

Review of major high impact climate events over China in 2018

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Outline

1

Climate Characteristics



2

Rainy Season Process

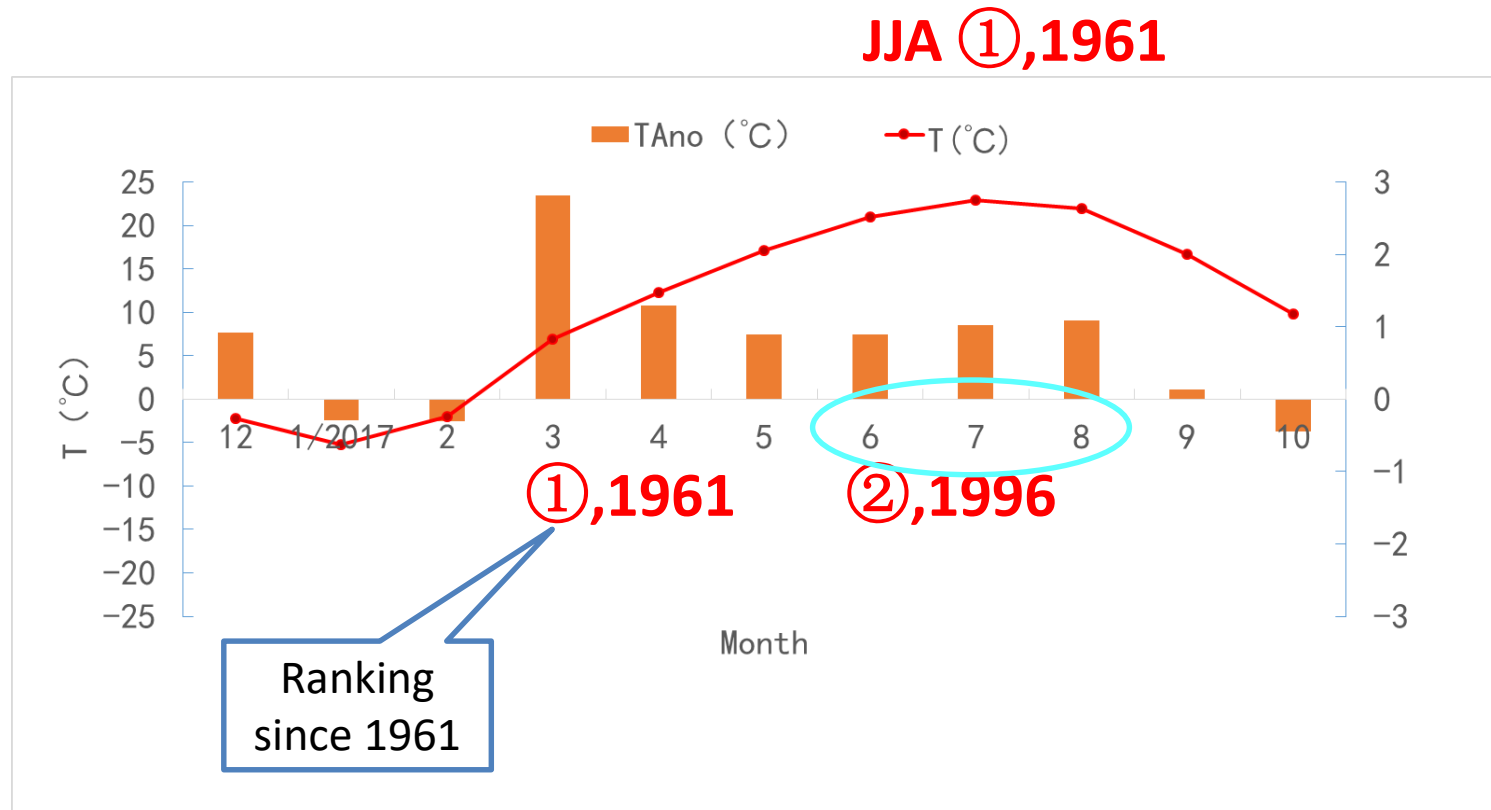
3

Major high impact events

4

Outlook

Warm: the most remarkable climate characteristic

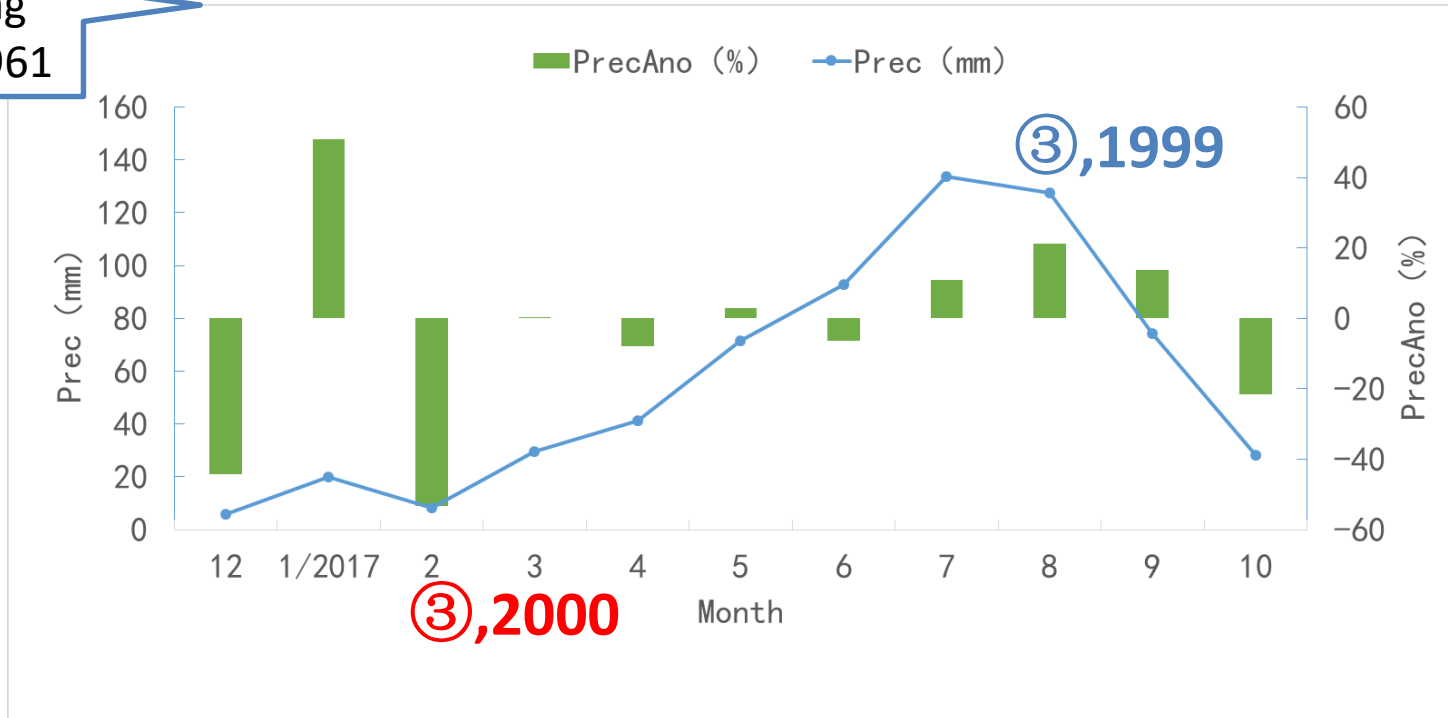


Monthly mean temperature and its anomalies over China during Dec 2017 to Oct 2018

- **The summer-mean temperature over China was 21.9°C, which was 1.0°C higher than climatology (1981-2010) and ranked first among mean temperature since 1961.**

Precipitation: temporal uneven

Ranking
since 1961

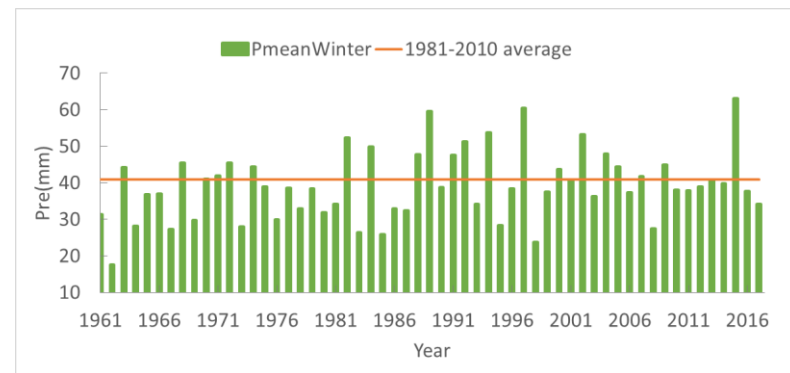
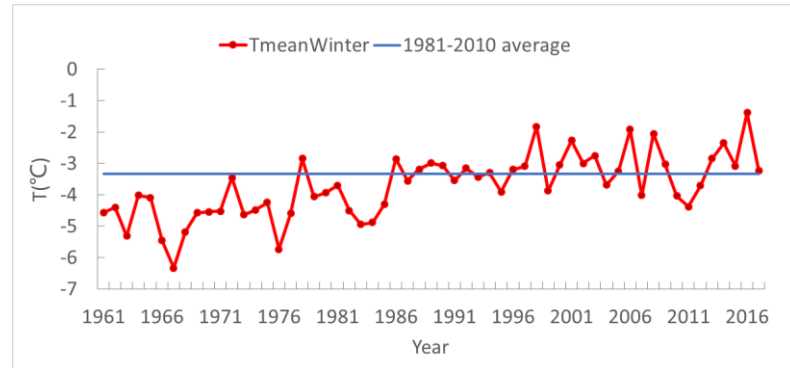


Monthly mean precipitation and its anomalies over China during Dec 2017 to Oct 2018

- Although it was dry in last winter generally , the precipitation in Jan was more than normal.
- In Jan, there were 3 large-scale snow and freezing rain processes in China, which were only inferior to those in 2008.

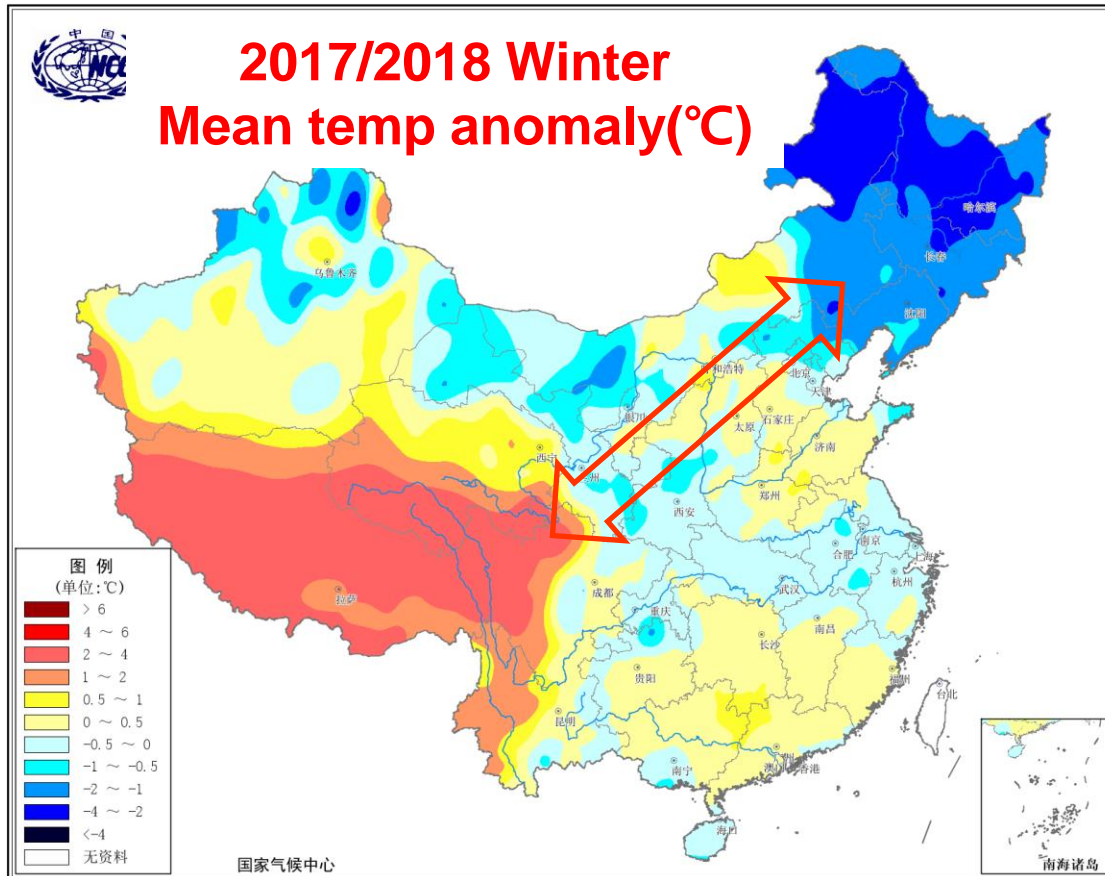
2017/2018 Winter: warm and dry

| Season | Temp | Pre |
|---------------|------|--------|
| Winter | warm | dry |
| Spring | warm | normal |
| Summer | warm | wet |
| Sep. and Oct. | cold | dry |

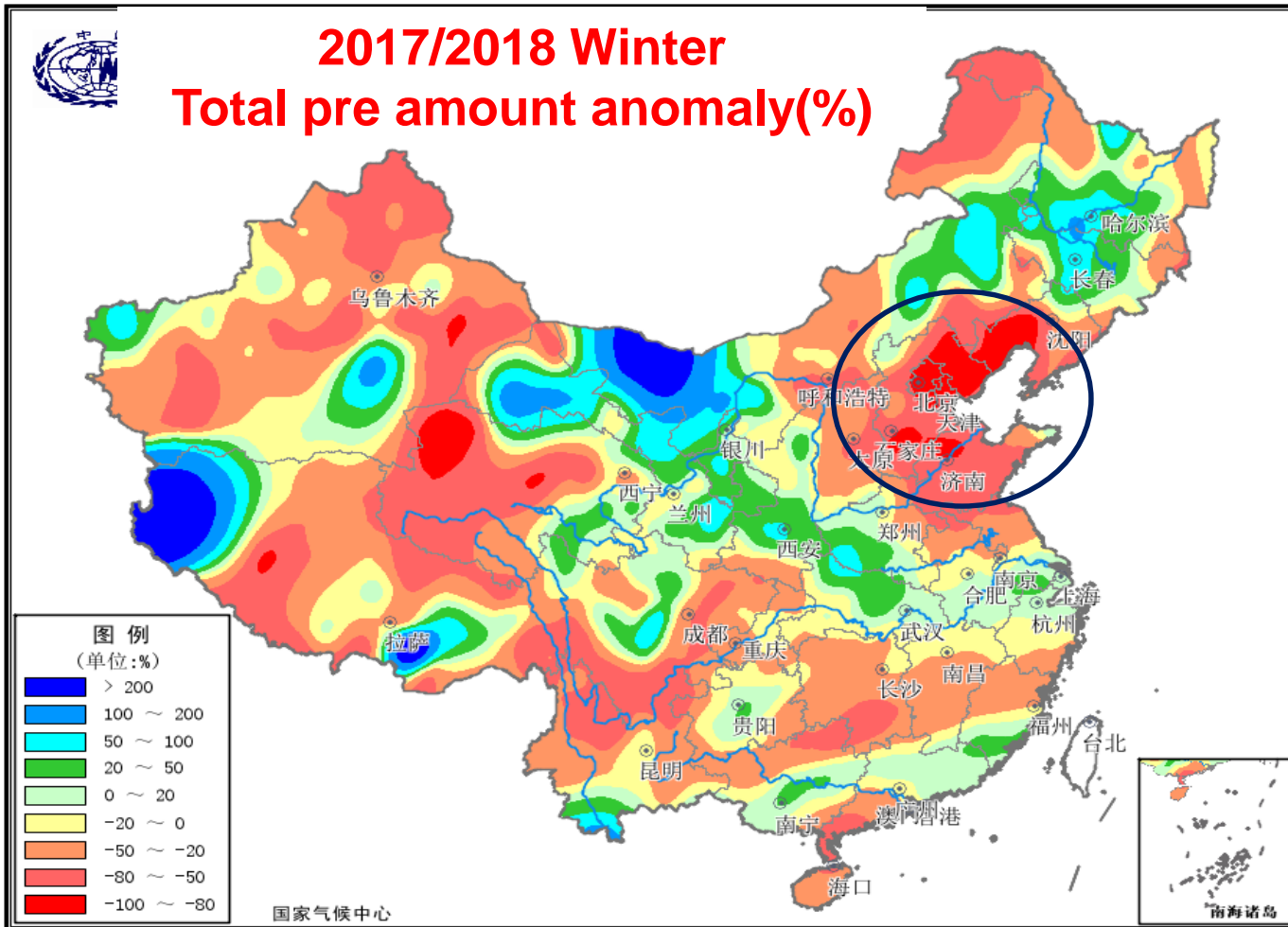


Winter mean temperature and precipitation over Mainland China 1961 to 2016

- This year, we started with a warm and dry winter.
- The anomaly of temperature over China was 0.2°C in winter of 2017/18 and the precipitation was 17.7% less than normal which was the least since 2009.



- Most part of China was nearly normal ($-0.5\text{ }^{\circ}\text{C}\sim 0.5\text{ }^{\circ}\text{C}$).
- The positive anomalies (warmer than $2\text{ }^{\circ}\text{C}$) were located in Southwest China and the negative anomalies (colder than $2\text{ }^{\circ}\text{C}$) were located in Northeast China.



In winter, there was lack of precipitation over most area of China. Especially in North China, the percentage of precipitation anomalies was lower than -80%.

Beijing no rain 145days Oct 23,2017- Mar 16,2018



Imperial Palace



Great Wall

Outline

1 Climate Characteristics

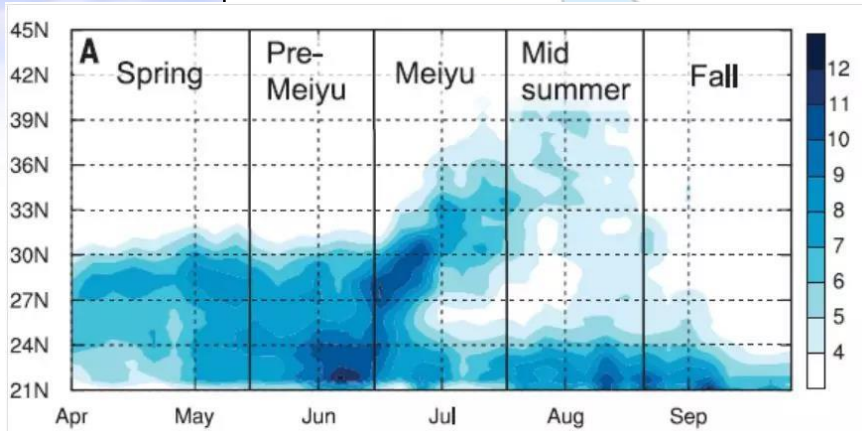
2 Rainy Season Process



3 Major high impact events

4 Outlook

Major Rainy Season Process



110° -120° E

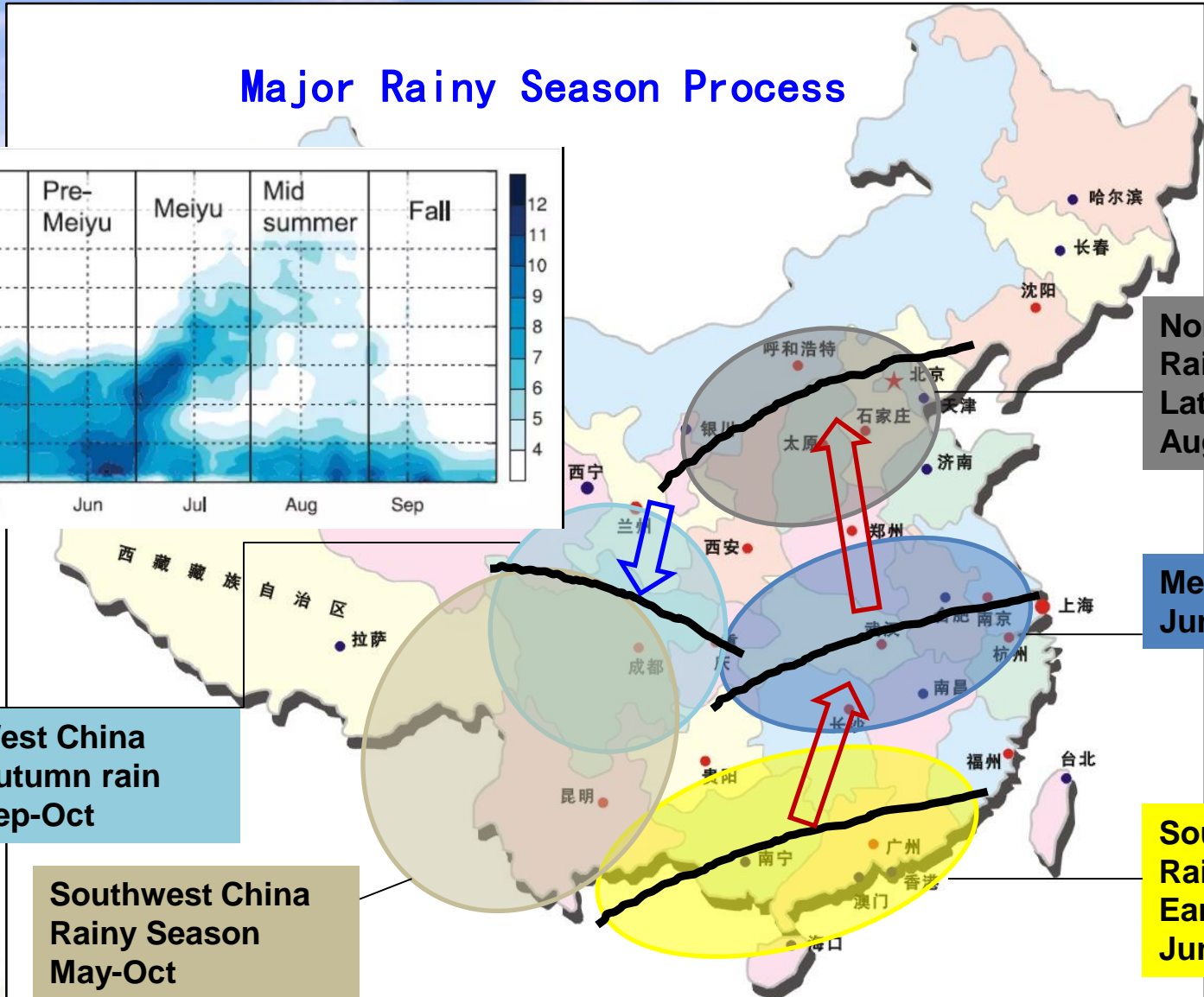
West China
Autumn rain
Sep-Oct

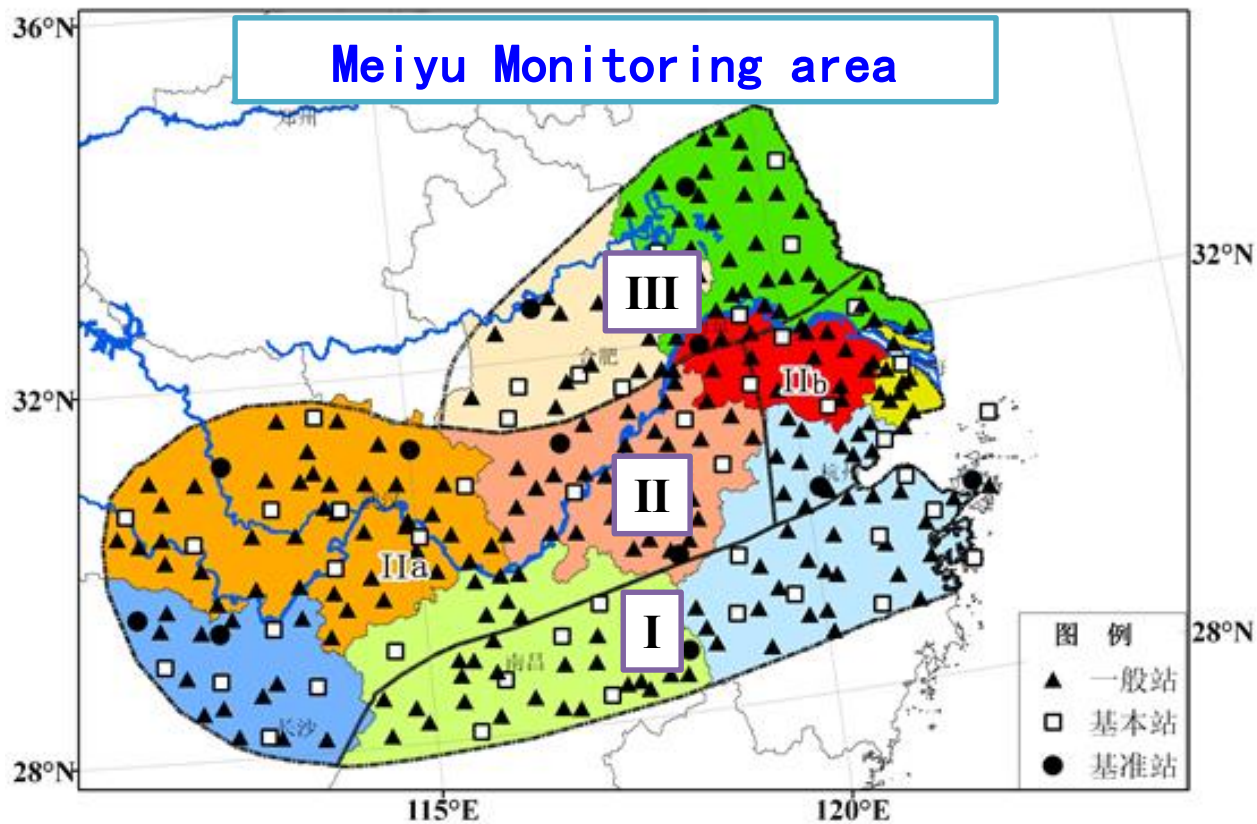
Southwest China
Rainy Season
May-Oct

North China
Rainy season
Late Jul-mid
Aug

Meiyu Season
Jun-mid Jul

South China
Rainy season
Early Apr-Late
Jun





| Region | I | II | III |
|-------------------------|-----------------------|-----------------------|-----------------------|
| Start (anomalies) | June 19 th | June 22 nd | June 28 th |
| | 11 d later | 7d later | 7d later |
| End (anomalies) | July 13 rd | July 13 rd | July 10 th |
| | 5d later | 1 d earlier | 5d earlier |
| Duration (anomalies) | 25d | 22d | 13d |
| | 6d shorter | 8d shorter | 12d shorter |
| Amount ANO | - | - | - |

Other Rainy Season information in 2018

| Region | South China | North China | West China |
|---------------------------------|------------------------|------------------------|-----------------------|
| Start (anomalies) | April 21 st | July 9 th | Sep. 10 th |
| | 15 d later | 9 d earlier | 1d later |
| End (anomalies) | June 30 th | August 7 th | Still in progress |
| | 4 d earlier | 11 d earlier | |
| Duration (anomalies) | 71d | 30d | |
| | 19d shorter | 2d shorter | |
| Amount ANO | 19% | 22% | |

Outline

1 Climate Characteristics

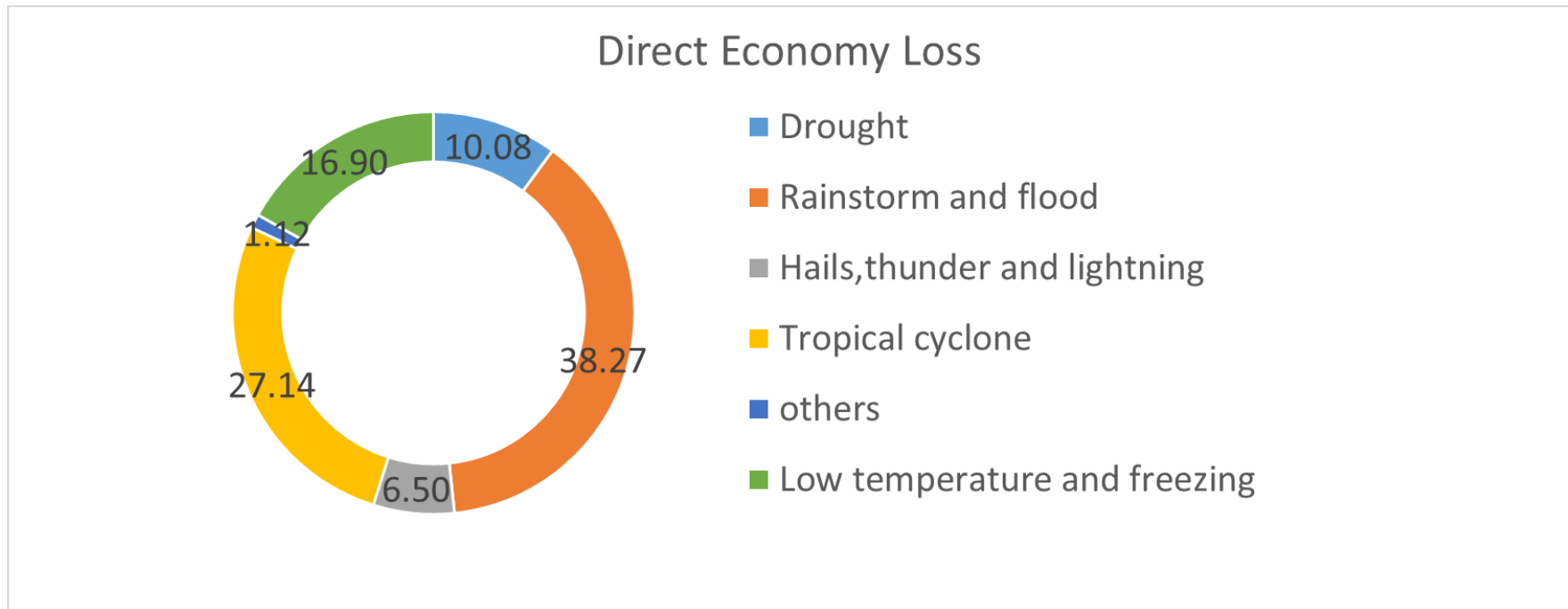
2 Rainy Season Process

3 Major high impact events



4 Outlook

Direct Economy Loss (%) in China Jan-Oct, 2018



- Of the various types of weather- and climate-related disasters, the direct economic losses caused by Rainstorm and flood account for **38.3 %** of the total loss.

Major high impact events and features

- Heat Wave

- ✓ North China start pretty early ;Wide range, long persistent

- Rainstorm and flooding

- ✓ Rain belt lay much north than normal

- Typhoons

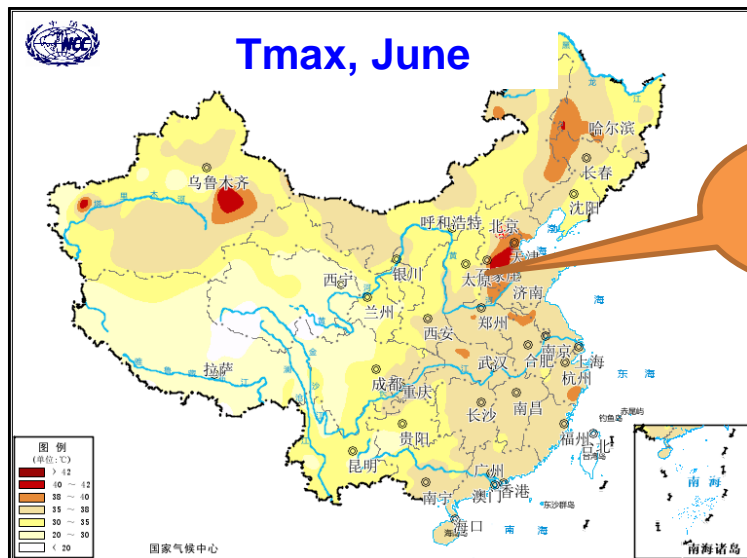
- ✓ Generated and landed more than normal; Landing position northward

- Low temperature and freezing

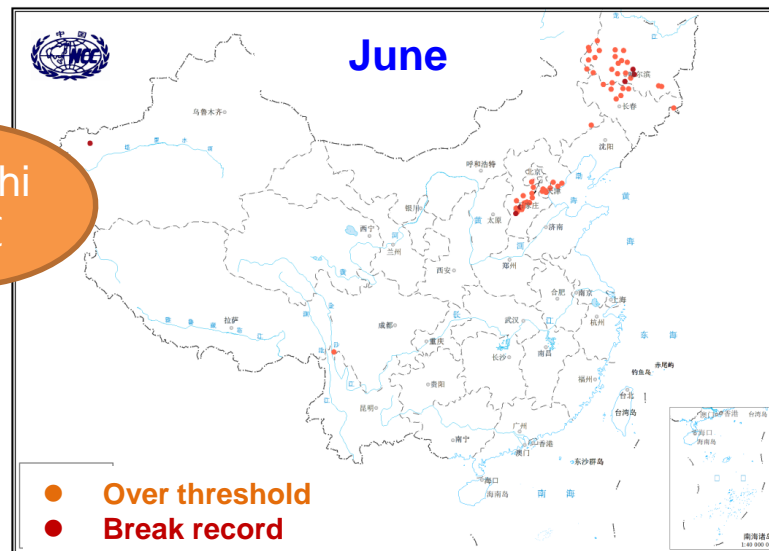
- ✓ Concentrated, suffer severe loss

Heat Wave:

1. North China Start Pretty Early

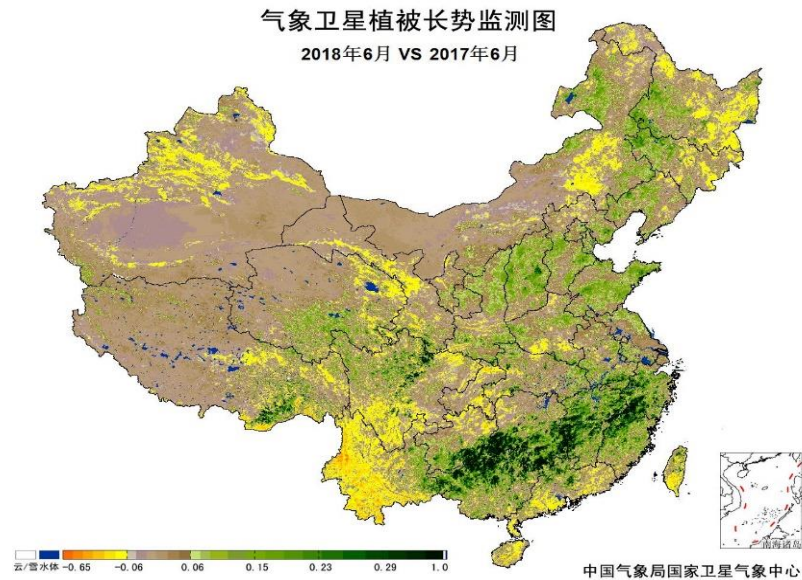


Yuanshi
43 °C



- In June, heat wave affected north part of China. Temperatures in most parts of the Beijing-Tianjin-Hebei area topped 35 °C from June 20th to 28th.
- 15 observation stations in the area recorded highs of over 40 °C .
- 58 stations had meet the extreme heat wave event standards and 5 stations broken their Tmax records.

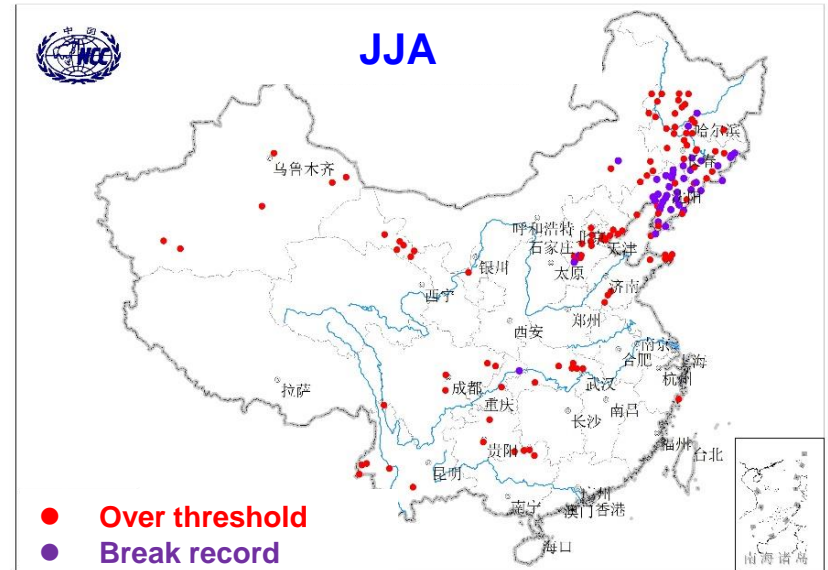
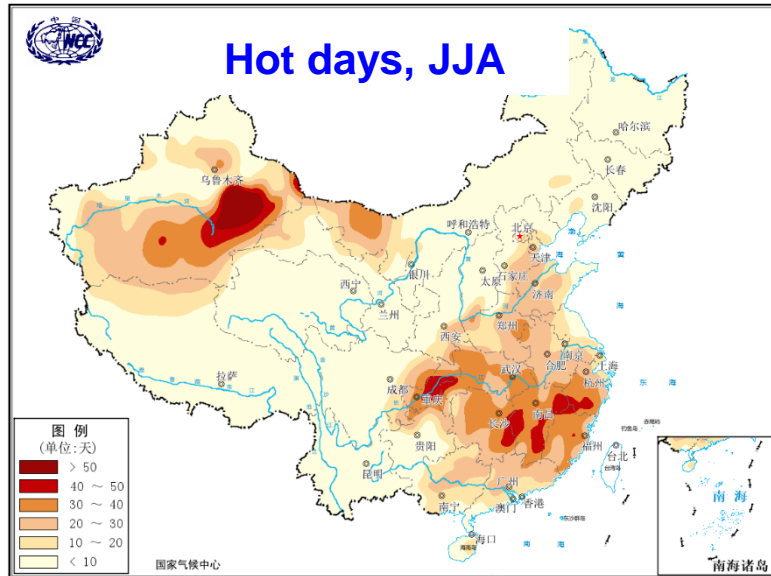
Heat Wave: Vegetation cover in June, 2018 vs 2017



- Many parts of China have experienced temperature rises in June, particularly in the Inner Mongolia region and the central and eastern parts of North China. Increases even reached 2 to 4 °C year-on-year in some areas.
- The heat wave that hit Inner Mongolia and parts of North China was caused by a strong continental high pressure system, which tends to linger.
- Because of the hot and dry weather conditions, grasslands in Inner Mongolia have been suffering. About 40 percent of the region's grasslands have been damaged.

Heat Wave:

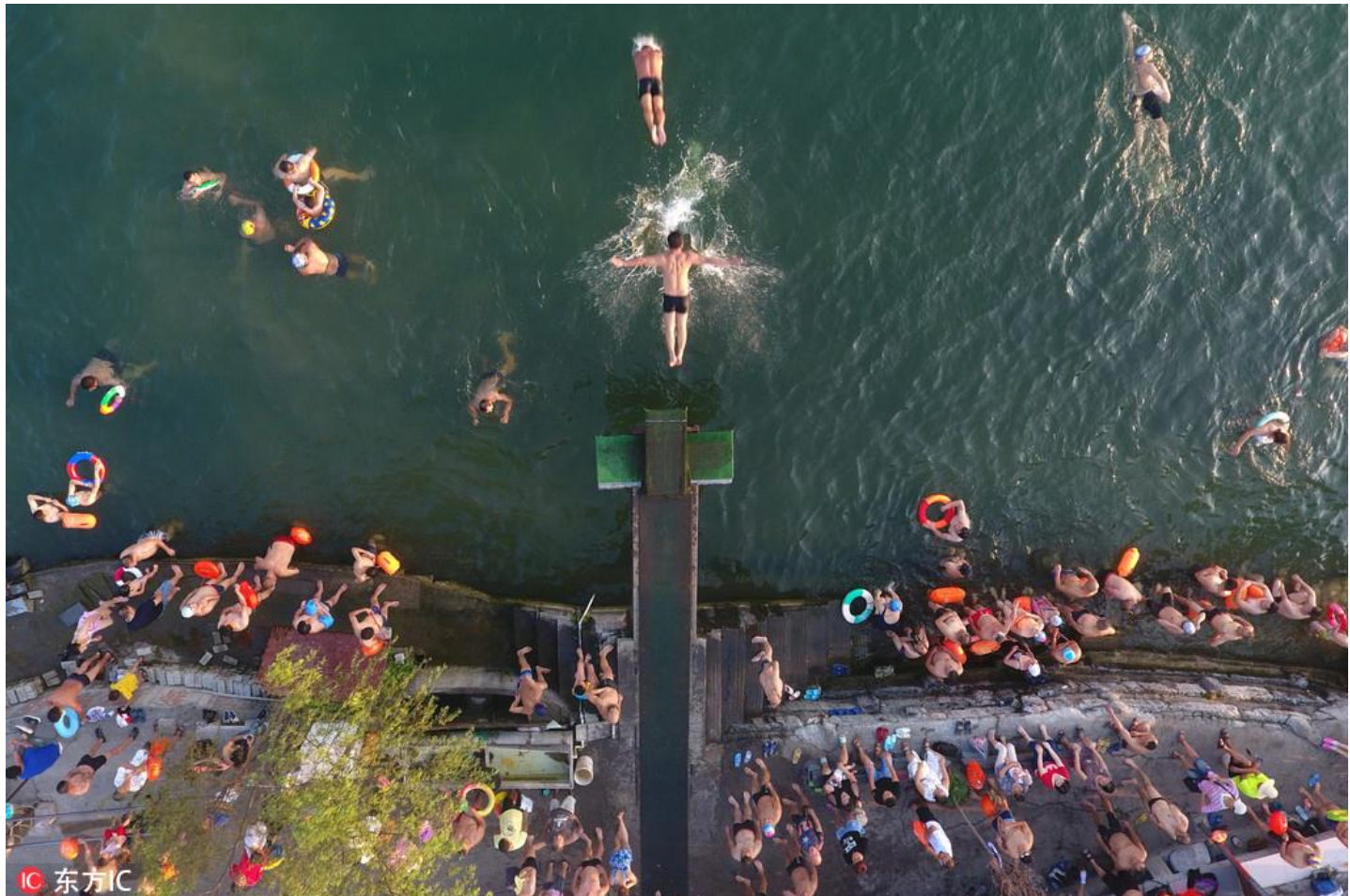
2. Wide range, long persistent



- In summer, heat wave affected vast areas of central and southern China, including Chongqing, Hunan and Fujian, in which hot days exceed 40.
- 148 stations had met the extreme heat wave event standards and 41 stations broken their Tmax records. Most of these stations located in NE China.
- CMA issued a high temperature warning for 33 consecutive days.

Heat Wave:

Local residents dive into a river to escape summer heat wave in Xiangyang city on Aug 7, 2018



Heat Wave: Shenyang, capital of Northeast China's Liaoning province on July 30, 2018



© 视觉中国



Growth in sales of air-conditioners 2018 VS 2017

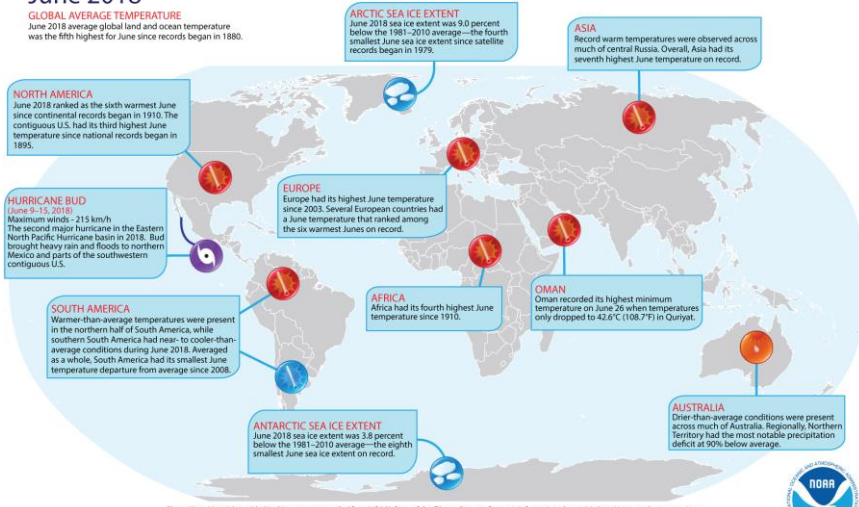


- Sales of air-conditioners skyrocket as heat wave grips Northeast China
- Sharp rise in demand for air-conditioners
- Shortage of installers

One world, one word: HOT!!!

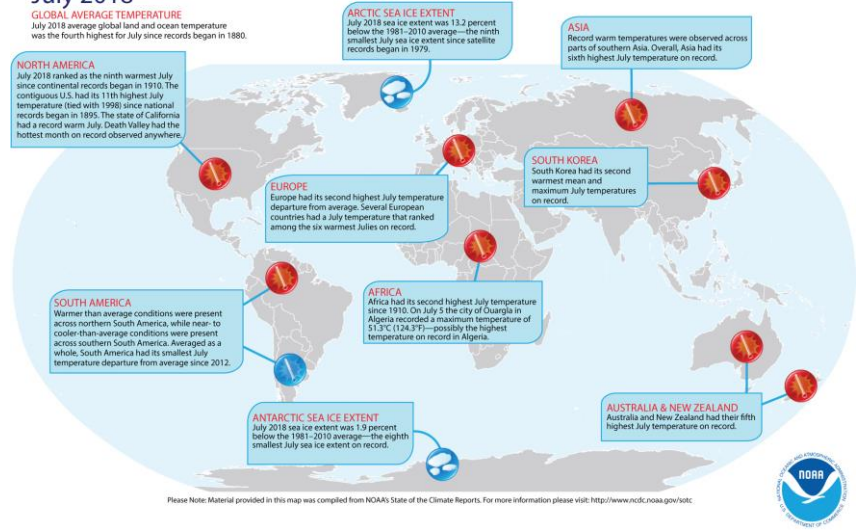
Selected Significant Climate Anomalies and Events June 2018

GLOBAL AVERAGE TEMPERATURE
June 2018 average global land and ocean temperature was the fifth highest for June since records began in 1880.



Selected Significant Climate Anomalies and Events July 2018

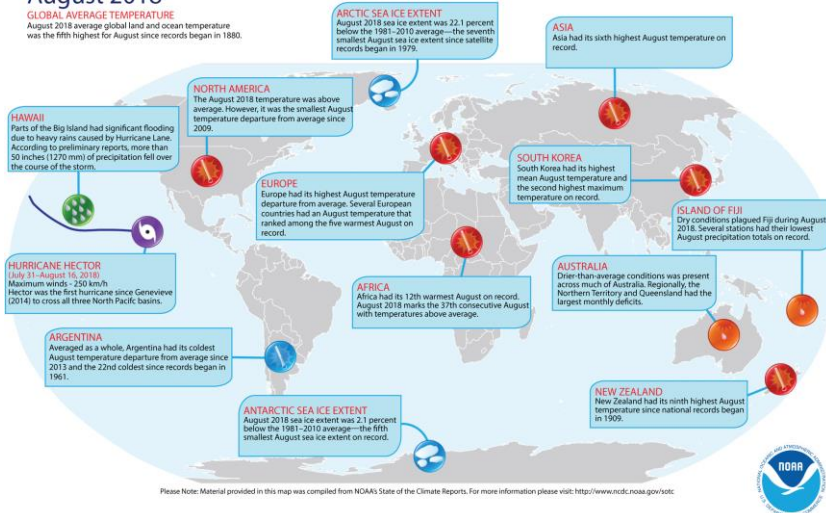
GLOBAL AVERAGE TEMPERATURE
July 2018 average global land and ocean temperature was the fourth highest for July since records began in 1880.



Please Note: Material provided in this map was compiled from NOAA's State of the Climate Reports. For more information please visit: <http://www.ncei.noaa.gov/state>

Selected Significant Climate Anomalies and Events August 2018

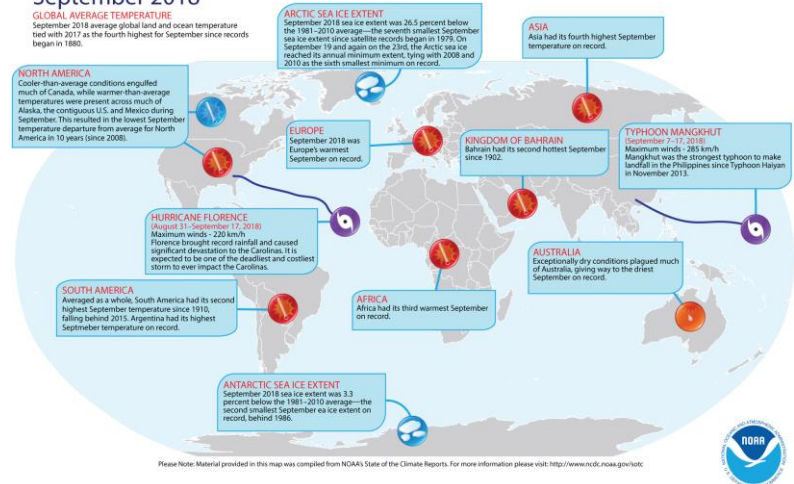
GLOBAL AVERAGE TEMPERATURE
August 2018 average global land and ocean temperature was the fifth highest for August since records began in 1880.



Please Note: Material provided in this map was compiled from NOAA's State of the Climate Reports. For more information please visit: <http://www.ncei.noaa.gov/state>

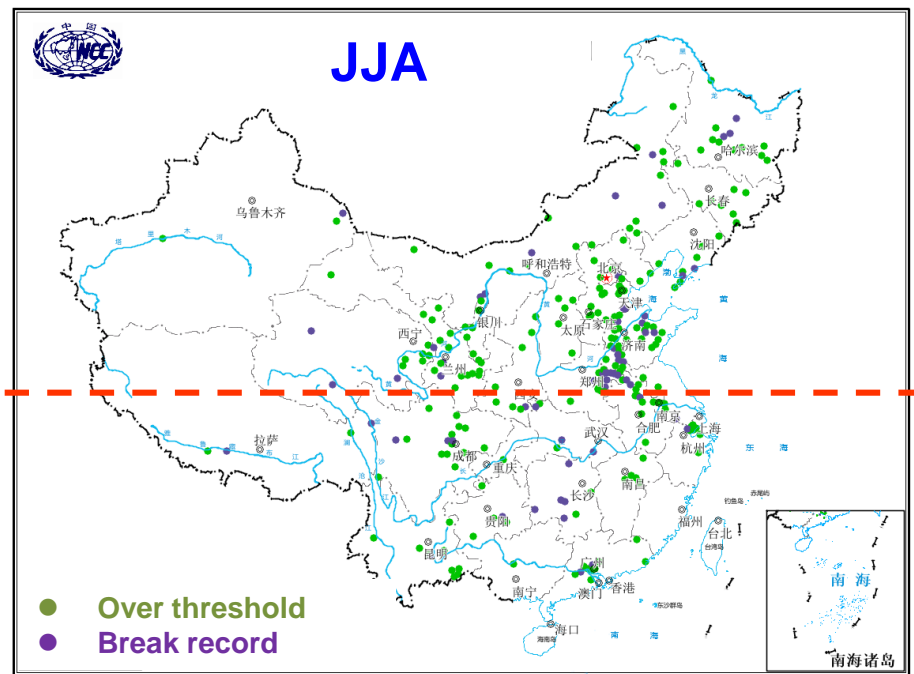
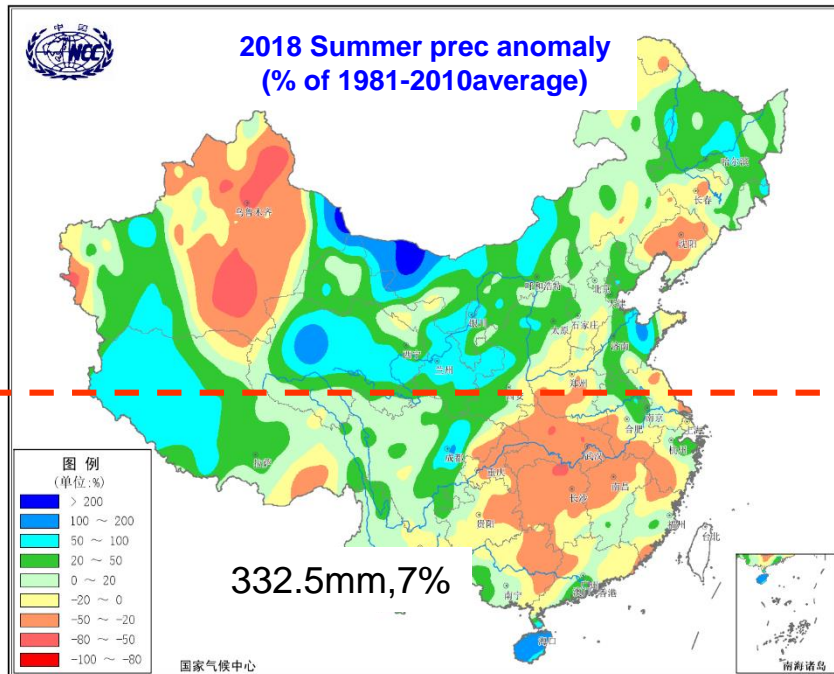
Selected Significant Climate Anomalies and Events September 2018

GLOBAL AVERAGE TEMPERATURE
September 2018 average global land and ocean temperature was the fourth highest for September since records began in 1880.



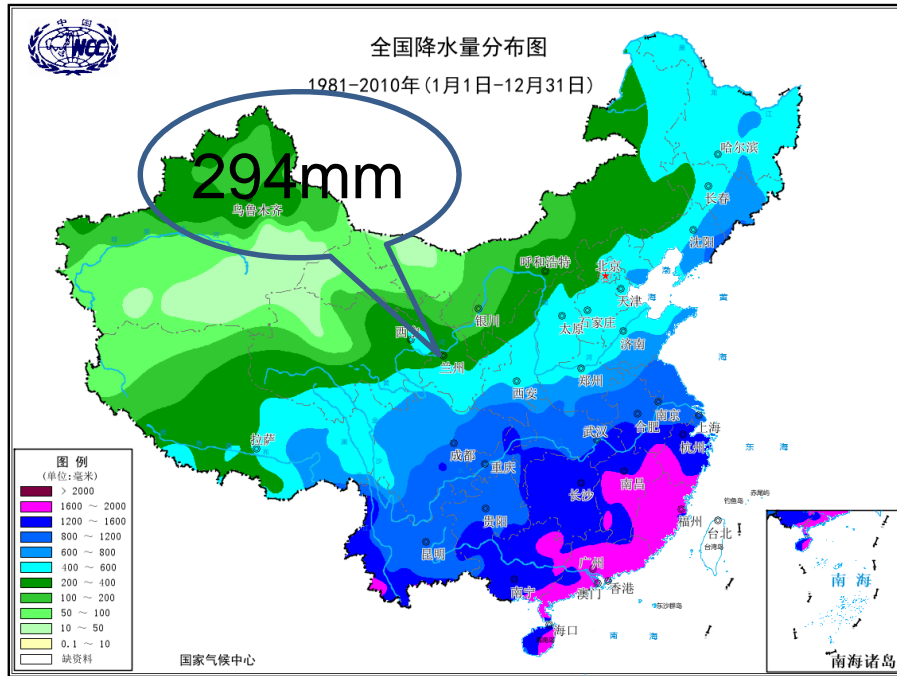
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Rainstorm and flooding: Rain belt lay much north than normal



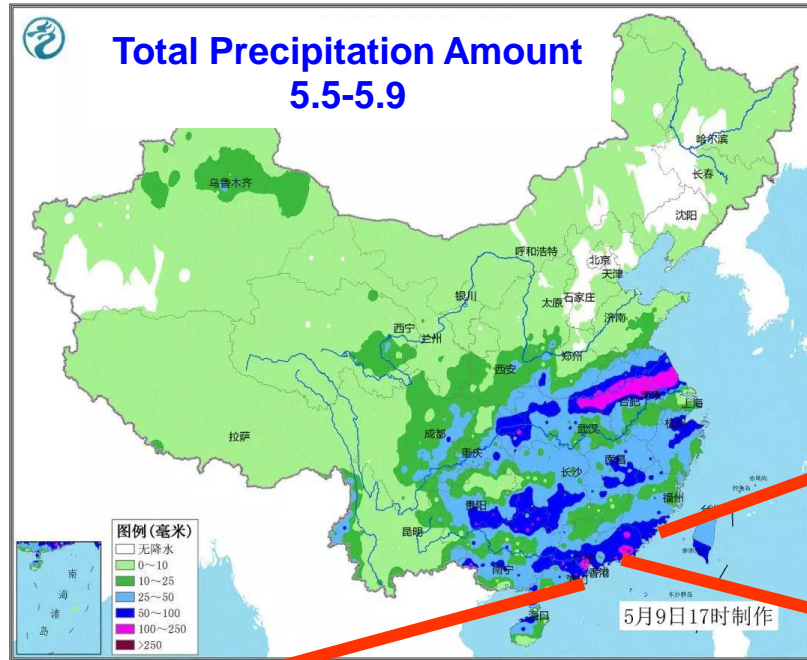
- In 2018, the rain belt lay much north than normal during the flood season(JJA).
- 269 stations had meet the extreme rainfall event standards and 61 stations broken their records. Most of these stations located in North China.
- From JAN to OCT, the direct economic losses caused by rainstorm exceeding 98.35 billion Yuan, 373 people of dead or missing, which were less than that of 2017.

Rainstorm and flooding: North China



- The water level and discharge around the Yellow River remains high due to the rainstorm in Lanzhou.

Rainstorm and flooding: South China



Xiamen
P(in an hour) 107.5mm
P(in one day) 320.5mm



Zhuhai, P(in an hour) > 80mm

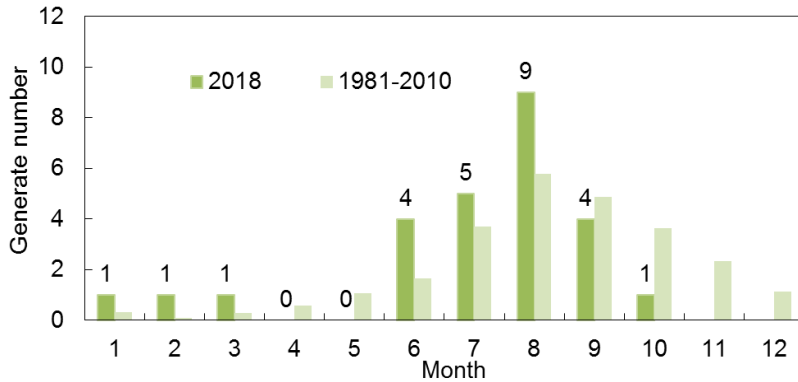


Guangzhou, P(in an hour) > 100mm

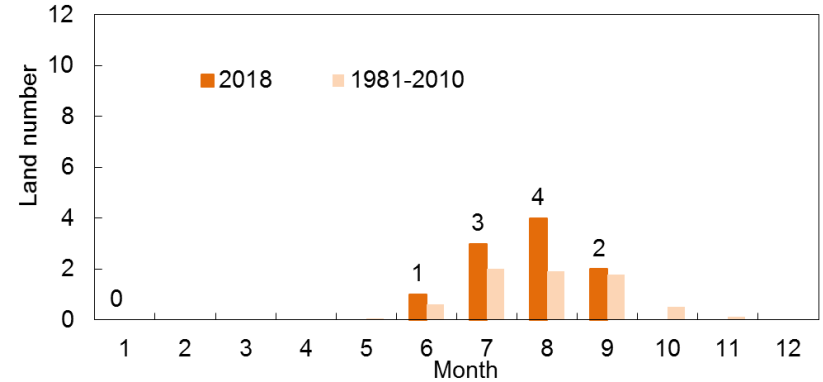
Tropical cyclones:

1. Generated and landed more than normal

- Generated 26 (22)



- Landed 10(7)



Waves crash against the shoreline of Wenling as super typhoon **Maria** approaches.

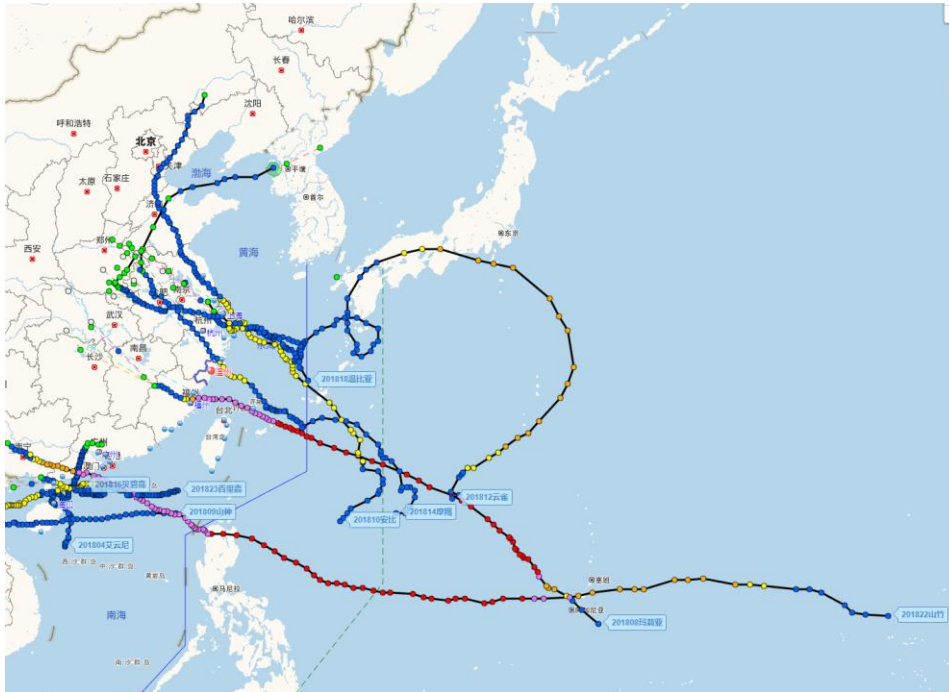


locals ride motorbikes on flooded street in heavy rain caused by typhoon **Ewinar**.

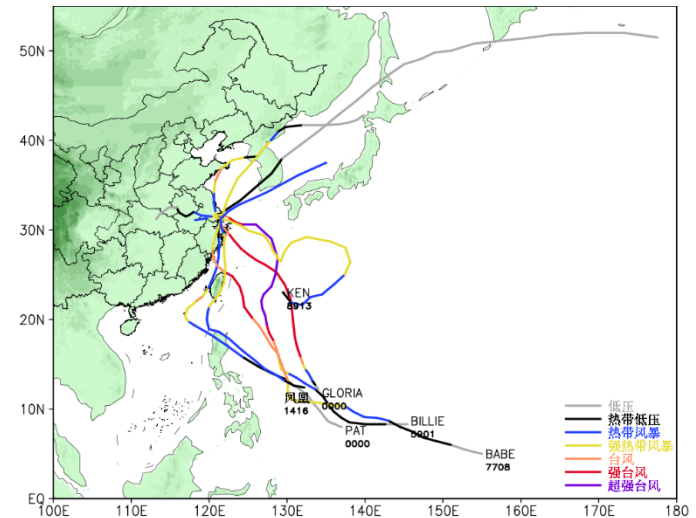


Waves pound the Hong Kong as Typhoon **Mangkhut** made landfall.

Tropical cyclones: 2.Landing position northward



3 typhoons made landfall over the coast of Shanghai in 2018

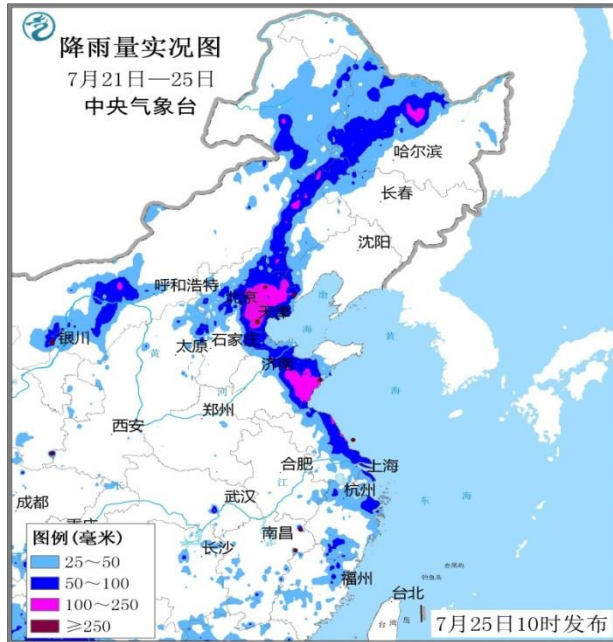


6 typhoons made landfall over the coast of Shanghai in 1949-2017

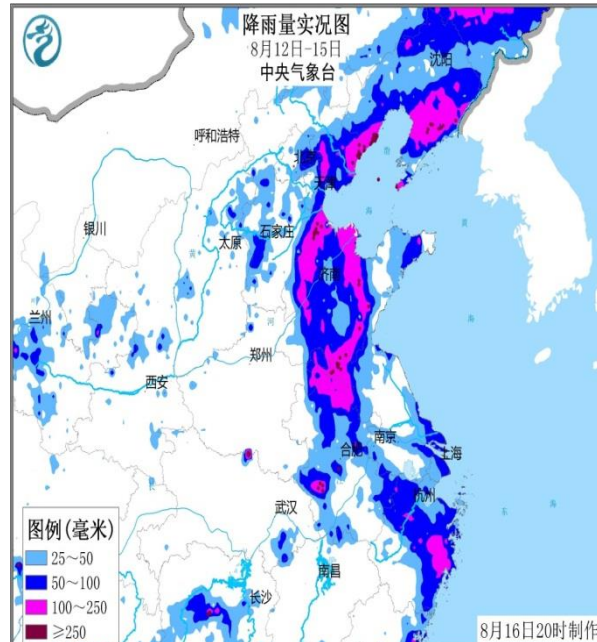
Tropical cyclones:

3. Tend to move northward after landing

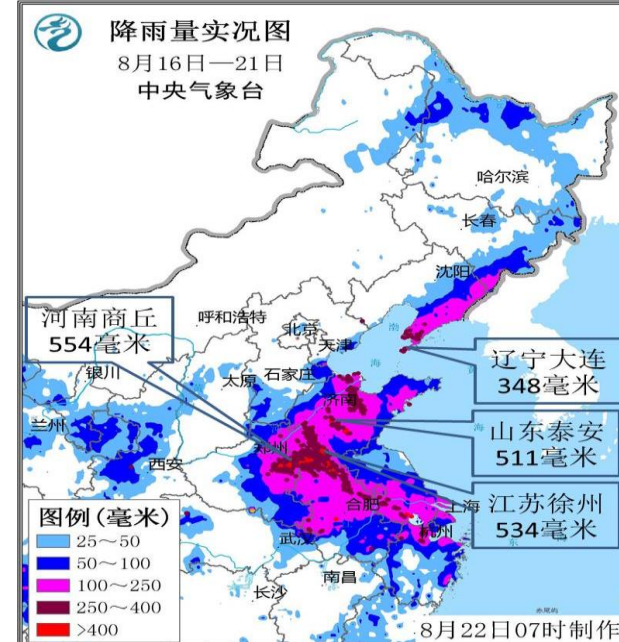
Total Precipitation Amount



AMPIL (Jul., 21-25)



YAGI (Aug. 12-15)

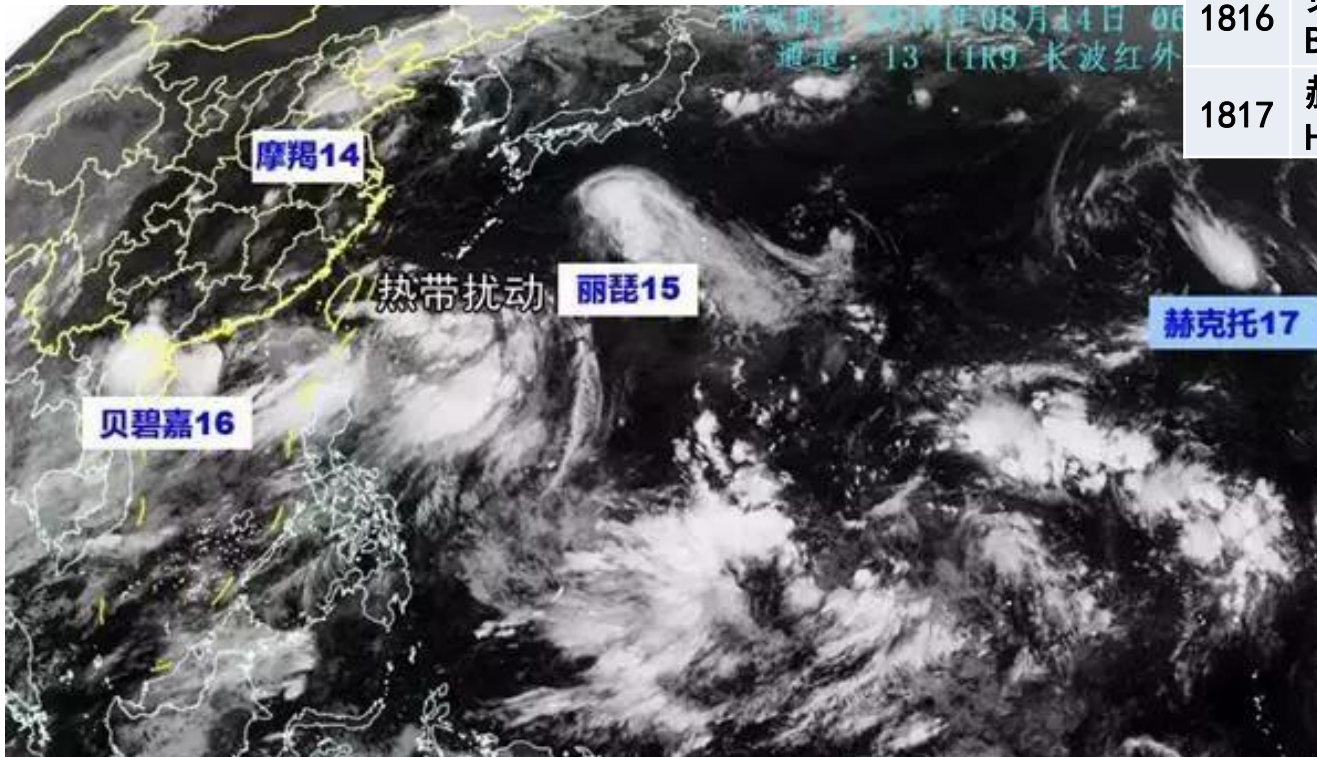


RUMBIA (Aug. 16-21)

Tropical cyclones:

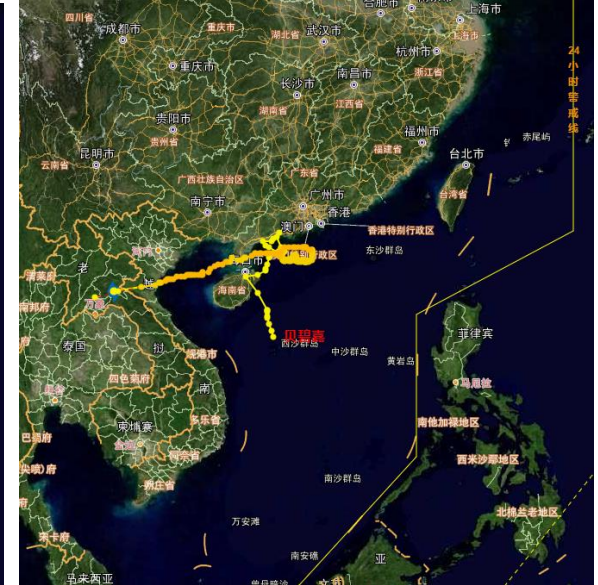
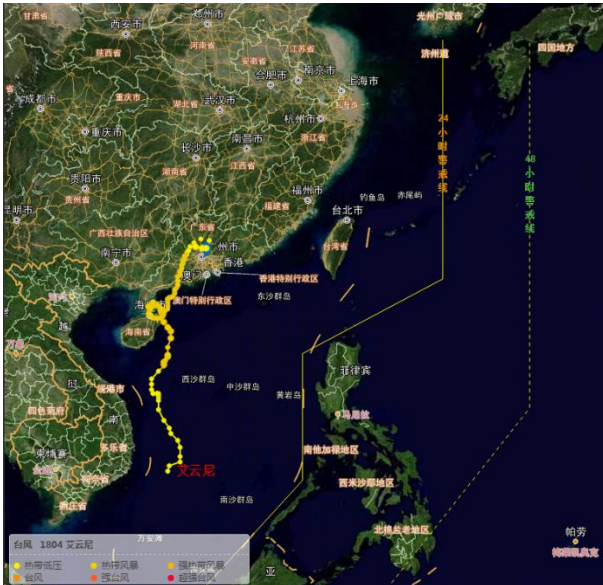
4. Generated in very close time, 4 cyclones in one week

| | | |
|------|----------------|-----------------------|
| 1814 | 摩羯 YAGI | Aug. 8 th |
| 1815 | 丽琵 LEEPI | Aug. 11 st |
| 1816 | 贝碧嘉 BEBINCA | Aug. 12 nd |
| 1817 | 赫克托 HECTOR | Aug. 14 nd |



Tropical cyclones:

5.Track strange and complex



1804 EWINIAR

- Landed 3 times
- China

1812 JONGDARI

- Landed 2 times
- Japan, China

1816 BEBINCA

- Landed 2 times
- China, Vietnam

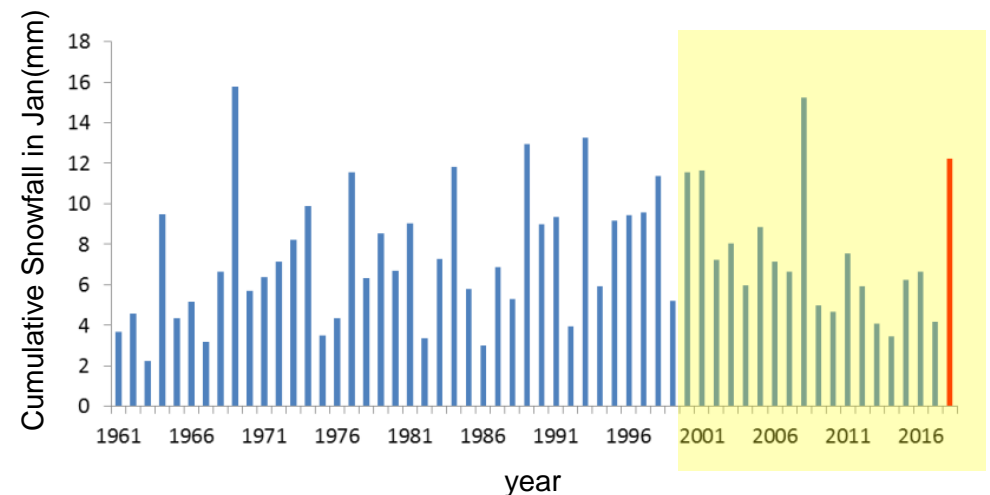
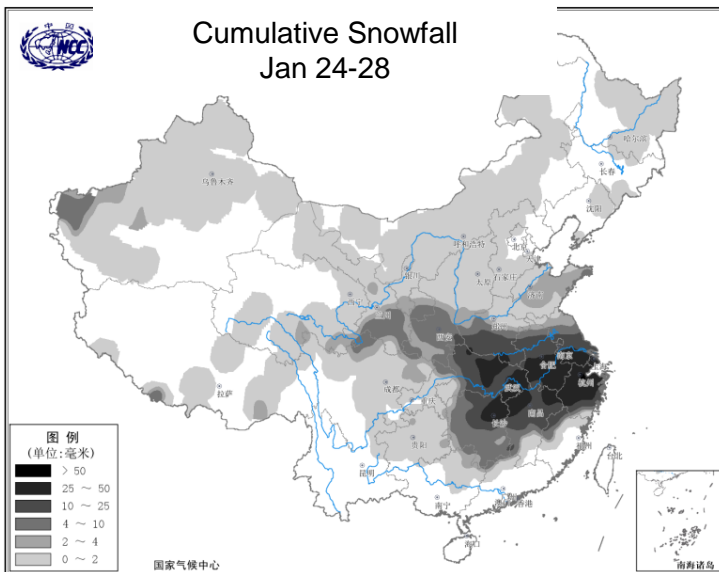
Tropical cyclones: 6.Loss is more serious than 2017



- According to the preliminary statistics, more than 30 million people were affected. 83 people were killed or missing. The direct economic losses were about 69.8 billion Yuan(\$10.1 billion).
- Comparing the economic losses and the number of dead or missing people caused by typhoons with those of 2017, this year is two times than last year.
- Typhoon RUMBIA left 37 dead and 11 missing and more than 15 million people were affected in 8 provinces. It also resulted in direct economic losses of 15 billion yuan (\$2.17 billion).

Low-temperature: Concentrated, suffer severe loss

- In January, there were three large-scale low-temperature rain and snow freezing weather processes in the central and Eastern region, covering an area of 5.76 million square kilometers.
- The average cumulative snowfall was the second highest in the same period since 2000 (only next to 2008).
- There were 8 million people were affected, the area affected of crops was 900 thousand hectares, and the direct economic loss was over 13 billion yuan(\$1.88 billion).



Outline

1 Climate Characteristics

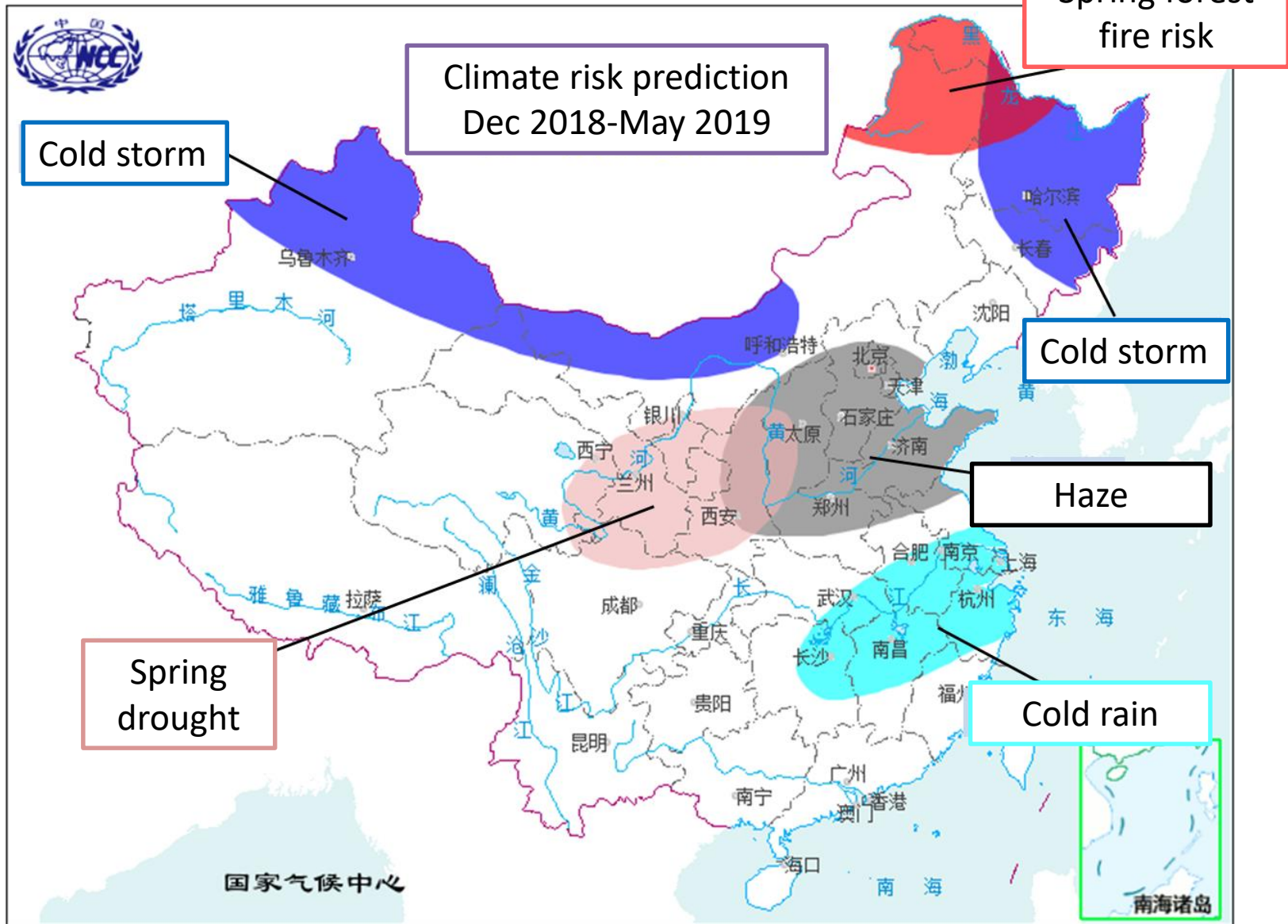
2 Rainy Season Process

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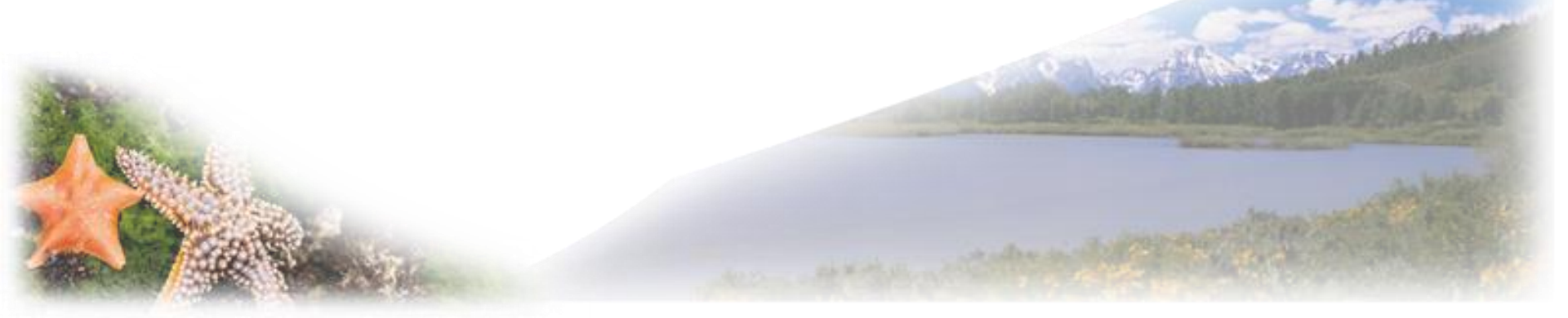


Outlook

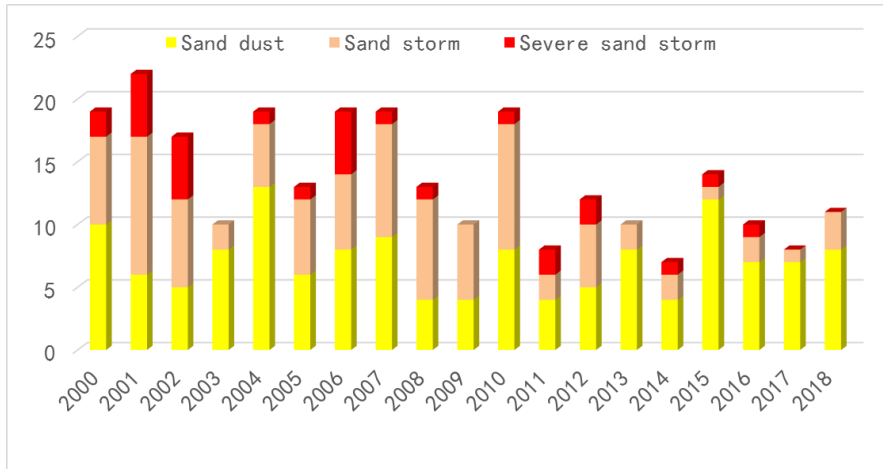


谢谢

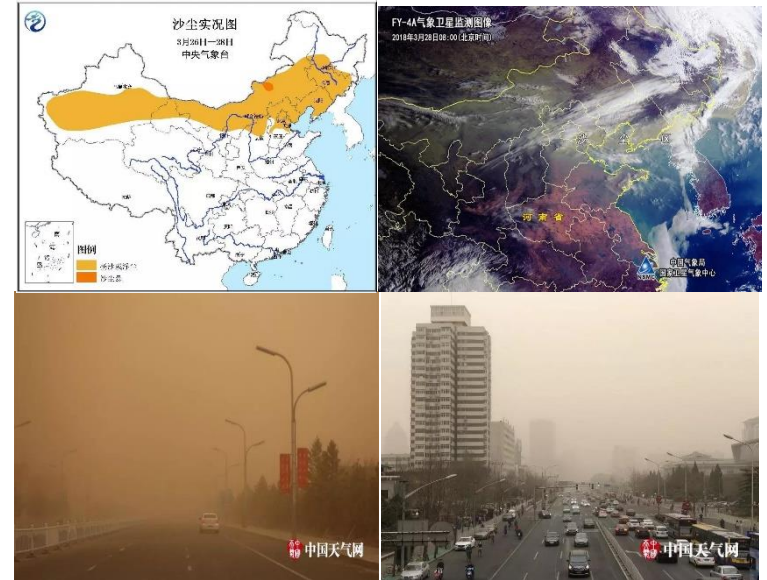
Thank you



Sand storms: Activity and a certain effect



Number of sand and dust storm events in China from 2000 to 2018



- In 2018, a total of 11 dust weather processes occurred, less than the average (13.8) over the same period in 2000-2017, including dust storms process 3 times, only nearly half of the average over the same periods in 2000-2017.
- The first dust process occurred on Feb 8, was earlier than normal (Feb 14).
- A dust storm process in Mar 26-29 affected 9 provinces (autonomous regions and municipalities), which was the one with the widest extent, affected about 1.5 million square kilometers, and had an adversely impact on agriculture, transportation, and air quality.