



EASCOF-10

10th Nov.2022



Climate Events and Impacts over China in 2022

Mei MEI

**Beijing Climate Center (BCC),
China Meteorological Administration (CMA)**





Outline

1

Climate features



2

Disaster Loss features

3

Major high impact events



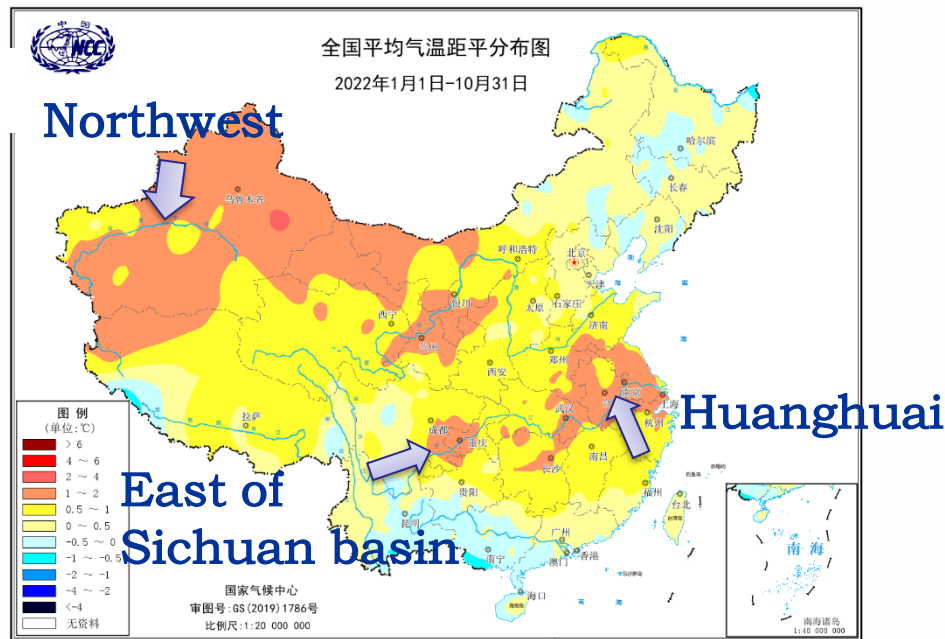
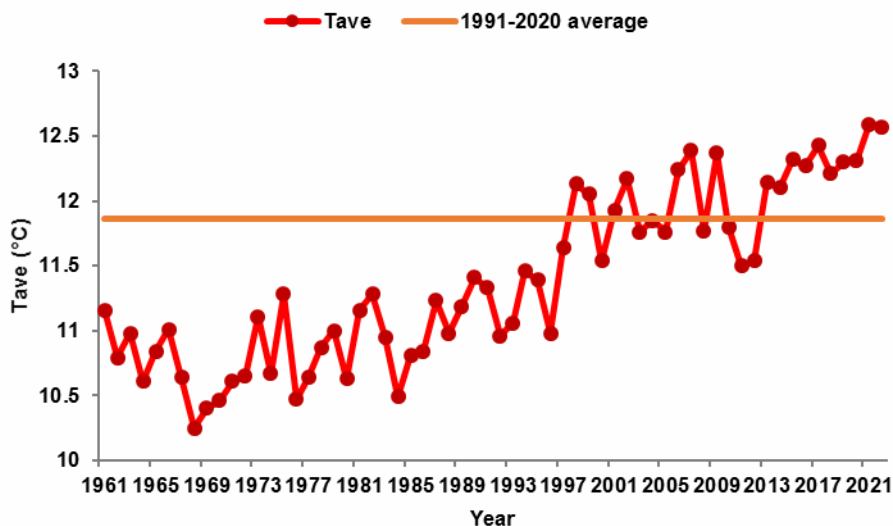


Temperature: Warm



Ave Temp anomaly(°C)

Annul Ave Temp in 1961-2022

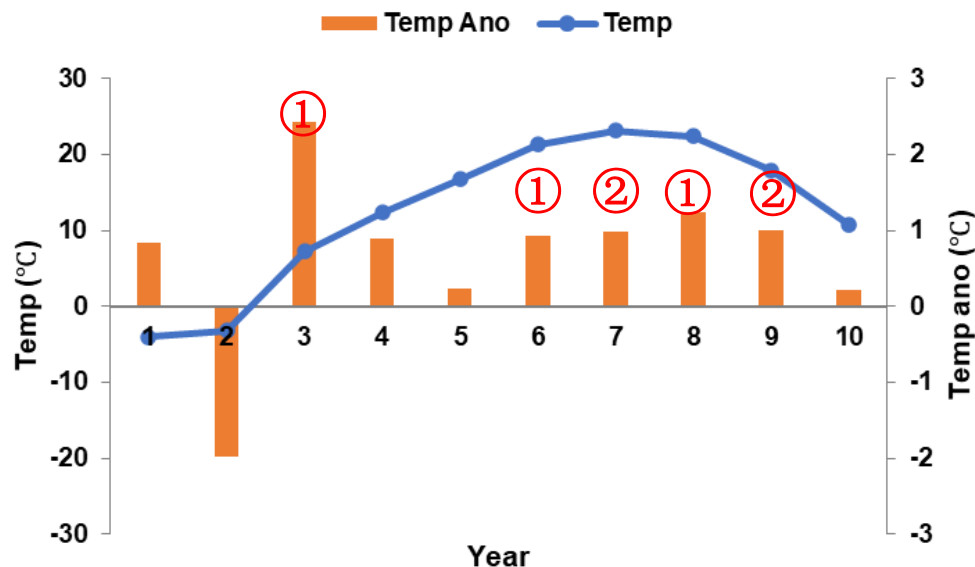


Period: from Jan to Oct, 2022
Normal: average over 1991-2020

- The mean temperature was **12.6°C**, **0.7°C warmer** than the normal, ranking the **second** since 1961.
- Ave Temp anomaly was within ± 1 °C over most part of China, except **Northwest China, Huanghuai and east of Sichuan basin**, where it was 1



Temperature: Warm



Monthly Ave Temp and anomalies (°C) over China in 2022

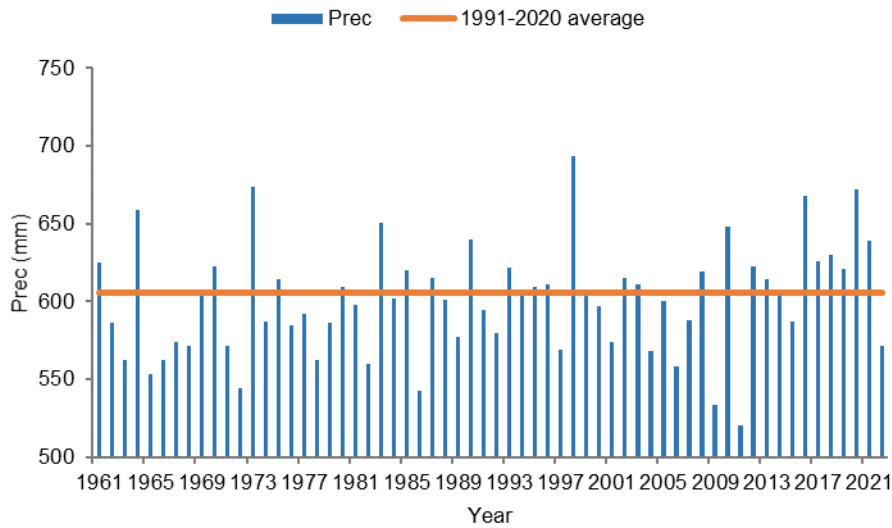
- Except the **colder Feb**, the mean temperatures in all months were above normal.
- Particularly, the temperatures in Mar, Jun, Jul, Aug and Sep were 2.4, 0.9, 1, 1.2 and 1°C warmer than the normal, ranking the first, first, 1, 1.2 and 1°C warmer than the normal, ranking the first, first,



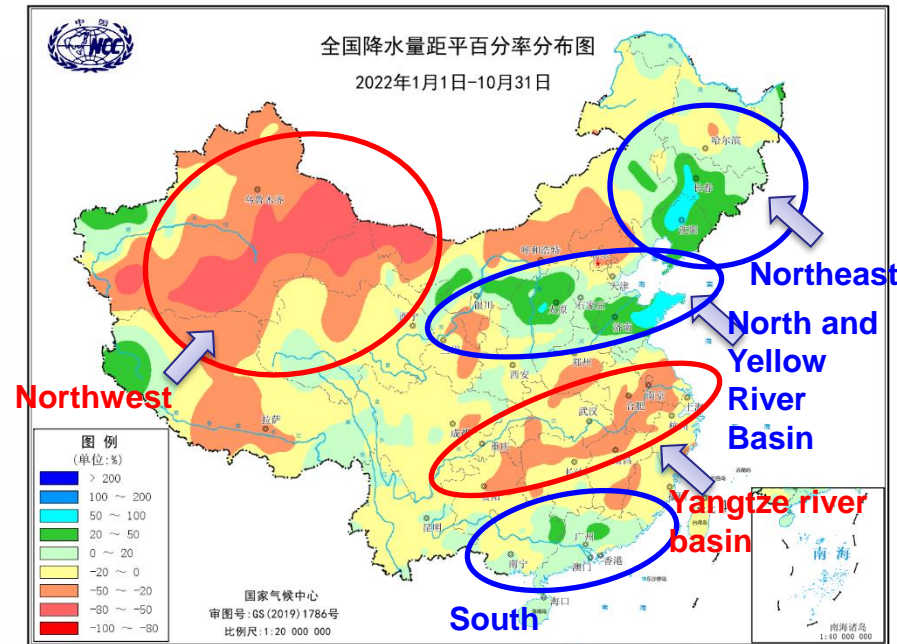
Precipitation: More



Prec in 1961-2022 (mm)



Prec Anomaly (%)



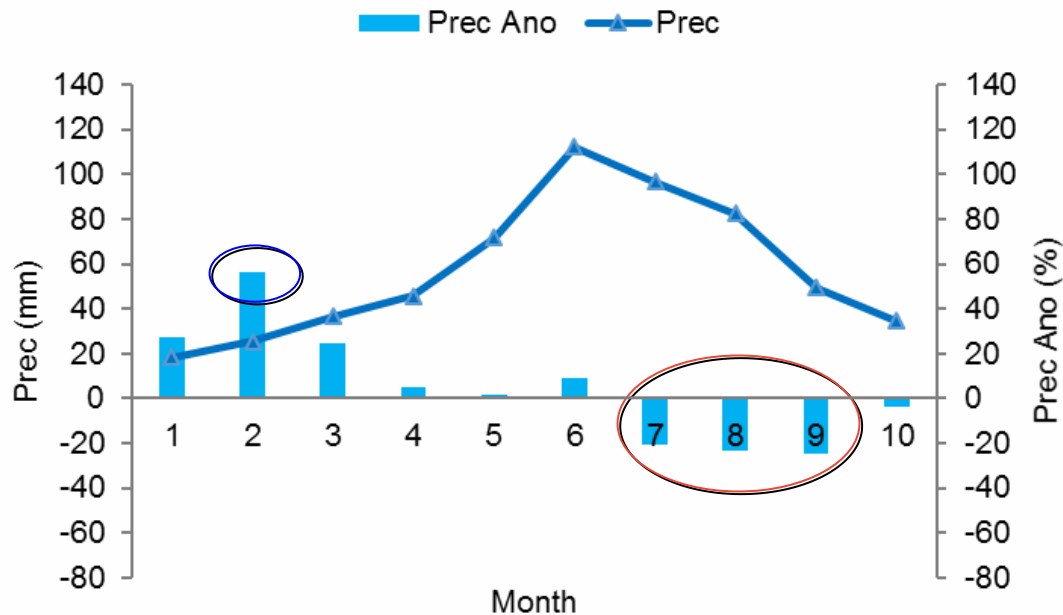
Period: from Jan to Oct, 2022

Normal: average over 1991-2020

- The Jan-to-Oct mean total precipitation over China was 571.8 mm, and **5.6% less** than the normal (605.9 mm).
- Precipitation was **less** (20-80%) in the mid-low reaches of Yangtze river basin and Northwest China, and **more** (20-100%) in South, North and Northeast China.



Precipitation: More in autumn



Monthly prec (mm) and anomalies (%) over China in 2022

- The precipitation was **more** than the normal in **first six months**, particularly in **Feb** (56.2%) ,ranking **the fourth** since 1961. Whereas in **Jul, Aug and Sep**, the precipitation was **less** than normal, ranking the



Outline



1 Climate features

2 Disaster Loss features



3 Major high impact events



Overall situation of loss

In the first three quarters, the natural disasters caused:

- **Affected people:** 107 million (↓ 10%); **Deaths or missing people:** 525 (↓ 30%);
- **Houses collapsed:** 34 thousand (↓ 71%);
- **Affected crop area:** 116 million hectares;
- **Direct economic losses:** 209.6 billion RMB (↓ 29 %)

(compared with the same period of past 5 years)

Source: National Disaster Reduction Center of China



Serious drought

In the first three quarters, the average temperature in China was high, and most extensive and long-lasting heatwave since 1961 occurred in the summer over the central and eastern regions, resulting in more serious drought disasters:

At the beginning of 2022, there was a successive winter-spring drought in the **Pearl River basin**;

From April to mid-June, spring-summer drought affected the **Huang-Huai-Hai and northwestern regions**;

Since June, extreme drought over **the Yangtze River valley** brought serious impact on agricultural production, drinking water, ecological environment and short-term power supply shortage.

Compared with the same period of past 5 years, the number of people affected by drought, the number of people needing life assistance and direct economic losses increased by 56%, 62% and 72% respectively in the three quarters.

Source: National Disaster Reduction Center of China





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1 Climate features

2 Disaster Loss features

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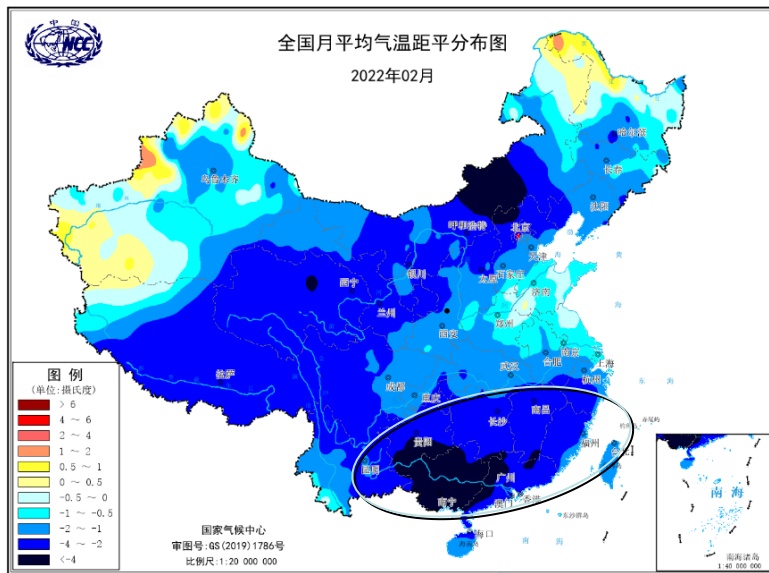
Major high impact events and features



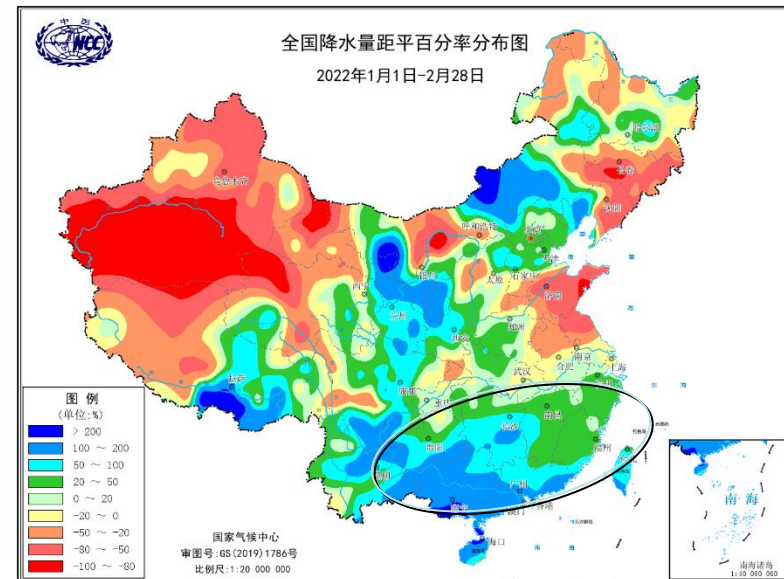
- **Snow and Rain processes**: frequently affecting the southern China in Jan and Feb.
- **Rainstorms**: Floods in Pearl River Basin in June, and in Song-Liao River Basin in July.
- **High temperature events** : breaking the record.
- **Droughts**: affecting the whole Yangtze River Basin and lasting long.
- Landing **TCs**: less, initial landing was late but strong, four successive landings of 2212 MUIFA.



Snow and rain: frequently affecting southern China.



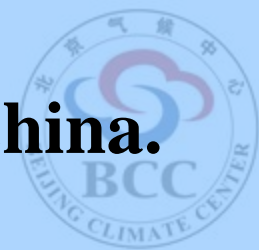
Mean temp. anomaly in Feb



Prec Anomaly (%) during Jan. to Feb.

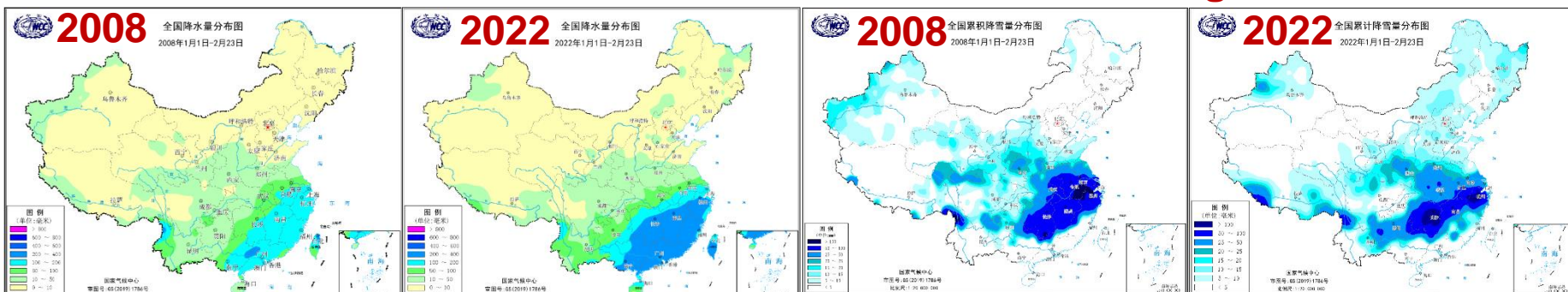
- In **February** 2022, monthly mean temperature was **2~4° C colder** than normal in the **southern China**, particularly exceeding 4 ° C colder in some areas.
- **Precipitation** was **more** (20-200%) in most areas south of the Yangtze River Basin. In eight provinces there, both of the accumulated precipitation and precipitation days broke records since 1961.

Snow and rain: frequently affecting Southern China.



Total prec. during Jan 1st to Feb 23rd

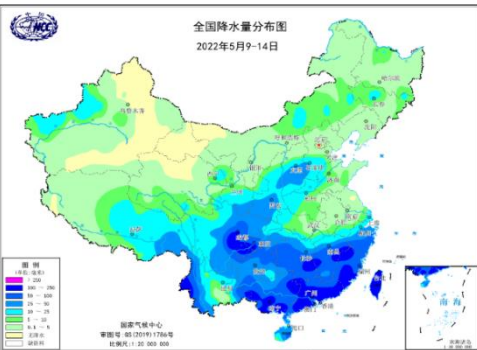
Total snowfall during Jan 1st to Feb 23rd



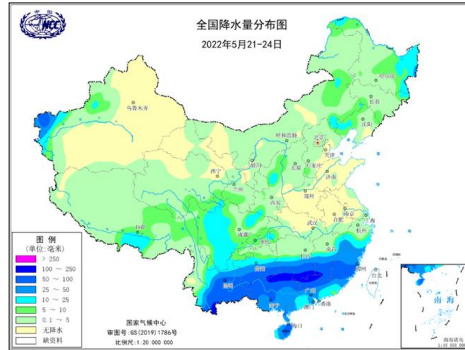
	2008	2022
Process frequency	4	7
Duration (d)	20	32
Date	Jan., earlier	Feb., later
Accumulated precipitation averaged in 8 provinces(mm)	99	190.8
Intensity of the precipitation in 8 provinces (stations with the daily pre. Over 50mm * days)	40	102
Area of the accumulated snowfall over 50 mm in 8 provinces (10 ⁴ square kilometers)	46.1	38.7
Glaze days (d)	4~30 d in Hunan, Guizhou and Jiangxi	2~10 d in parts of Guizhou,
Direct economic loss (RMB)	159 billion	80 billion

Rainstorms: Southern China suffered strong rainstorms

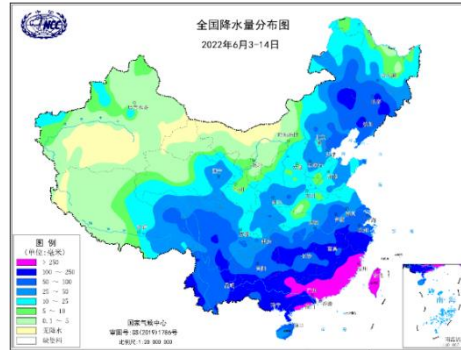
5. 9—5. 14



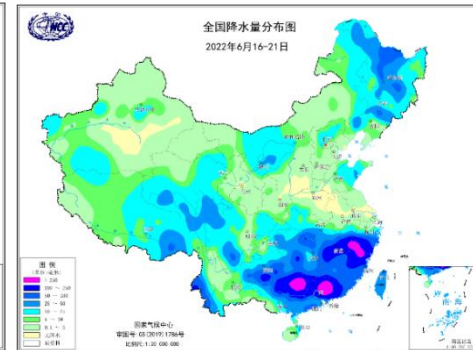
5. 21—5. 24



6. 3—6. 14



6. 16—6. 21

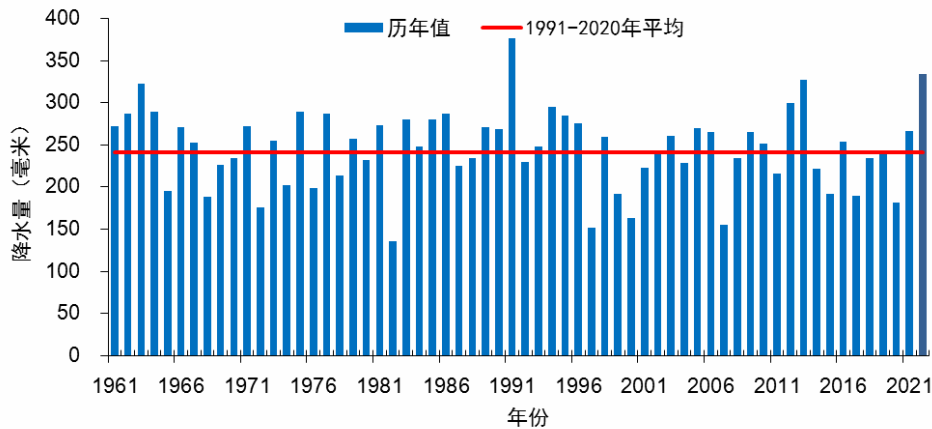


Process accumulated prep. (mm)

- From May 9 to Jun 21, **southern China encountered 4 strong rainstorms**, with huge amount of precipitation, broadly affected area, long duration and large overlapping area.
- The accumulated precipitation was 28.9% abnormal in **Pearl River basin**, ranking **top 1** since 1961.
- In June, the water levels of 212 rivers in Pearl River Basin exceeded the warning lines, causing 2 basin floods and 6 tributary floods. Some parts of Guangdong and Guangxi provinces experienced urban waterloggings.

Rainstorms: Northeast China suffered strong rainstorms

The variation of accumulated prec. during June to July



Breaking riverbank of Raoyang river in Panjin, Liaoning province

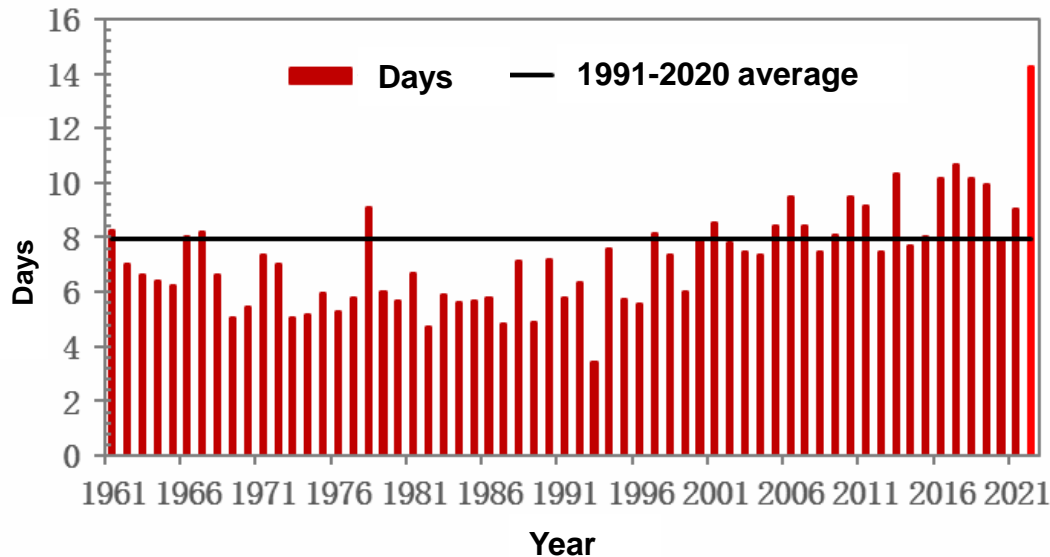


- From June to July, the accumulated precipitation (334.9 mm) average in the three provinces of **Northeast China** was almost **4 times more** than the normal, ranking **second** since 1961.
- Both of the accumulated precipitation (414.2 mm) and the rainfall days (37.8 d) in **Jilin** province **broke their historical records**.
- There were **over-alert floods** occurring in 40 rivers in the **Song-Liao River Basin**, leading to great impacts on the transport and agriculture.

High temperature events : Top 1

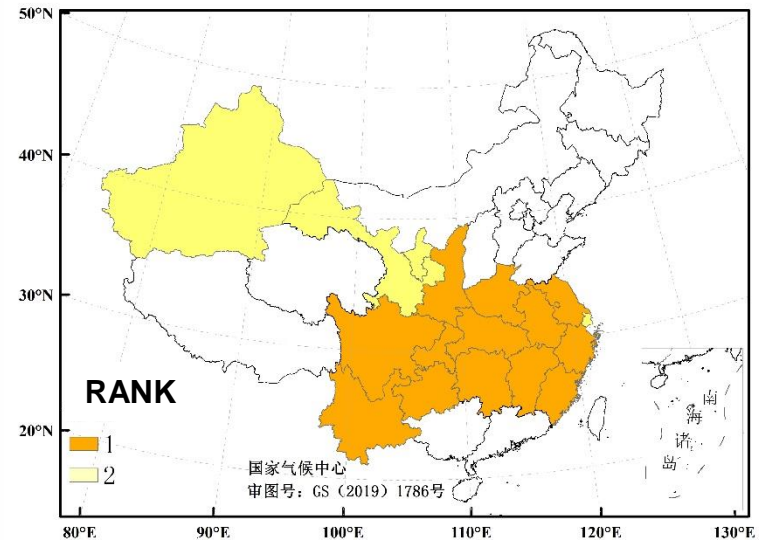


Aver. High temp. days



from 1st Jun to 30th Aug

Aver. High temp. days of provinces

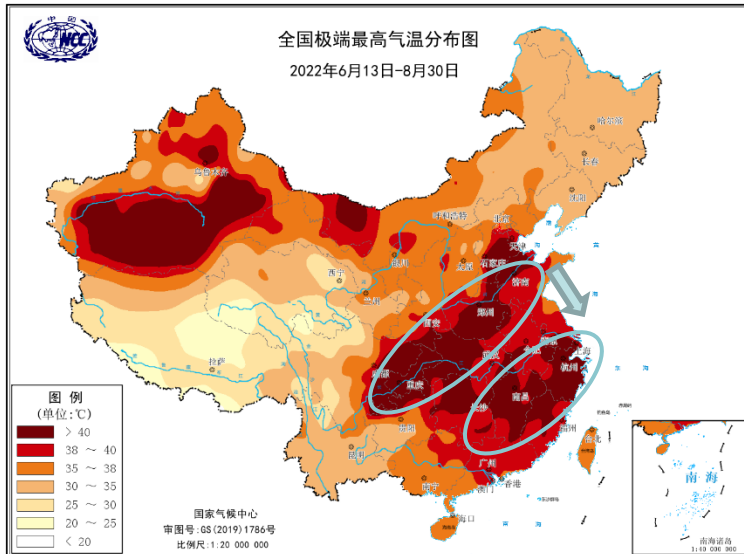


- In summer, the mean high temp. days over China was 14.3 days, 6.3 days more than the normal, resulting in the hottest summer on record with 1.05 °C abnormal.
- 13 provinces experienced the hottest summer as well .

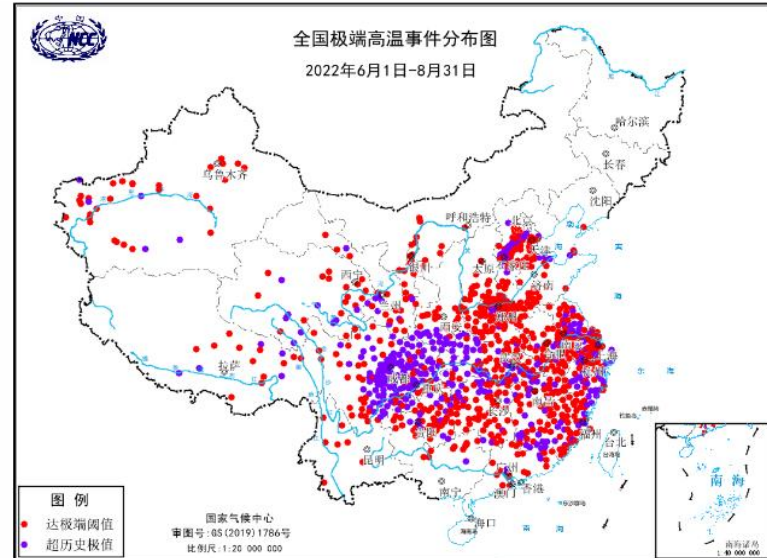
High temperature events : Top 1



Max of daily maximum temp



Extreme high temp events (purple dots: breaking record)



- China had the most **extensive, extreme and long-lasting** heatwave since national records began, extending from mid-June to the end of August.

- 15 locations experienced 42 consecutive days above 35 ° C. 366 locations had their highest temperature on record, and Beibei of Chongqing province experienced the most extremely high of **45 ° C**.

- Different from the top 2 and top 3, this event showed **two extreme high temp belts** in North and South China.

High temperature events : Top 1



Jun 11th to 15th

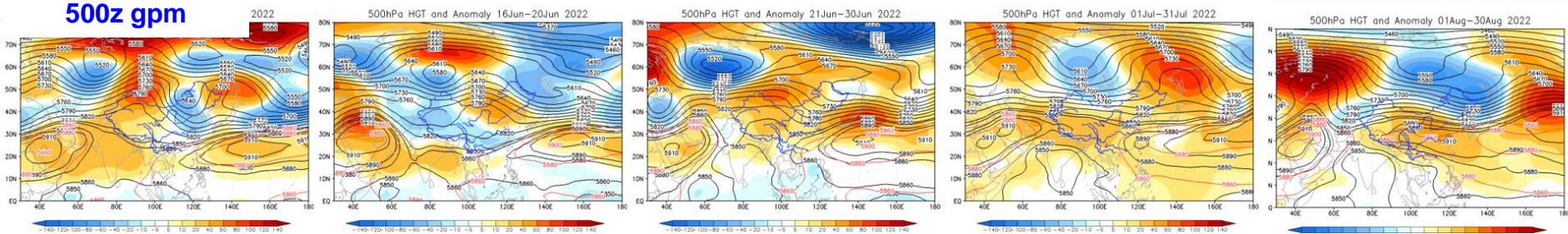
Jun 16th to 20th

Jun 21th to 30th

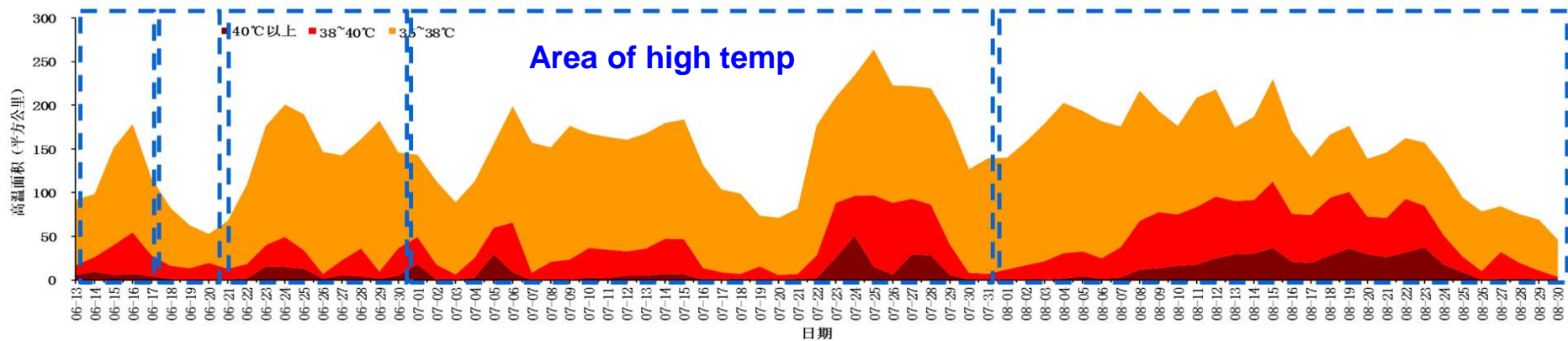
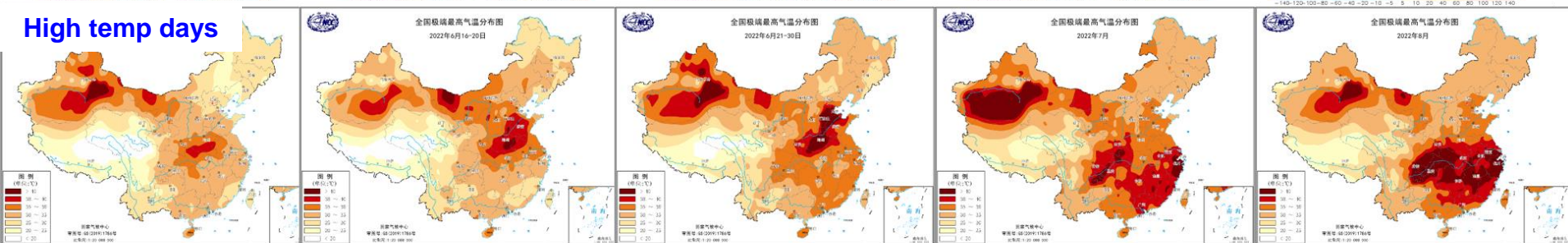
Jul

Aug

500z gpm



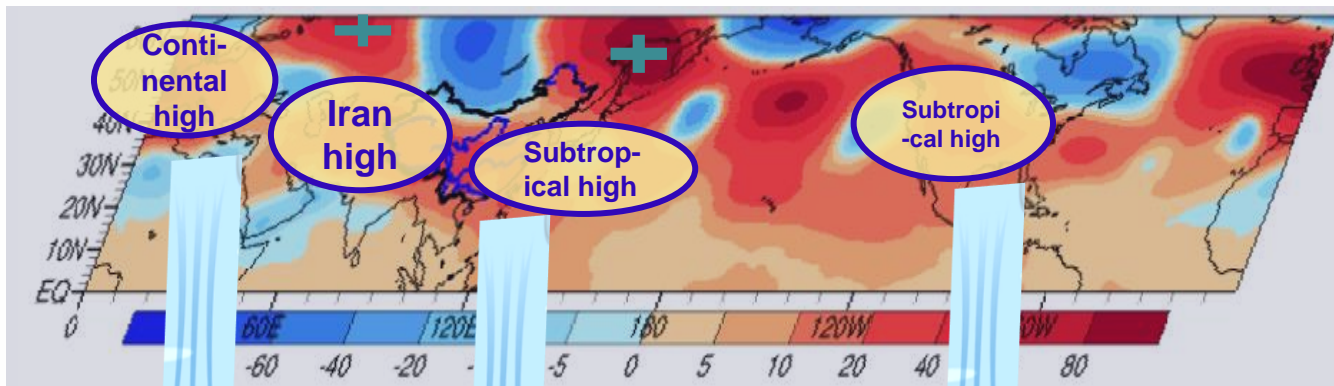
High temp days



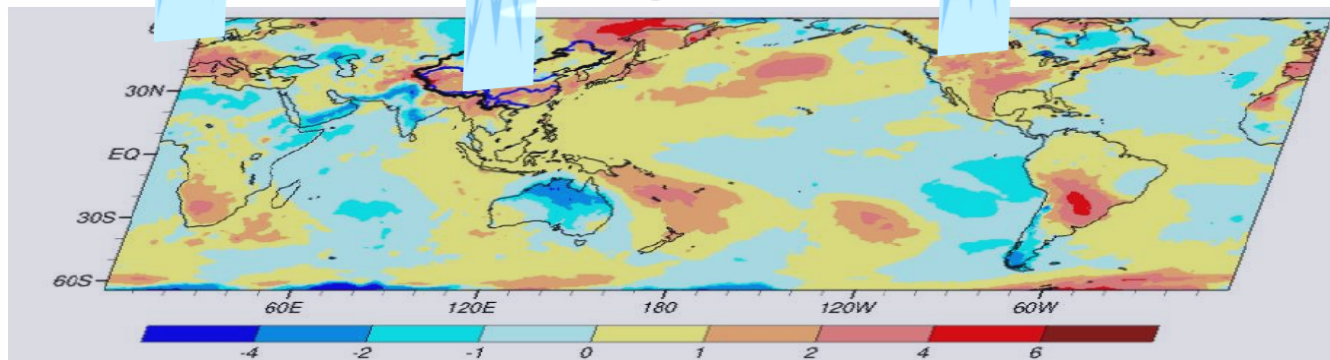
High temperature events : Top 1



Geopotential height anomalies at 500 hPa in Jul



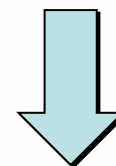
2m Temp anomalies in Jul



Re-development of La Nina in Summer

Arctic warming amplification effect

Tibetan plateau snow melting



Wide-range high pressure belt

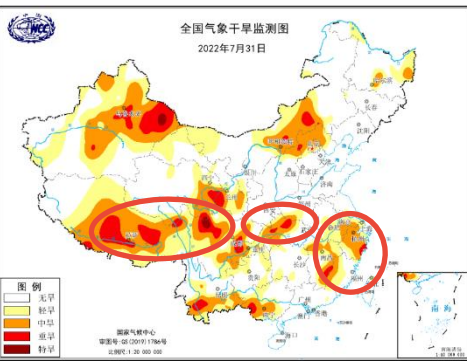


Less clouds, intense radiation

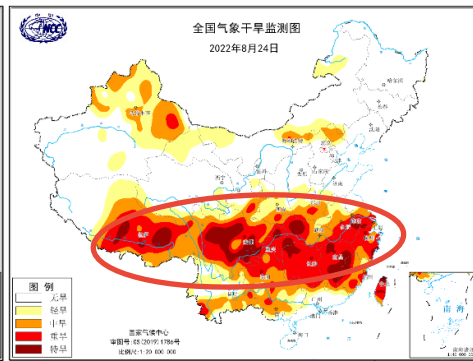
Sinking motion, warm cover

Droughts: Yangtze River Basin and its south

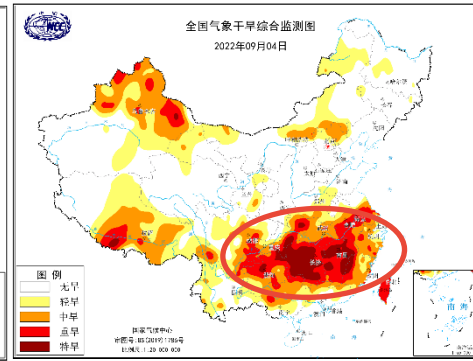
31th Jul



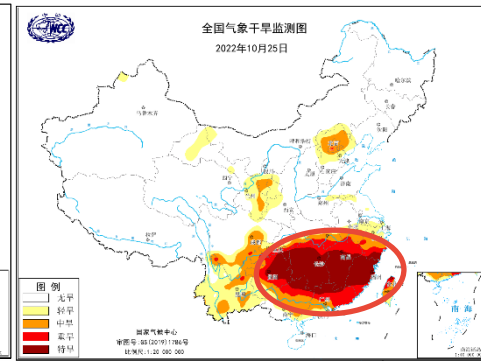
24st Aug



4th Sep



25th Oct

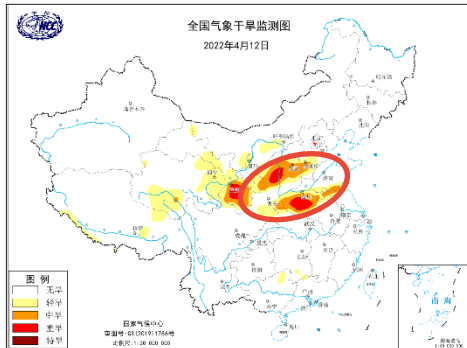


China daily meteorological drought monitoring map

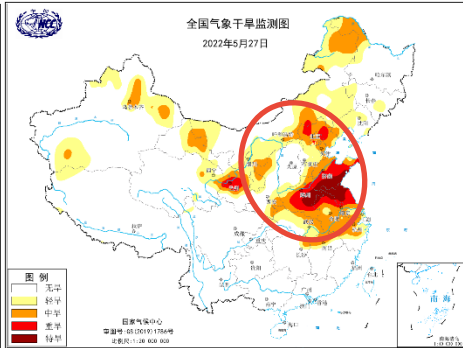
- Most of the southern China (apart from Guangdong province) having seasonal rainfall **20% to 50% below average** and the **extremely heatwave**, the drought Initially appearing in late Jul over the **Yangtze River basin**.
- Due to the persistent dry and warm anomalies, the drought lasted to the autumn and continued, with the **center shift** to the middle and lower reaches of Yangtze River basin and its south.

Droughts: Huanghuai and Northwest China

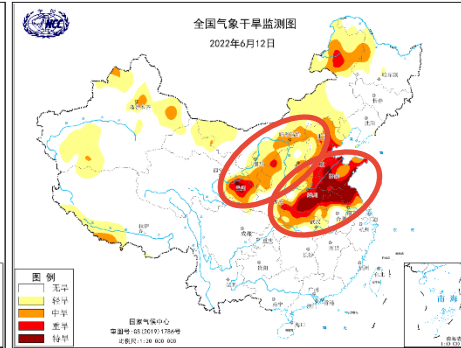
12th Apr



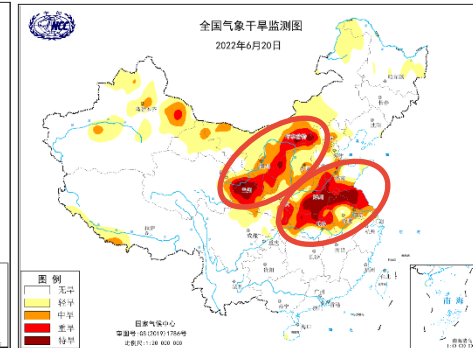
27st May



12st Jun



20th Jun



China daily meteorological drought monitoring map

- From mid Apr to mid Jul, in **Huanghuai and Northwest China**, with continuous high temp and less rainfall, **spring-summer drought** continued.
- On May 27th, the drought area reach the peak. In the mid Jun, the severe drought enlarged in Huanghuai basin and the drought started to developed in the east of Northwest China.

The compound impacts of drought and heatwave

Poyang lake drying up



Frequent Wildfires in Chongqing



Crops losses in Chongqing

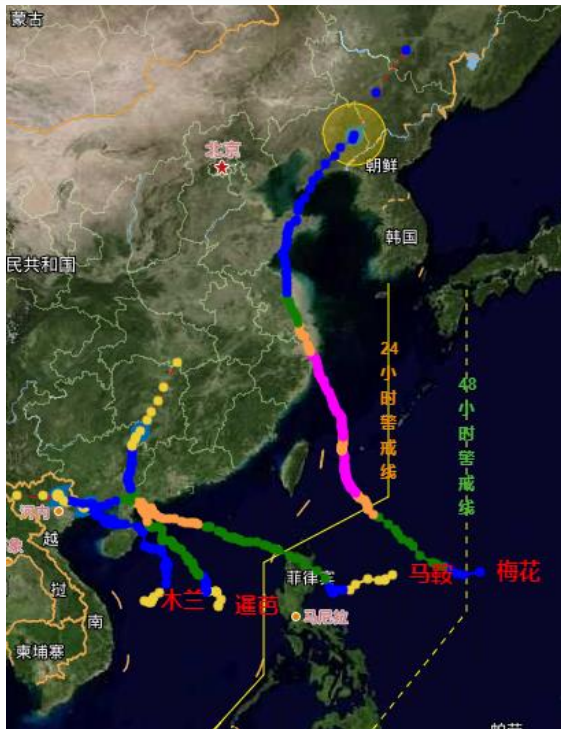


Increased electricity load



- Parts of the middle-lower reaches of Yangtze River reached the **lowest recorded level** since 1949.
- There were numerous **wildfires** in Chongqing and Sichuan.
- At the peak of drought in August, a total of 4.49 million people in the country needed life assistance due to drought, and the affected area of crops was 4.3 million hectares.

Landing TCs: less, initial landing was late



4 landfalling TCs:

2203 CHABA

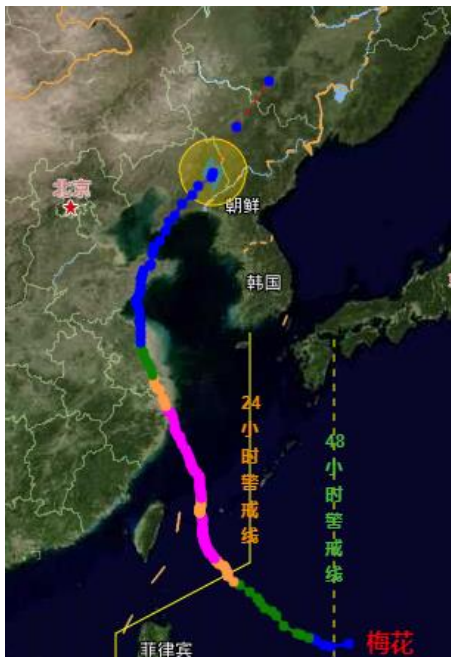
2207 MULAN

2209 MA-ON

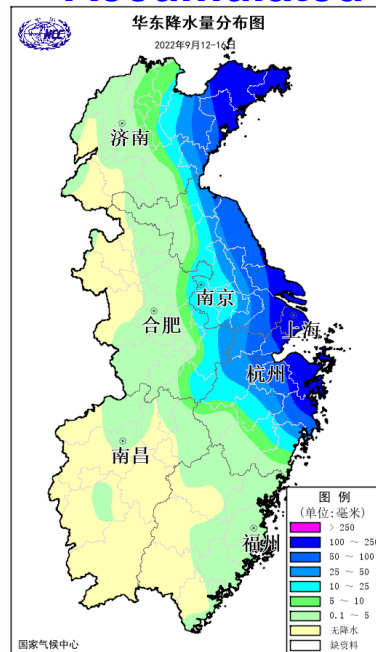
2212 MUIFA

- In the three quarters, **23 TCs generated** over the WNP and SCS, **1 more than the normal (22)** . **4 TCs made landfall** over China, **3.1 less** than the normal (7.1).
- **The first landing TC CHABA** in 2022 (Jul 2th) was later than that in the normal years, and ranked fourth for first landing strength since 1991, causing 1.9 billion people affected and 3.1 billion RMB direct economic losses.

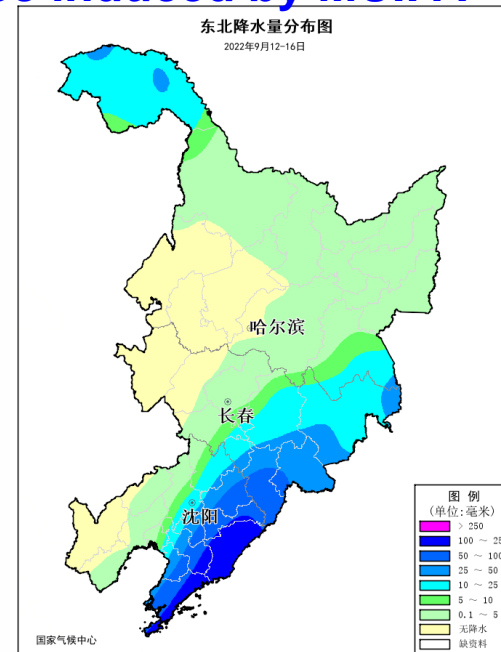
Landing TCs: 4 consecutive landings of MUIFA



Accumulated prec induced by MUIFA



East China



Northeast China

- MUIFA landed four times in Zhejiang, Shanghai, Shandong and Liaoning provinces during Sep 14th and 16th. It is one of the three TCs with four times of landfall since 1949.
- MUIFA landed northmost, breaking the record of landfall TCs in autumn.
- Due to its slow moving speed, long detention time over land and the encountering with cold air, MUIFA had brought rainstorms to East and Northeast China.



谢谢

Thank you

