp/°C/
1-Dec
8-Dec
15-Dec
22-Dec
29-Dec
5-Jan
12-Jan
19-Jan
26-Jan
Snowfall
Snow cover depth
Tmin









SUMMURY

- Climatological disasters, especially forest and wild fire accounted for 70% of all hydro meteorological disasters and become the largest contributor to the economic losses.
- In comparison between last 2 decades the number of weather related disasters in Mongolia has risen by almost 2 times in last decade.
- In Mongolia, strong wind, storm and thunderstorm are occurred more frequently.
- Convective weather phenomena are totally more than 53% among all type of disasters and those convective related disasters and their damages have dramatically rising trend in last several years.
- The 2009-2010 winter was the harshest and second coldest winter for last 3 decades and more than 9.7 million livestock died in a winter of snow, cold and gales. Mongolia faced heavy losses of 309.5 million dollars.

THANK YOU FOR PAYING ATTENTION