



**The 4th Session of East Asia winter Climate Outlook
Forum (EASCOF-IV)
8-9 November 2016
Ulaanbaatar, Mongolia**

**Summer extreme events in 2016 and
winter severe condition – dzud in Mongolia**

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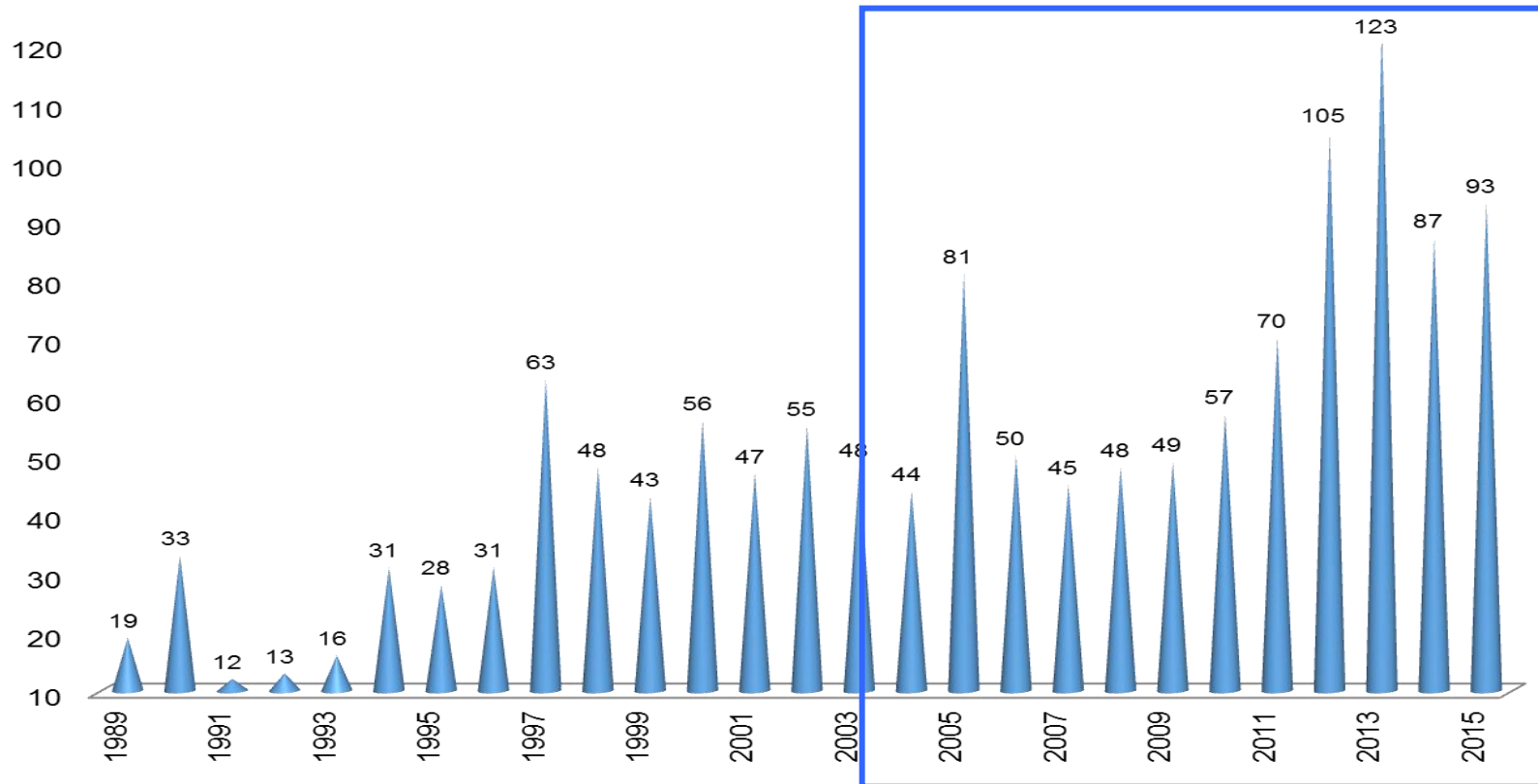
08-Nov-2016

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- ❑ Summer extreme events in 2016
- ❑ Winter severe condition - Dzud

> Natural disasters in Mongolia

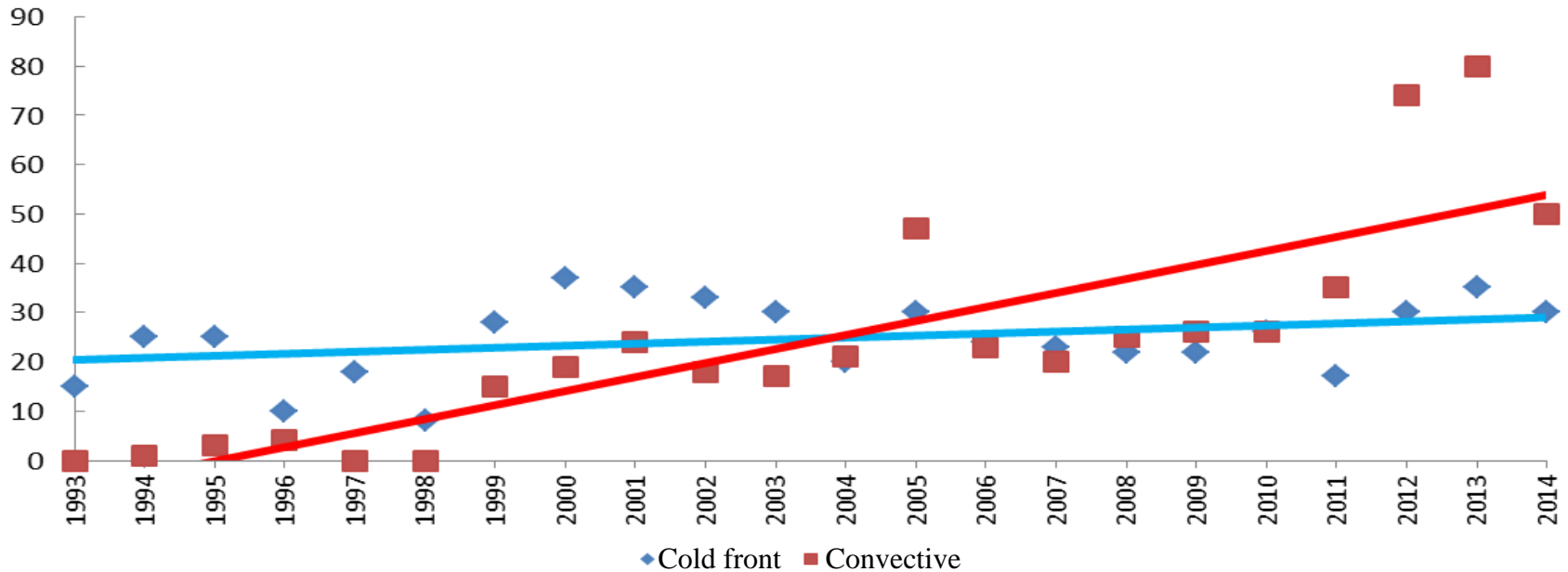
The number of weather-related disasters in Mongolia /Hydrological and meteorological/



The global warming was the main fact to affect extreme weather and the number of disasters in Mongolia has risen for last several years. According to latest 20 years' studies, from 1989 to 1996, reported disasters averaged 45 per year—from 1997 to 2011, this figure shot up by more than two times to an average 57 disasters each year.

> Natural disasters in Mongolia

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



A number of studies show, under the impacts of global warming and climate change, that the atmospheric disaster occurrence, especially in the frequency of those convective disasters, is expected to rapidly increase in the world. Similarly, in Mongolia squall, hail, lightning, thunderstorm and flash flood are becoming more common hazardous events, and they have doubled in the last two decades. According to a disasters duration, we have classified total atmospheric disaster into two types, long and short term phenomena.

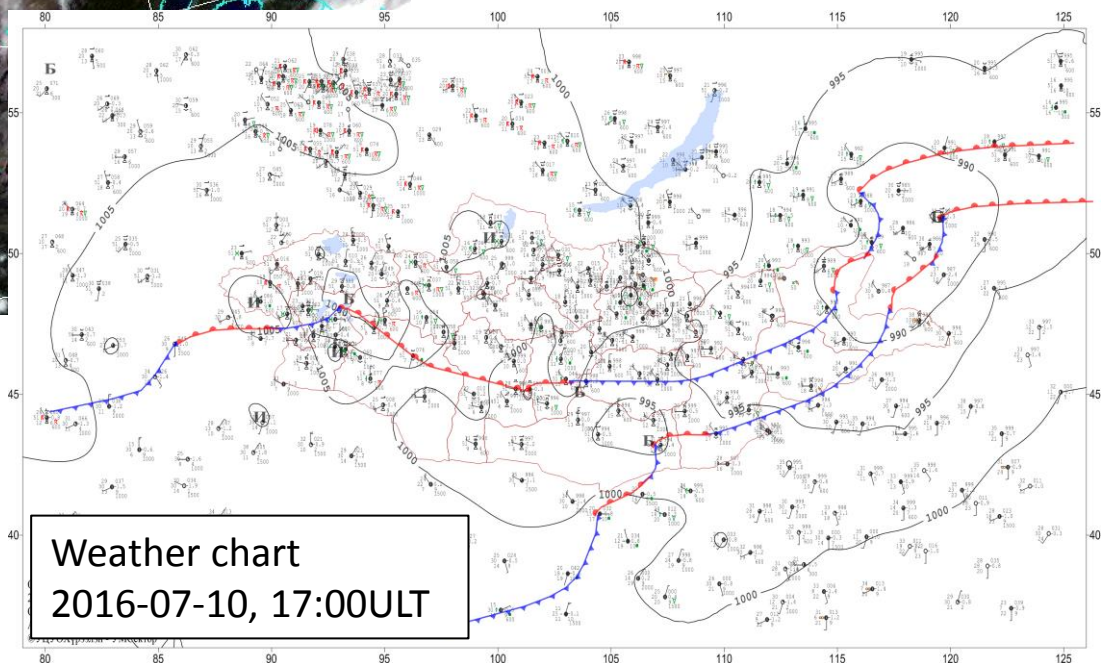
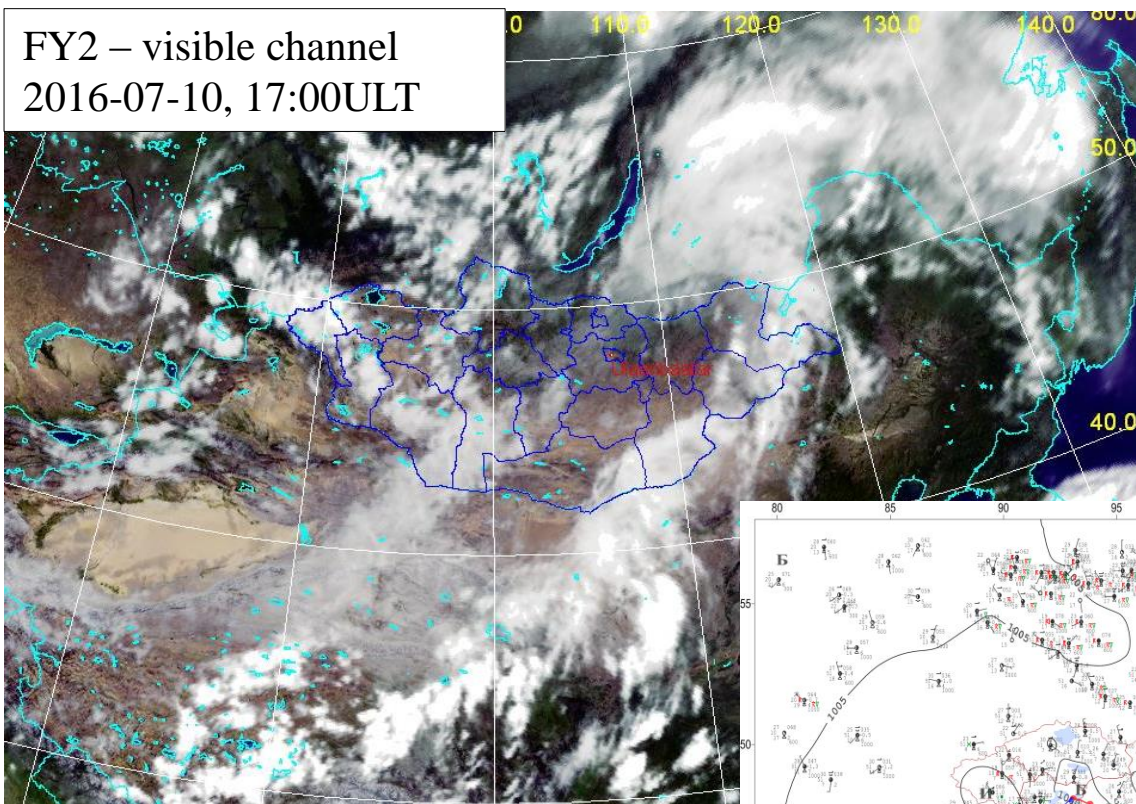


Summer extreme weather events in 2016

> Extreme weather events in 2016

Thunderstorm – 10th of July in Bayan-Ulgii province

FY2 – visible channel
2016-07-10, 17:00ULT



Weather chart
2016-07-10, 17:00ULT

> Extreme weather events in 2016

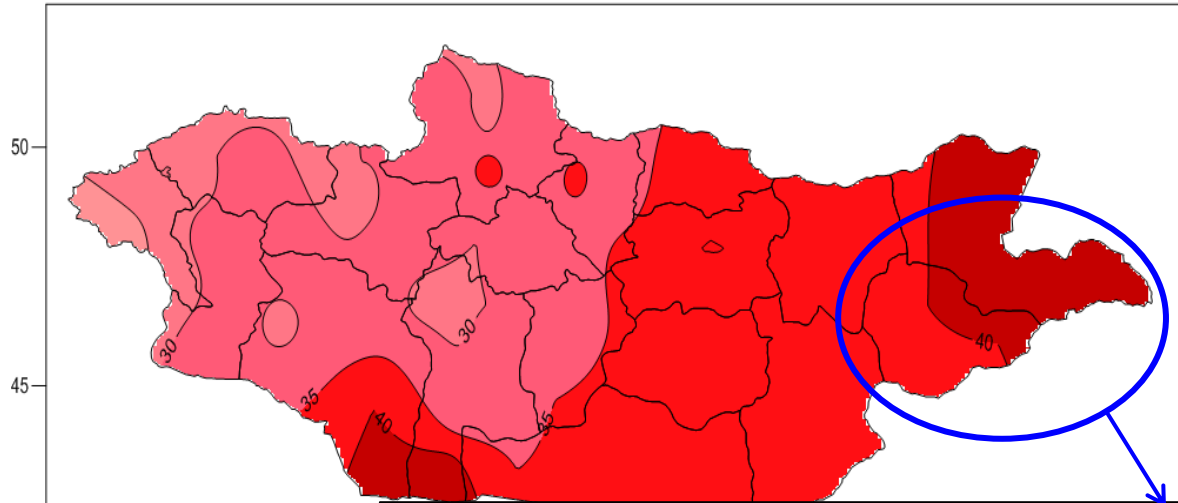
Thunderstorm – 10th of July in Bayan-Ulgii province



1664 people of 361 household are affected and 175 houses crushed. This extreme weather events caused 2 2.259.565.000 tugrugs.

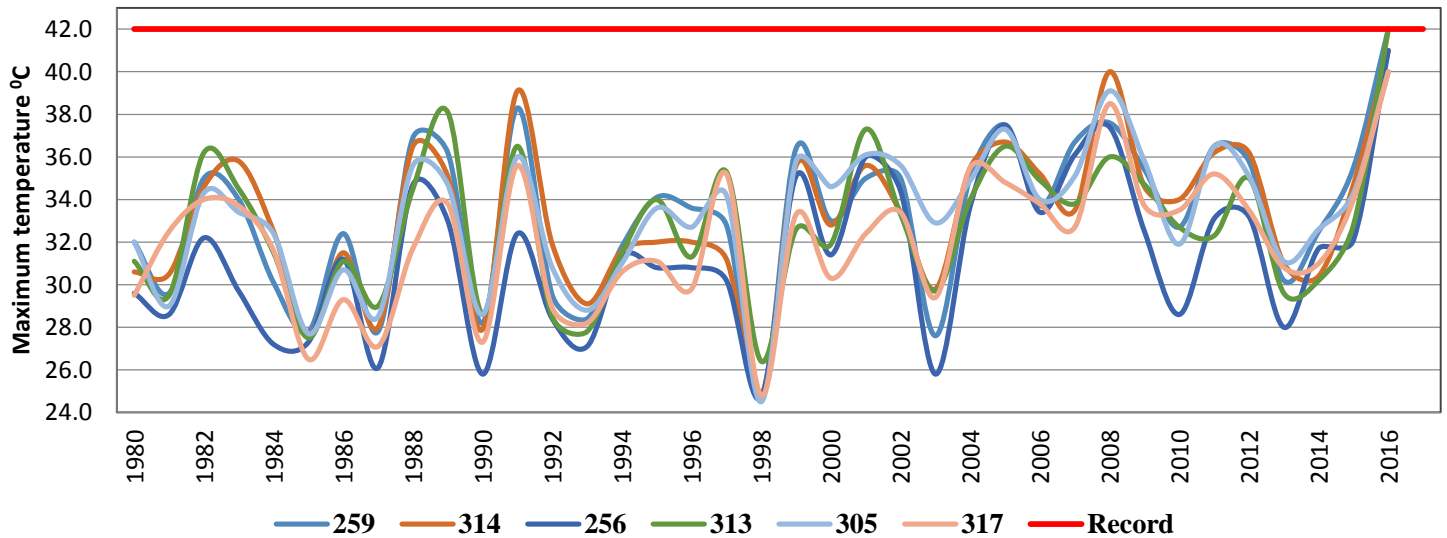
> Extreme weather events in 2016

Heat wave – 1 to 4th of August in eastern part of Mongolia



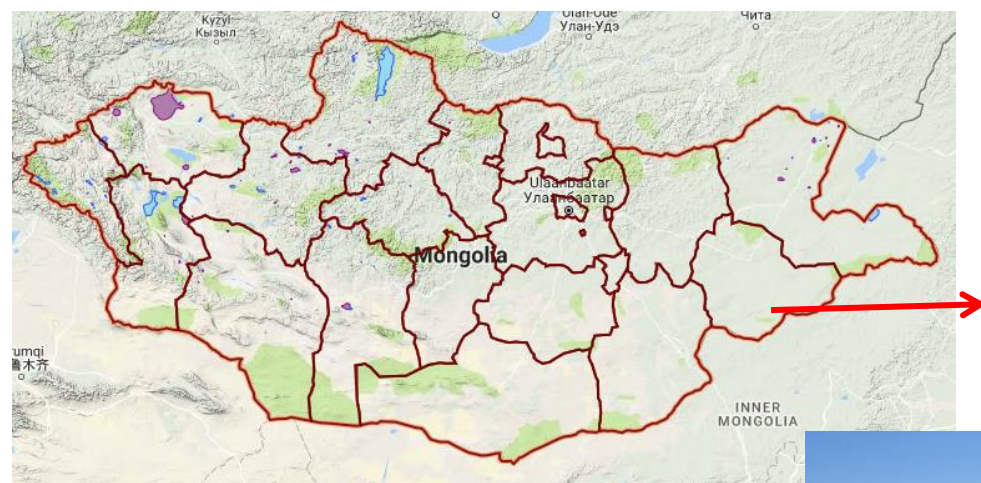
Maximum

Time series of Maximum temperature of August /1980-2016/



> Special extreme events in 2016

Ganga nuur



Before



August 2016



October 2016

Winter severe condition Dzud in Mongolia

Winter severe condition - Dzud

In the instruction of identification of dzud and drought condition, adopted by the joint resolution 539/97/113, made in 1969 by Minister of Agriculture, chairman of Supreme Council of Agricultural Co-operative Union and chairman of General Department of Hydrology and Meteorology Service of Mongolia, dzud condition was defined as “dzud occurs in the unfavorable weather condition, namely, deep snowfall or extreme coldness damaging normal functioning of animal husbandry and eventually that condition leads to animal losses resulted from starvation. [Natsagdorj.L,]

There are different types of zud:

- *Tsagaan* (white) zud
- *Khar* (black) zud
- *Tumer* (iron) zud
- *Khuiten* (cold) zud
- *Khavsarsan* (combined) zud

[Chogsom.D, 1964]

Main factors of Dzud:

- *Temperature*
- *Precipitation*
- *Snow cover*
- *Summer condition*



Winter severe condition - Dzud



Monkey

1944 1956 1968 1980 1992 2004 2016

- 1944-1945 – dzud+drought
- 1956-1957 – dzud
- 1968-1969 – extremely below
- 1980-1981 – dzud /white/
- 1992-1993 – dzud /white/
- 2004-2005 – dzud /white/
- 2016-2017-???

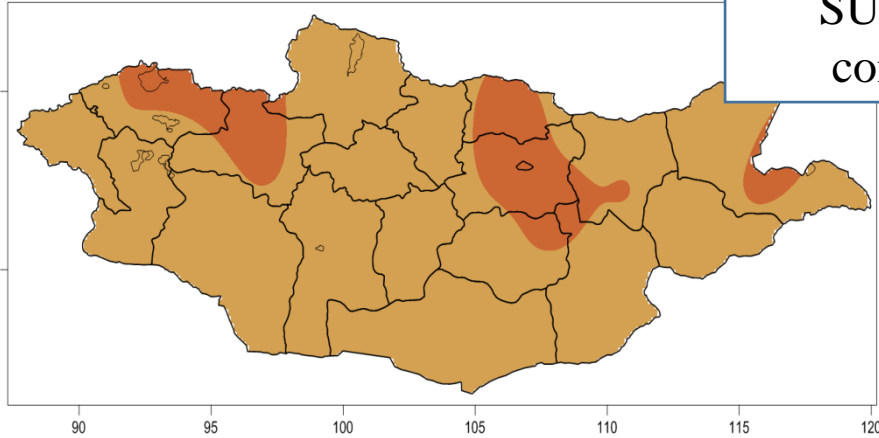
start	end	aimag	sum	Talbai	TminUp	TminLow	SnowHLow, cm	SnowHUp, cm	SnowNLow, g/cm3	SnowNUp, g/cm4	Z
1980.11.10	1981.3.20	6	51	20	-40	-46	11	27	0.20	0.40	
1981.11.20	1982.03.31	6	39		-40	-45	10	34	0.20	0.40	
1982.11.10	1983.03.20	11	54	20	-35	-47	10	21	0.20	0.40	
1983.10.31	1984.04.10	7	18	18	-35	-47	10	29	0.18	0.33	
1984.11.20	1985.03.31	8	39		-35	-40	10	20	0.20	0.30	
1986.10.31	1987.03.31	16	160	60	-35	-44	5	36	0.20	0.46	
1987.10.20	1988.04.10	14	76	30	-35	-47	5	35	0.20	0.42	
1990.11.10	1991.03.31	10	27	32	-30	-43	10	34	0.16	0.35	
1991.11.10	1992.03.31	2	11	4	-38	-43	15	30	0.24	0.32	
1992.11.10	1993.03.20	12	57		-40	-46	10	30			
1993	1994.03.20	7	21	10	-30	-40	15	30	0.24	0.32	
1994.11.10	1995.03.31	6	17	10	-30	-38	10	20	0.20	0.28	
1998.11.20	1999.03.31	12	37	14			10	33	0.16	0.37	
1999.11.30	2000.03.20	14	58	15	-40	-50	10	46	0.16	0.37	
2000.10.30	2001.03.20	17	98		-40	-51					



Monkey

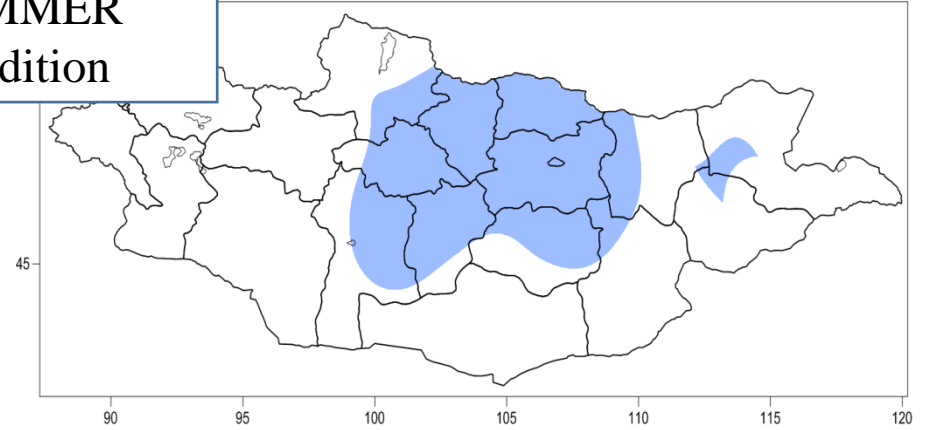
1944 1956 1968 1980 1992 2004 2016

Summer precipitation anomaly of 1944

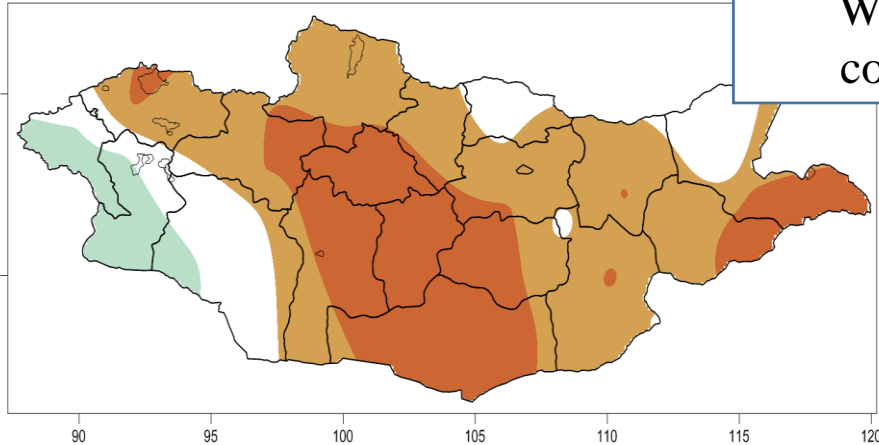


SUMMER
condition

Summer temperature anomaly of 1944

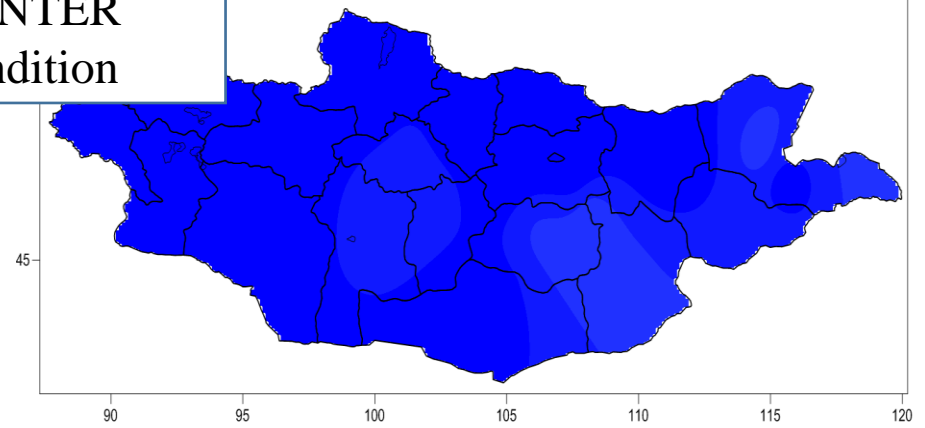


Winter precipitation anomaly of 1944-1945



WINTER
condition

Winter temperature anomaly of 1944-1945



In 1944 all climatic events such as dry summer, the snow cover of 15-28 sm that started from November, cold temperature lower than the average by 5.9-11.40C, and high wind lead to loss of 7.5 million animals which is the 31.7 percent of total [Natsagdorj.L, 2000].



Winter severe condition - Dzud

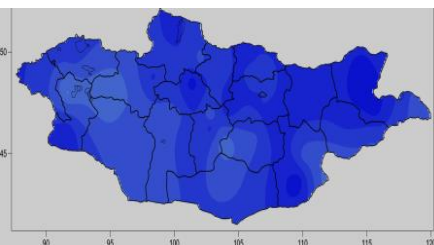
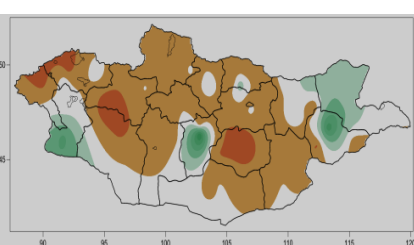
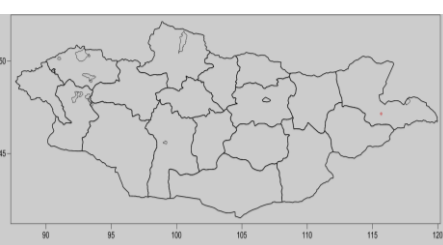
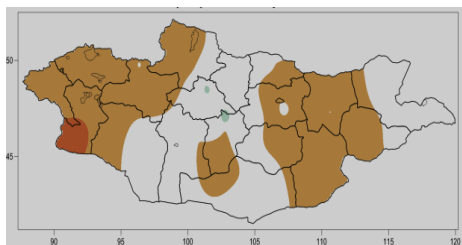
SUMMER - precipitation

SUMMER - temperature

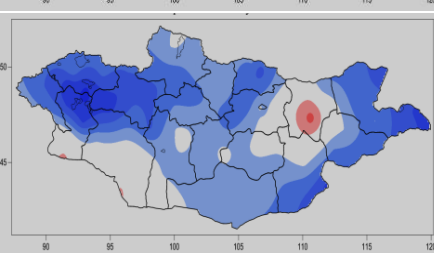
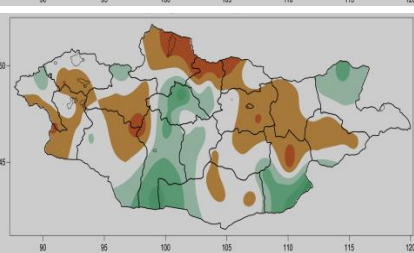
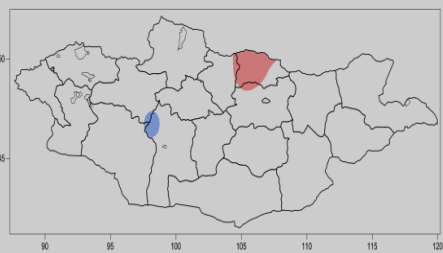
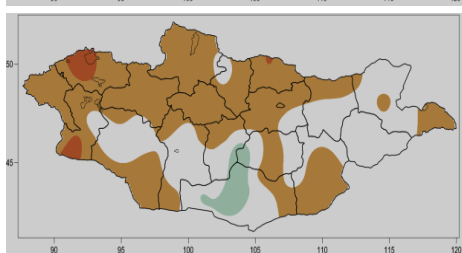
WINTER - precipitation

WINTER - temperature

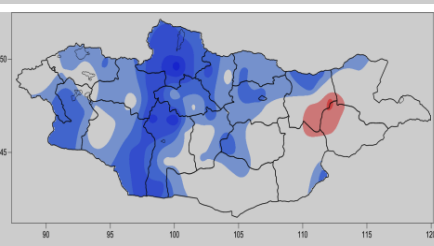
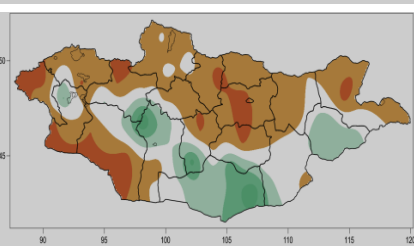
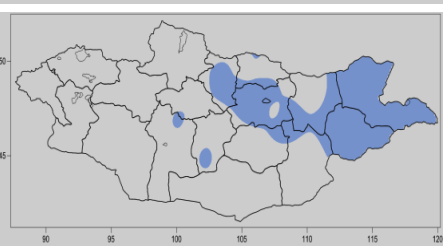
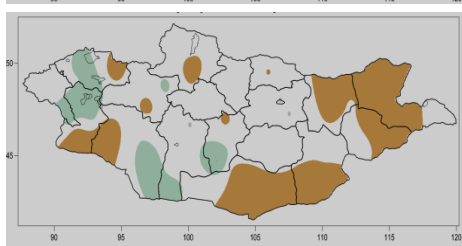
1968



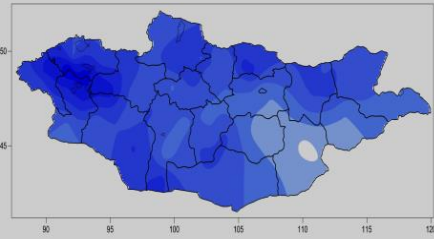
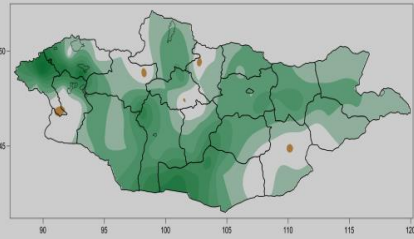
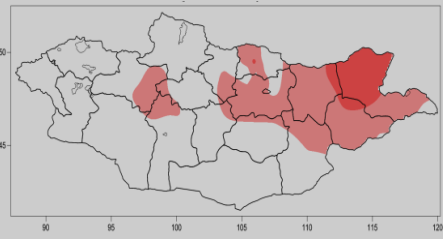
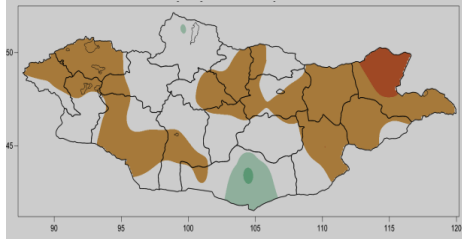
1980



1992



2004



Below normal precipitation

Above normal precipitation

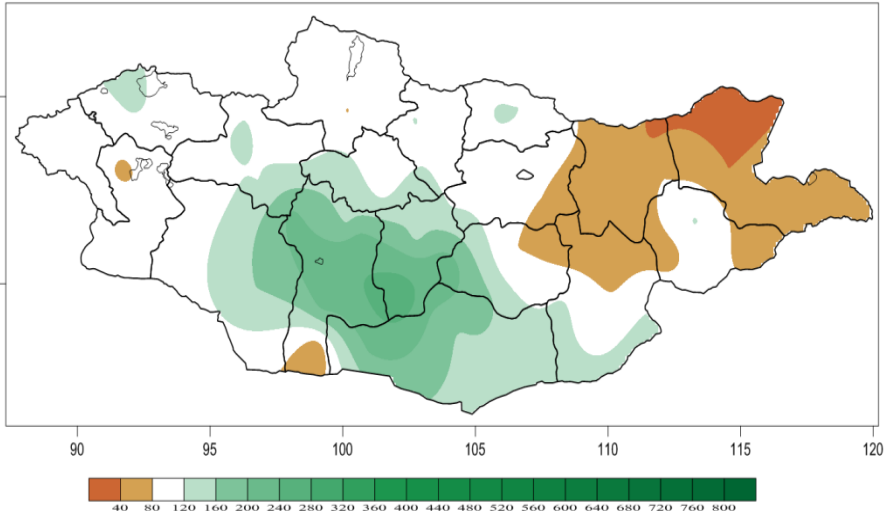
Below normal Temperature

Above normal Temperature

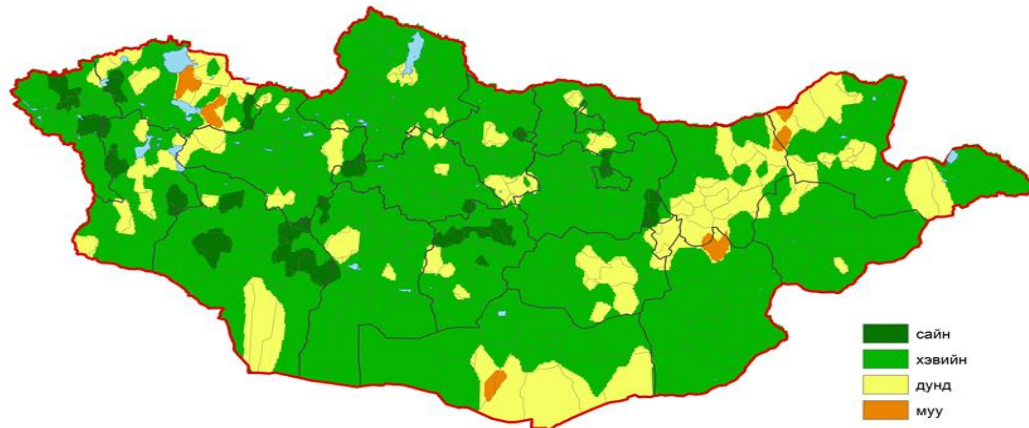
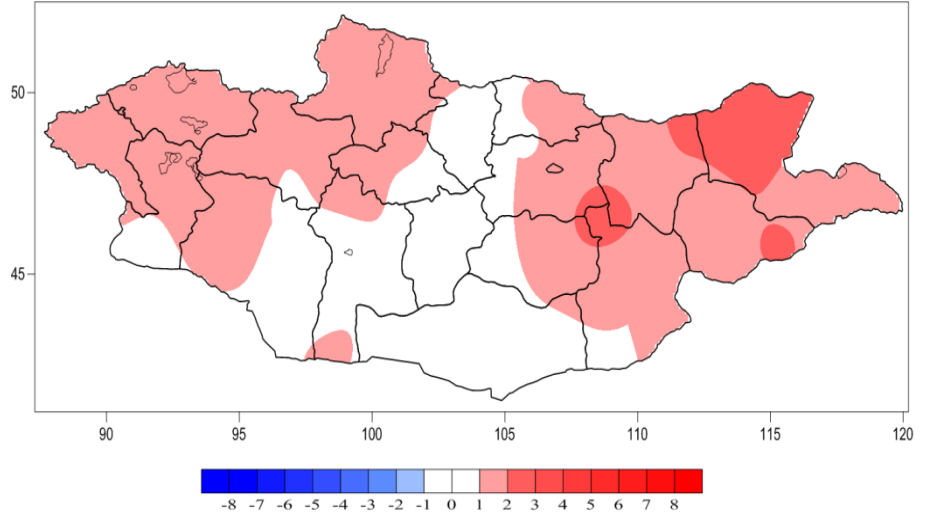


Winter severe condition - Dzud

Summer precipitation anomaly of 2016



Summer temperature anomaly of 2016



Summer condition /2016.07.31/

Last summer condition, which is one of the main factors of the dzud was above normal over whole country, it is suggesting that winter condition could be better.



Thank you for your attention

> Asian Zodiac

	Snake	1941 1953 1965 1977 1989 2001 2013
	Horse	1942 1954 1966 1978 1990 2002 2014
	Goat	1943 1955 1967 1979 1991 2003 2015
	Monkey	1944 1956 1968 1980 1992 2004 2016
	Rooster	1945 1957 1969 1981 1993 2005 2017
	Dog	1946 1958 1970 1982 1994 2006 2018
	Pig	1947 1959 1971 1983 1995 2007 2019
	Rat	1948 1960 1972 1984 1996 2008 2020
	Ox	1949 1961 1973 1985 1997 2009 2021
	Tiger	1950 1962 1974 1986 1998 2010 2022
	Rabbit	1951 1963 1975 1987 1999 2011 2023
	Dragon	1952 1964 1976 1988 2000 2012 2024