The Application of EPS Products in NMC/CMA

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National Meteorological Center (NMC)/CMA

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Jiutepec, Morelos, México

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OVERVIEW

- Operational EPS in NMC
- Application of EPS Products in NMC
- Research on Application of EPS
- Plans

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1 Operational EPS in NMC

T213 Global Ensemble System	
Resolution	640*321
Initial uncertainty	Breeding vector
Initial uncertainty Model uncertainty	None
Daily frequency	00、06、12 and 18UTC
Perturbed members	14 members for each cycle
Forecast length	10 days(240 hours)
Implementation	2006
Output	24 hourly

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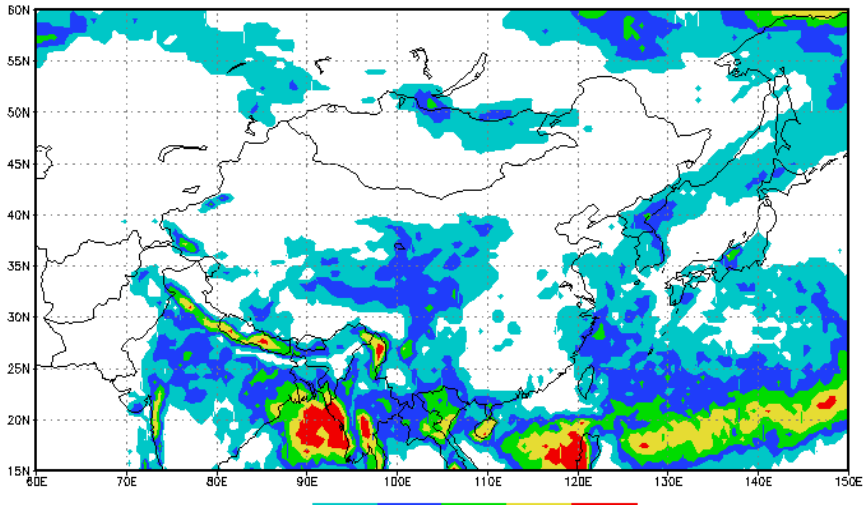
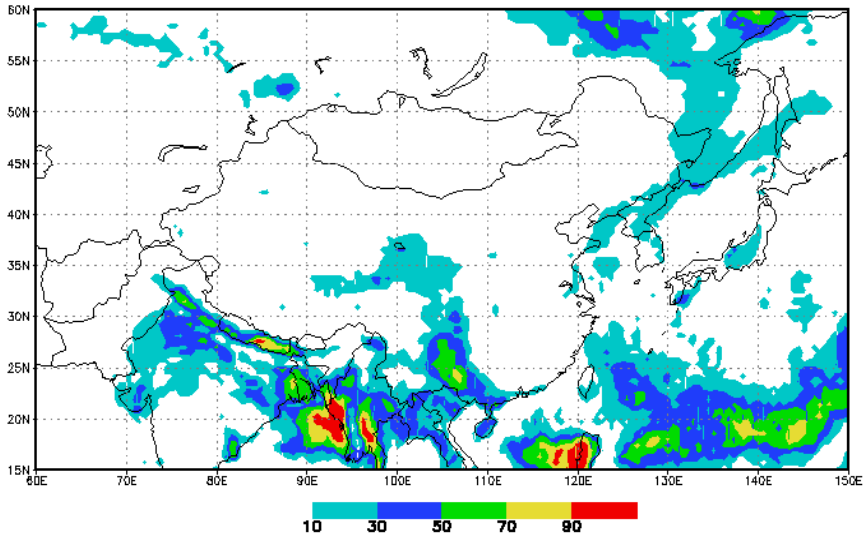
2 Application of EPS Products in NMC

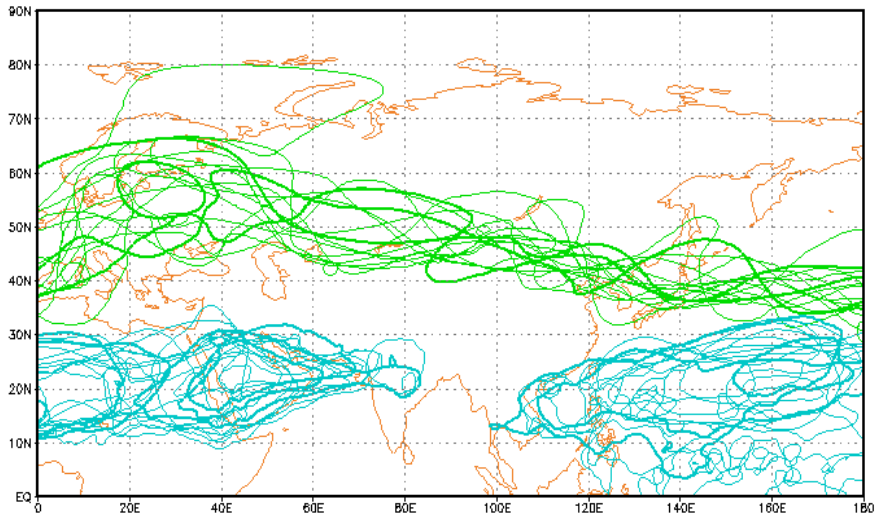
EPS—T213 Prob total rainip >10.0mm 96H fcst from 12Z 18 AUG 2006



EPS—T213 Prob total rainip >10.0mm 72H fcst from 12Z 18 AUG 2006



S—T213 500mb ht(m) 568 and 588m Spgt 240H fcst from 12Z 13 MAY 20C



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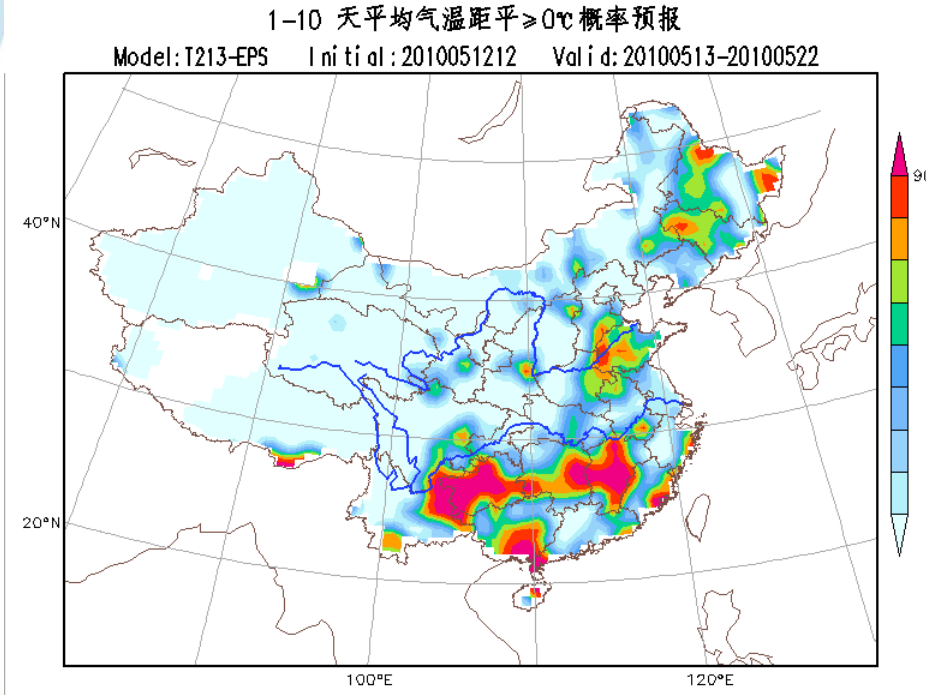
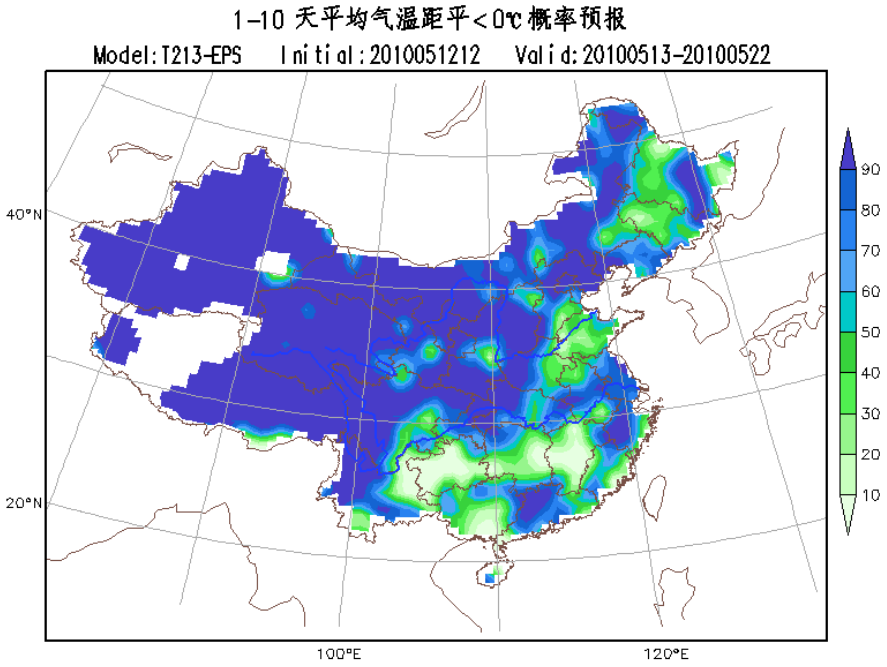
2 Application of EPS Products in NMC

The probability of the mean temperature(0-240h) above normal



The probability of the mean temperature(0-240h) below normal



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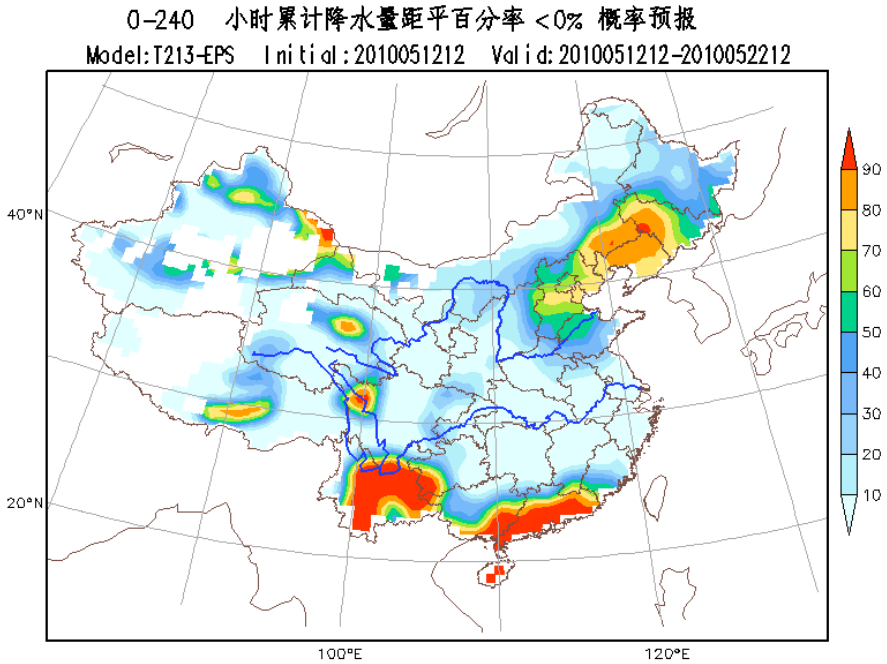
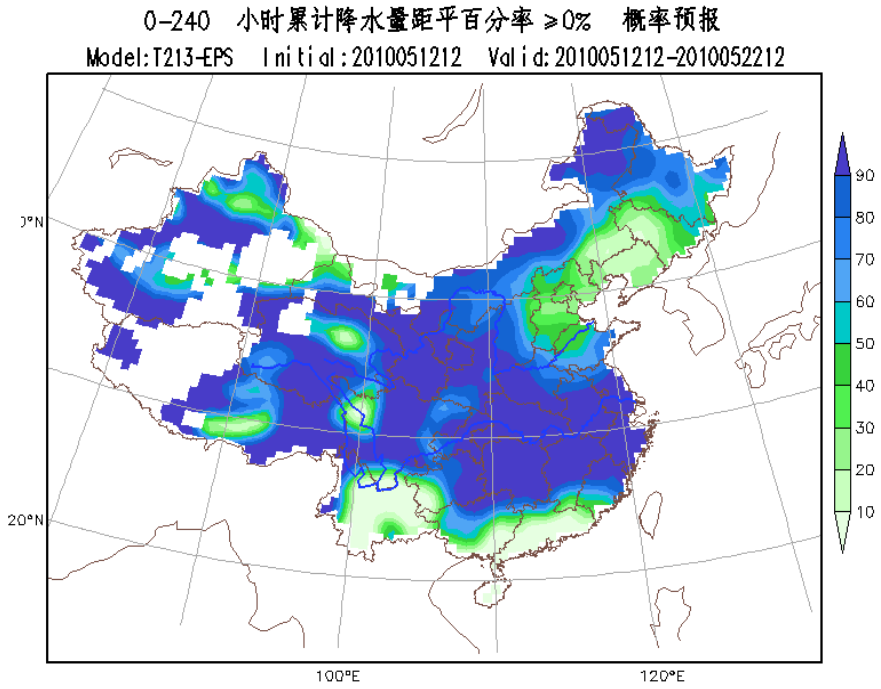
2 Application of EPS Products in NMC



The probability of the accumulated precipitation(0-240h) below normal

The probability of the accumulated precipitation(0-240h) above normal



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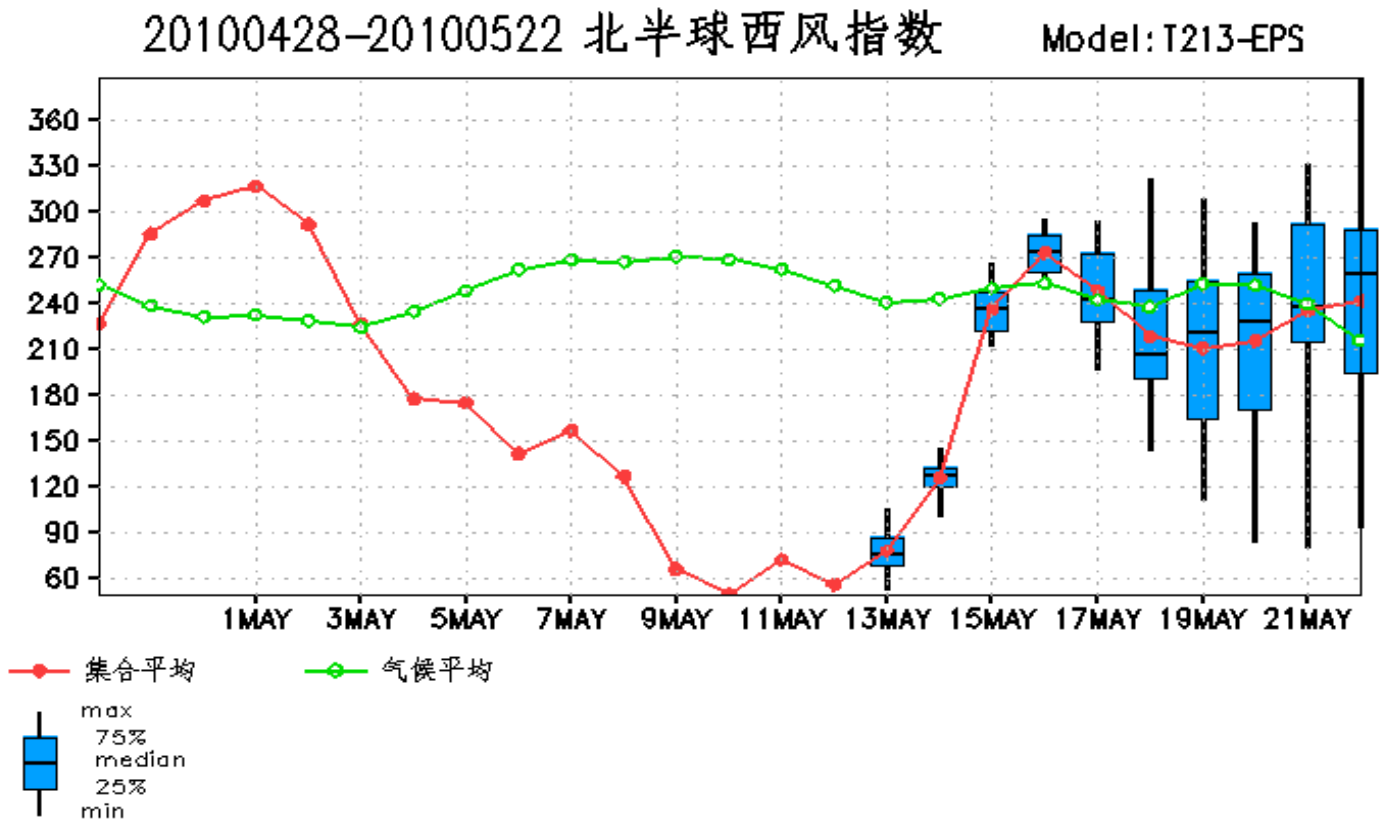

Westerly index of northern hemisphere(analysis + 10days forecast)

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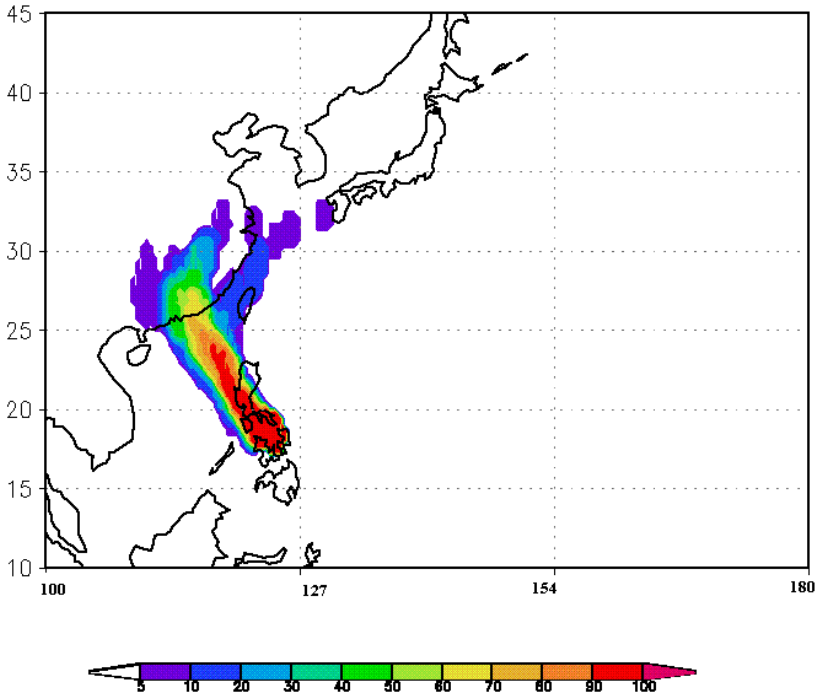

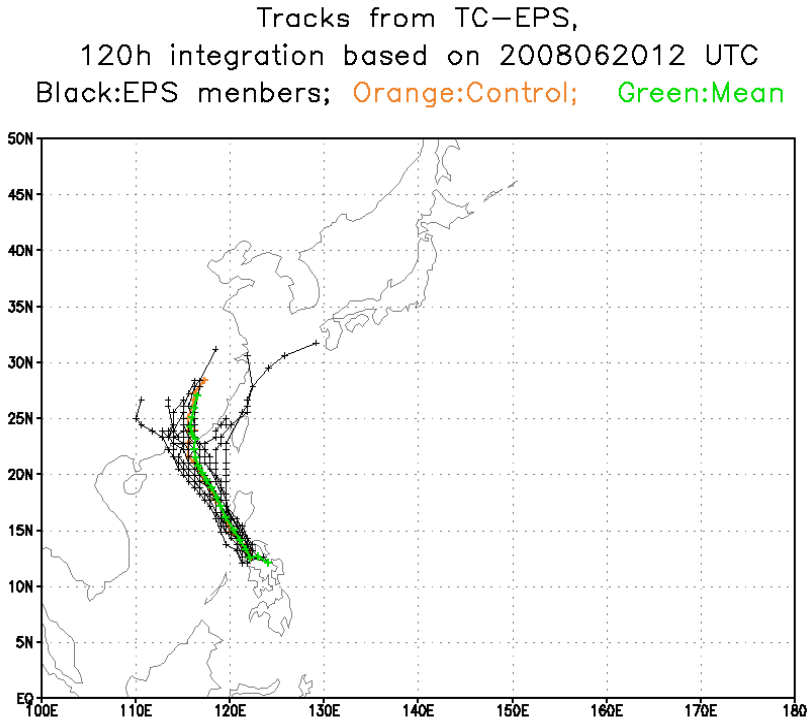

Pass Probability Prediction

Track Ensemble Prediction

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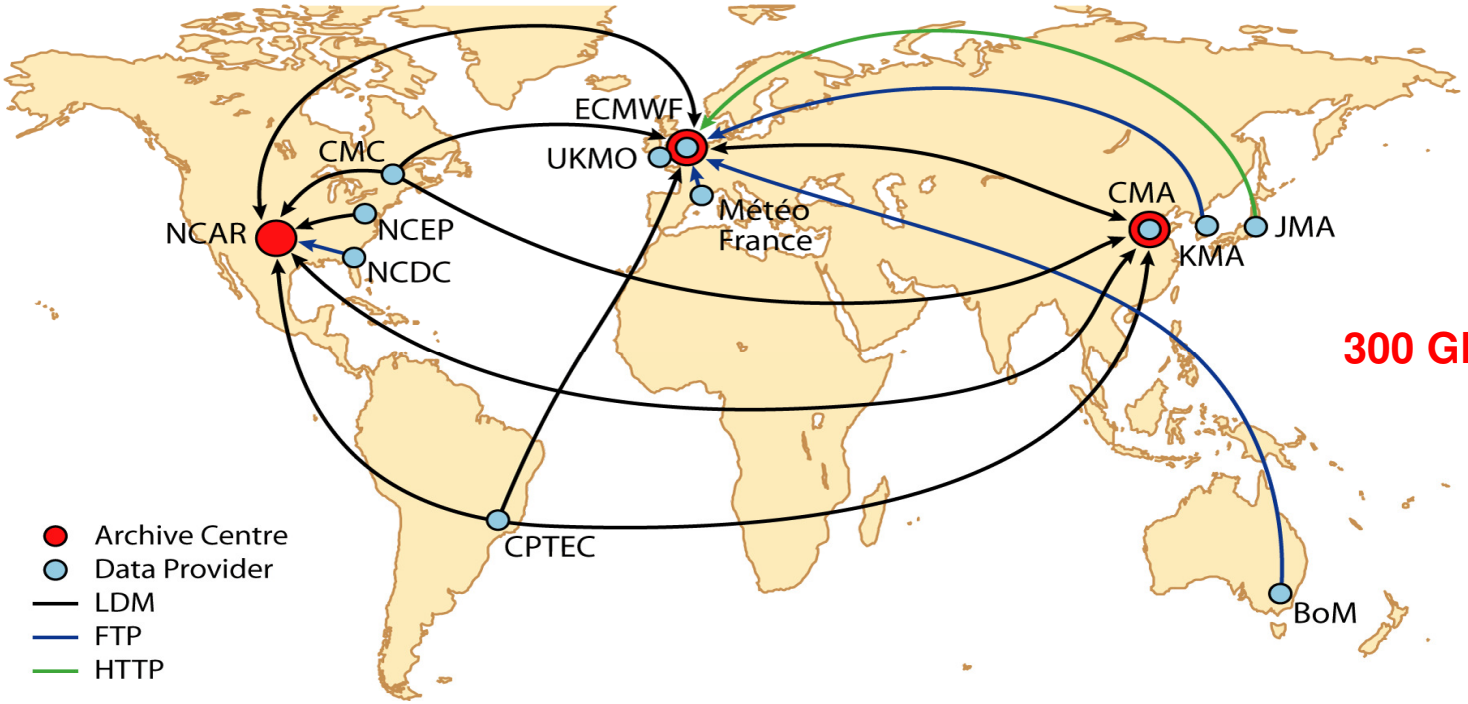
3 Research on The Application of TIGGE DATA

One of three TIGGE data archive centers



300 GB per day

Research Project: The application technology for TIGGE data(2007-2009)

THORPEX Interactive Grand Global Ensemble

The Observing System Research and Predictability Experiment

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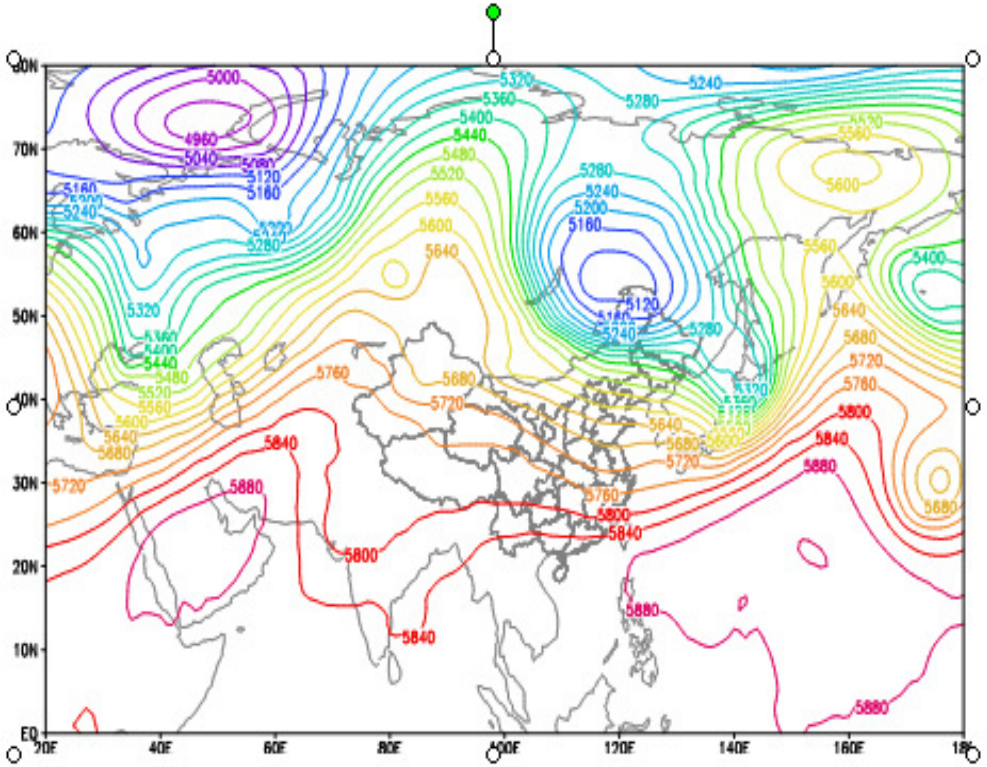
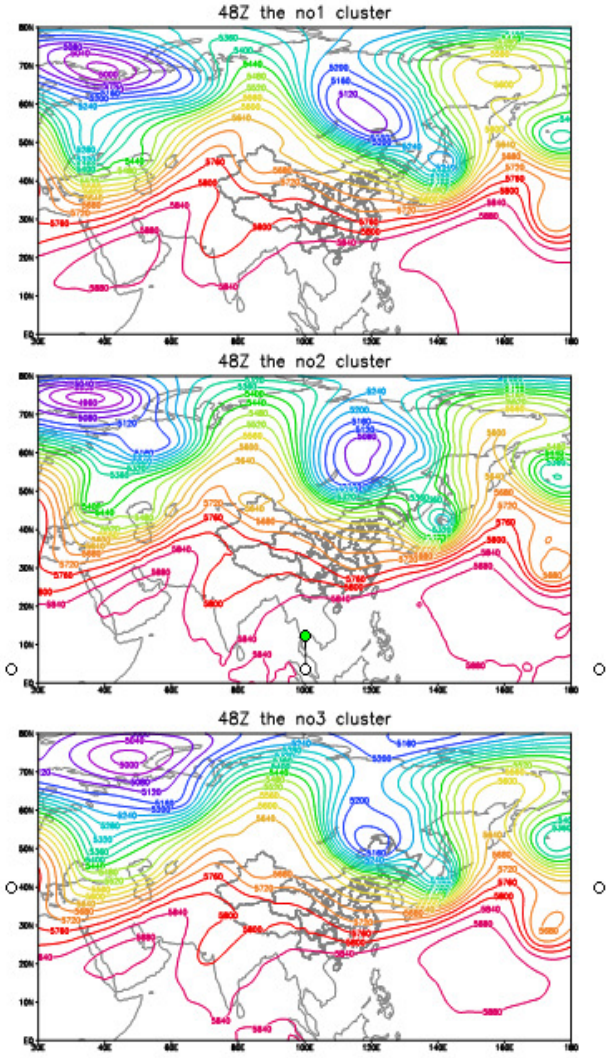
3.1 Research: Cluster Method



NCEP analysis on 12UTC 7th Nov 06.



The probability of the three groups are **40.0%、 6.7%、 53.3%**

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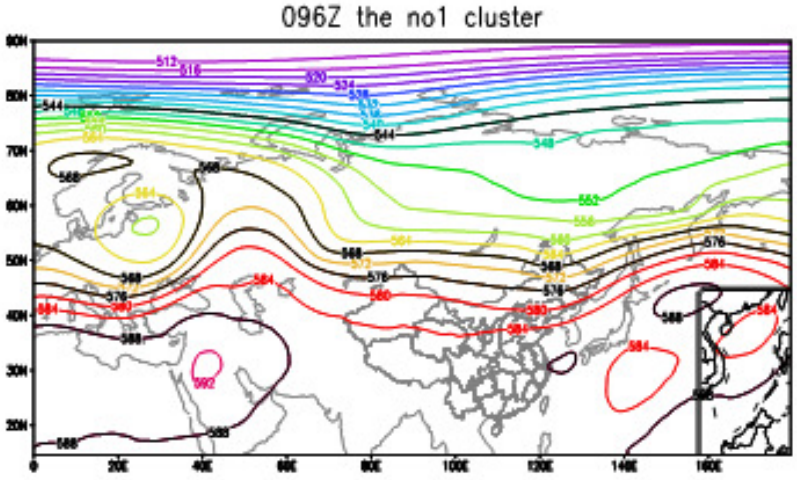
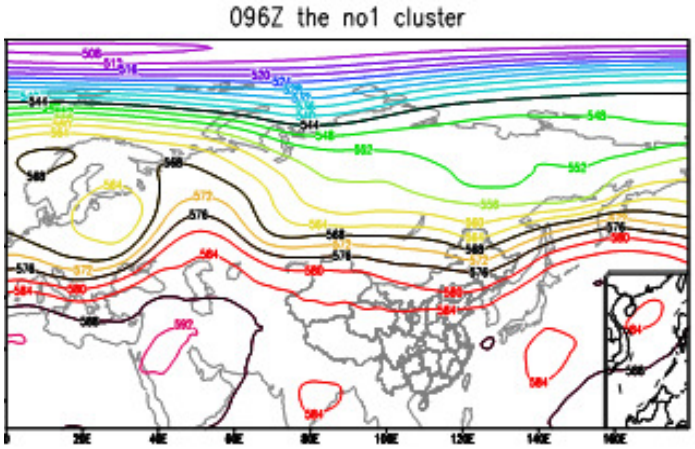
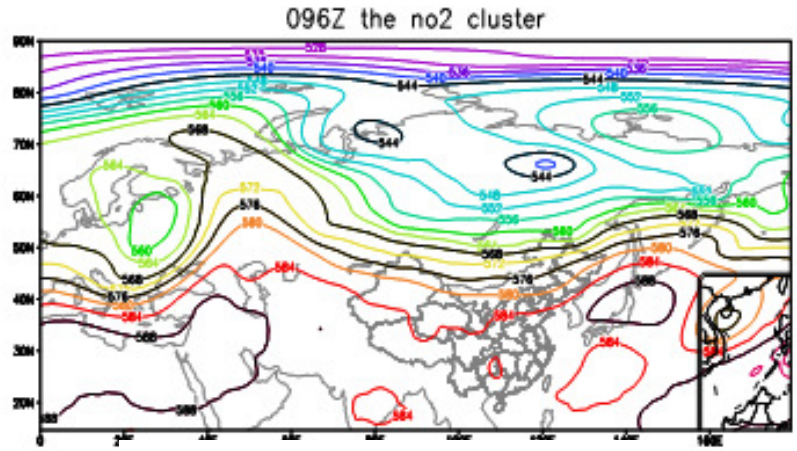
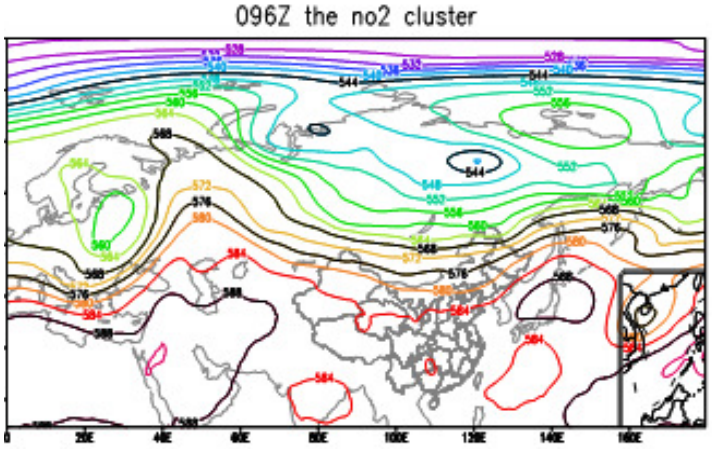
3.1 Research: Multi Model Cluster after bias correction









before bias correction

after bias correction

Bias Correction：

Decaying averaging mean error = (1-w) * prior t.m.e + w * (f - a)

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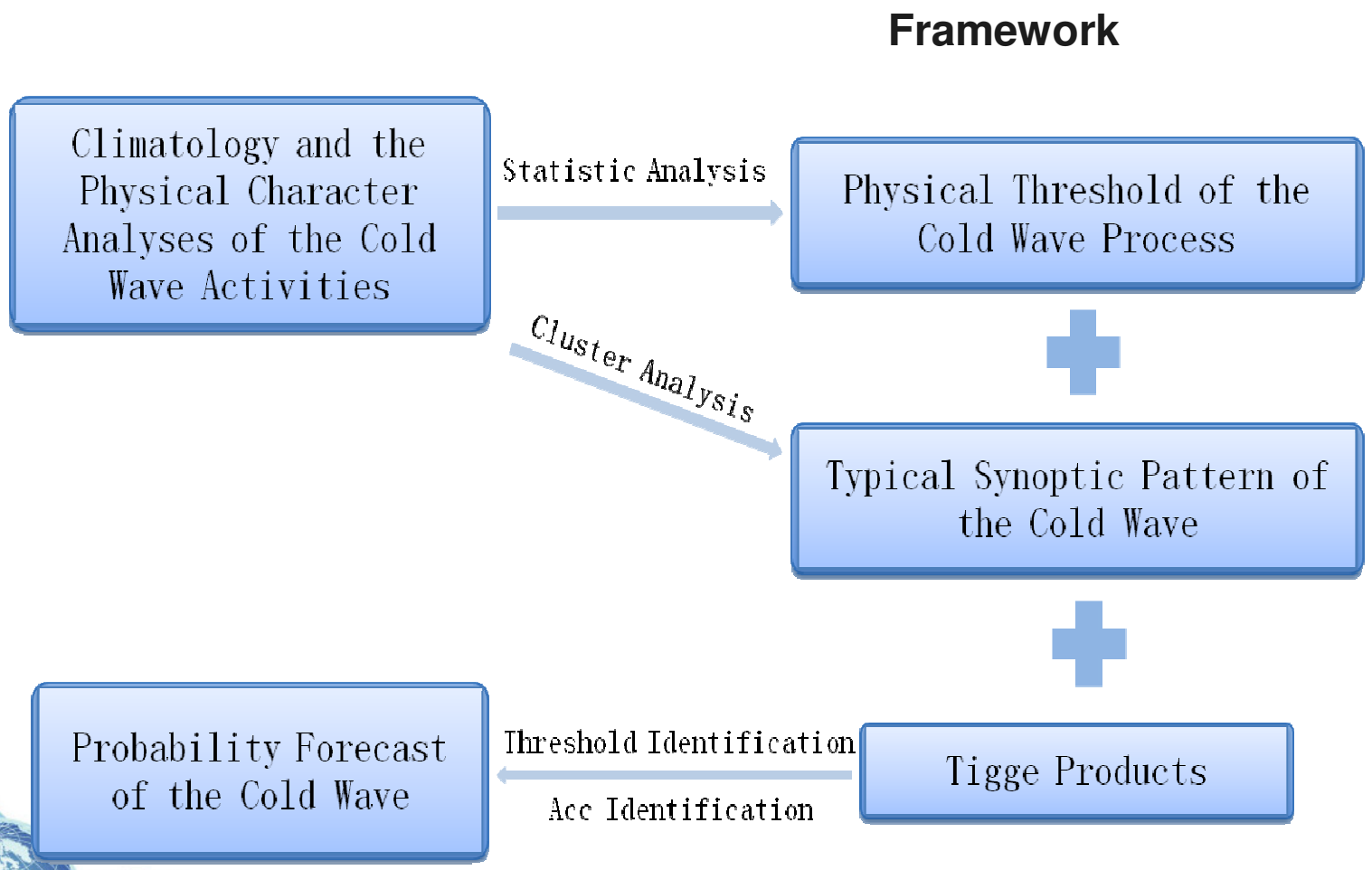
3.2 Automatic Identification Forecast for Cold Wave in China



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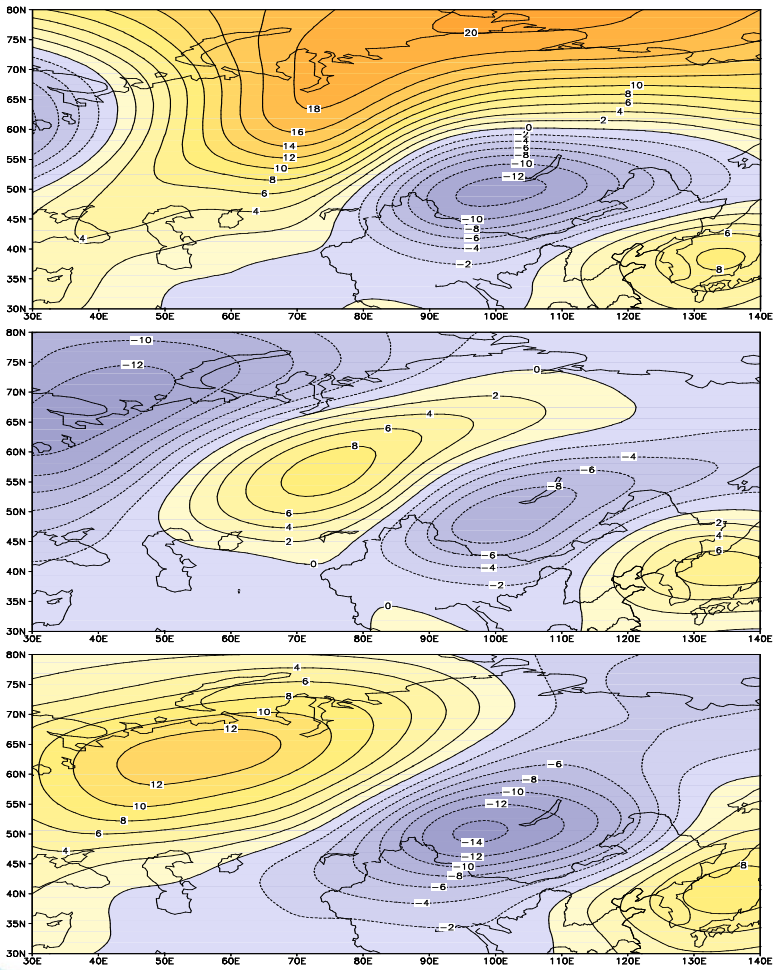

Different objective cluster methods have been made on 87 cold wave processes among 56 years to get the typical patterns .

we found that the cluster based on the abnormal field of the 500hPa not only helps to reduce the influence of the seasonal variety but also gives prominence to the circulation disturbance under which the cold wave happens. The cluster analysis result in three typical abnormal distributions of cold wave: zonal plus-minus-plus distribution, meridional minus-plus-minus and plus-minus-plus distribution. An objective cold wave forecast model is finally established based on the typical synoptic pattern and the thresholds of physical character during the cold wave process.

Three typical 500hPa Anomaly Distributions of Cold Wave in China

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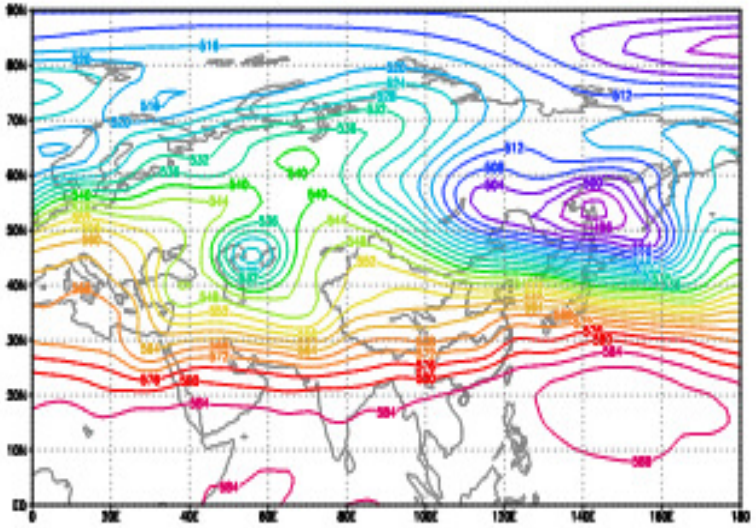
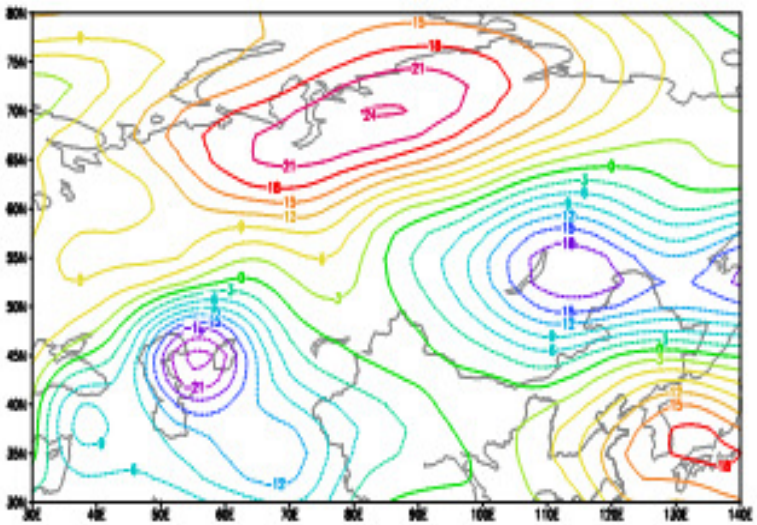
3.2 Automatic Identification Forecast for Cold Wave in China

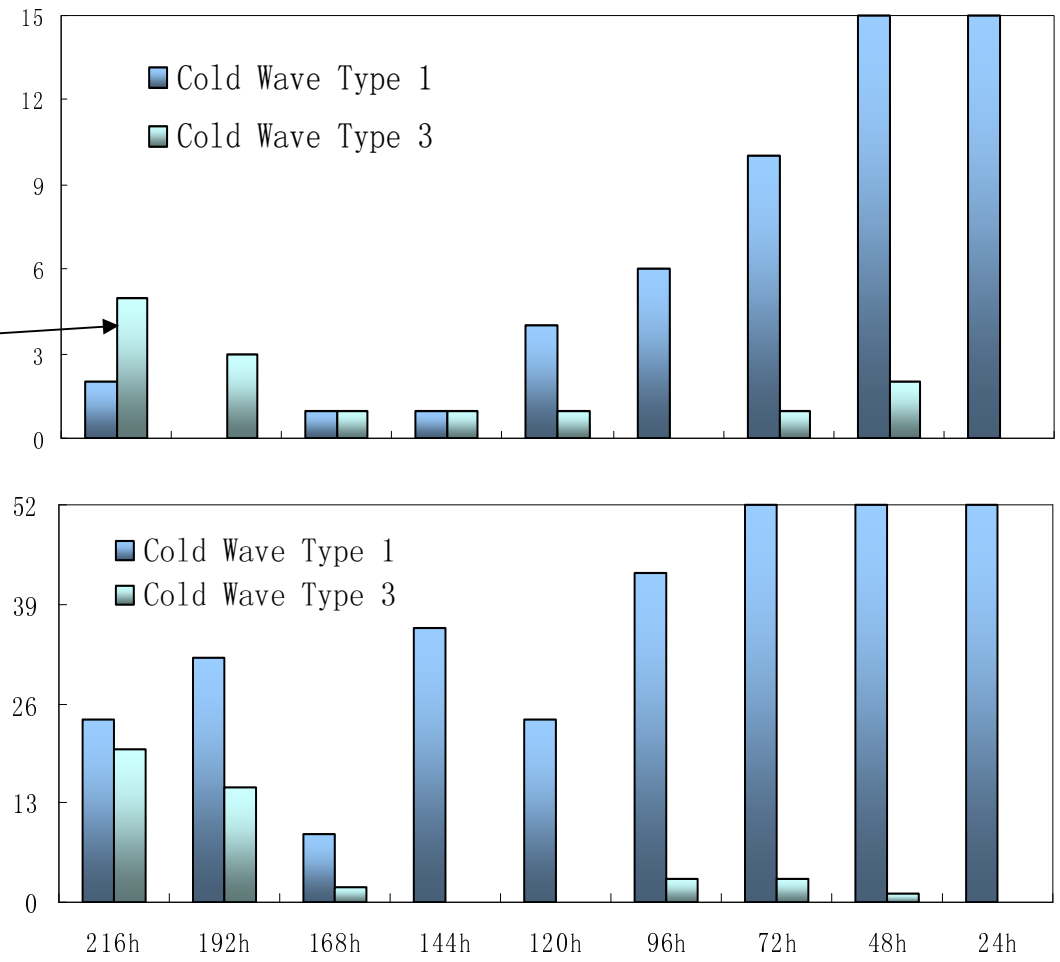
10 January 2008





3.2 Automatic Identification Forecast for Cold Wave in China

Numbers of the Ensemble Members that Forecast the Cold Wave



Forecast Result for the Cold Wave of 10 January 2008 based on the NMC&ECMWF Ensemble Products

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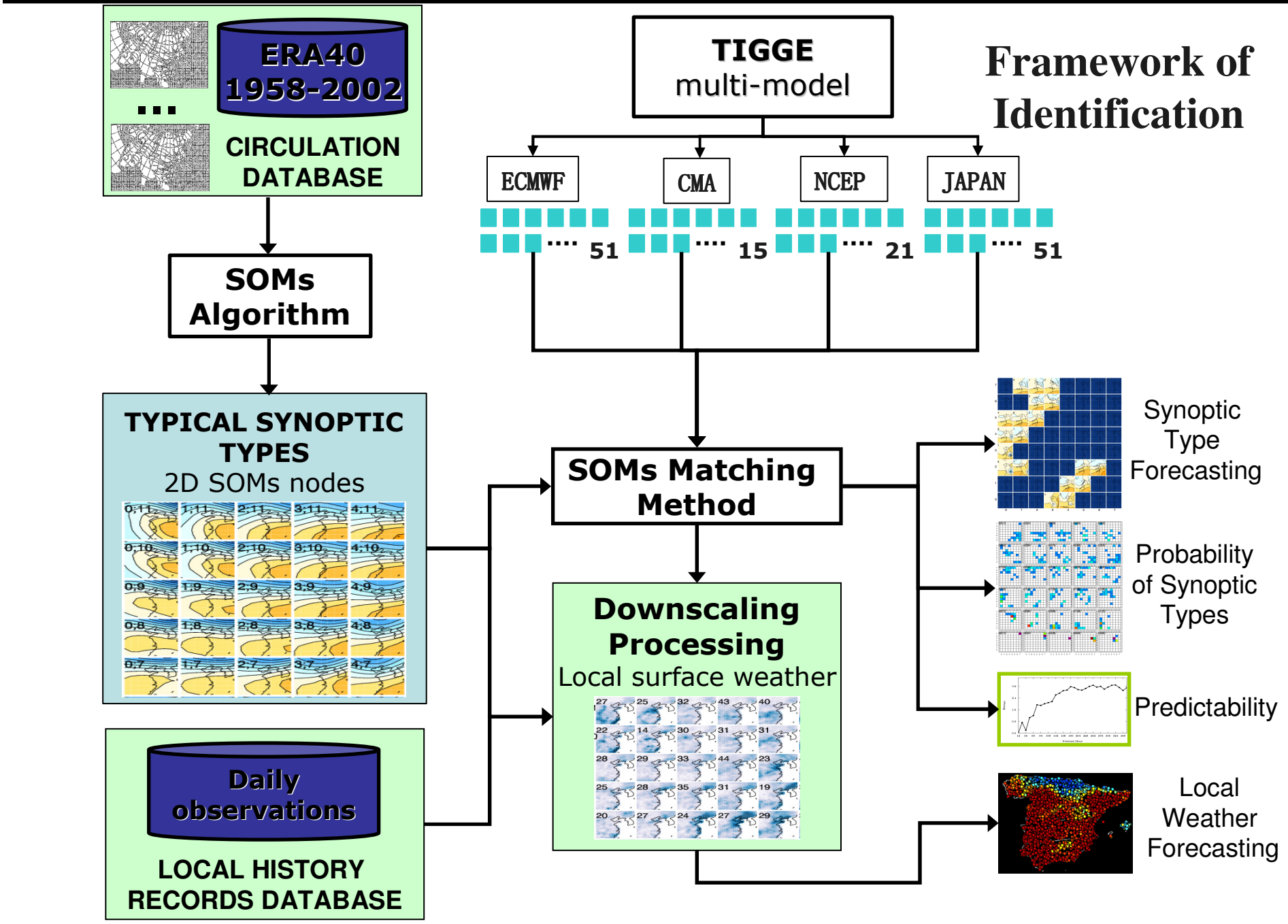
3.3 Identification of Typical Weather Events in Summer over China



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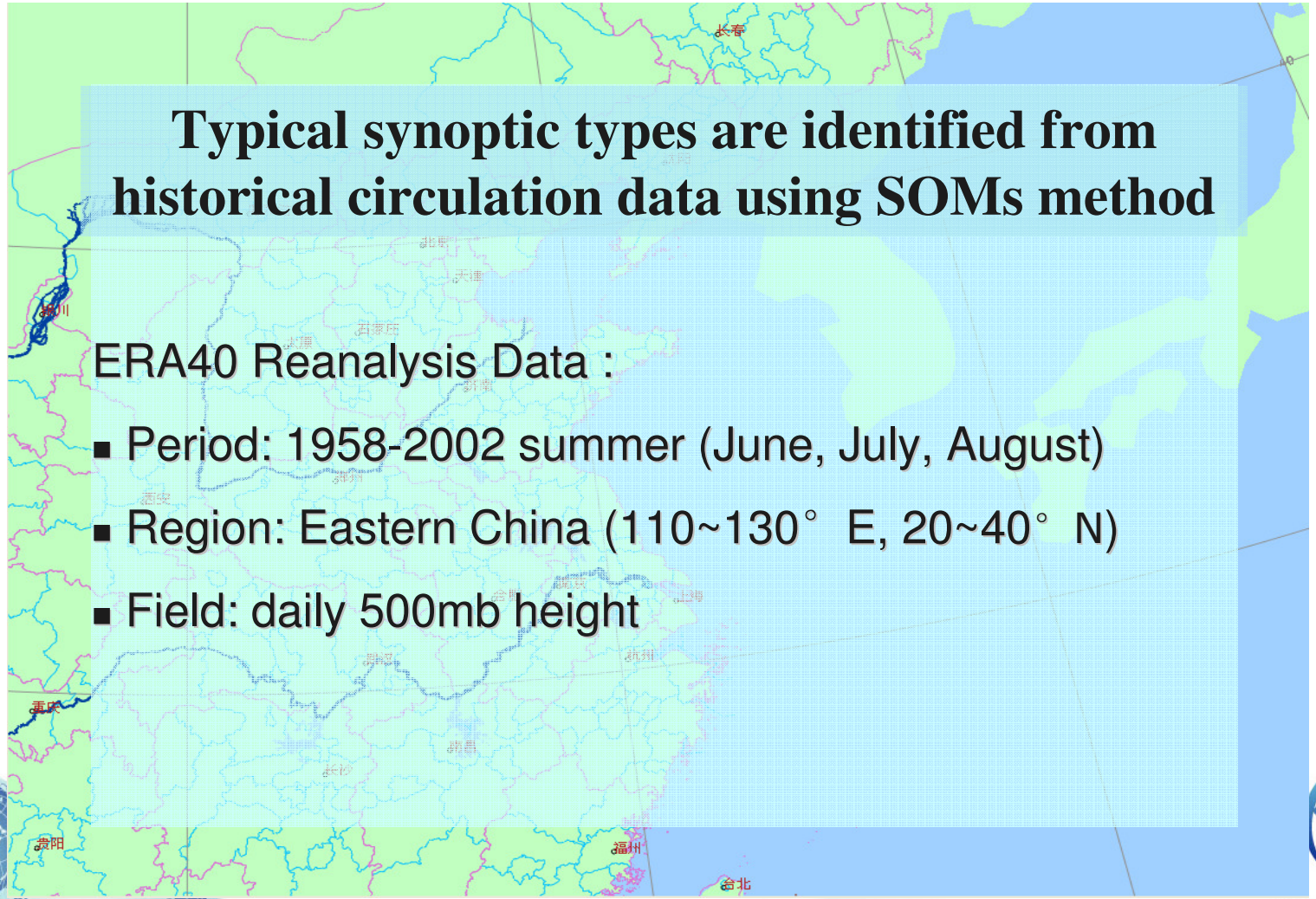

Typical synoptic types are identified from historical circulation data using SOMs method

ERA40 Reanalysis Data :

- Period: 1958-2002 summer (June, July, August)
- Region: Eastern China (110~130° E, 20~40° N)
- Field: daily 500mb height

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3.3 Identification of Typical Weather Events in Summer over China

TYPICAL SYNOPTIC TYPES

12 x 12 SOMs ARRAY

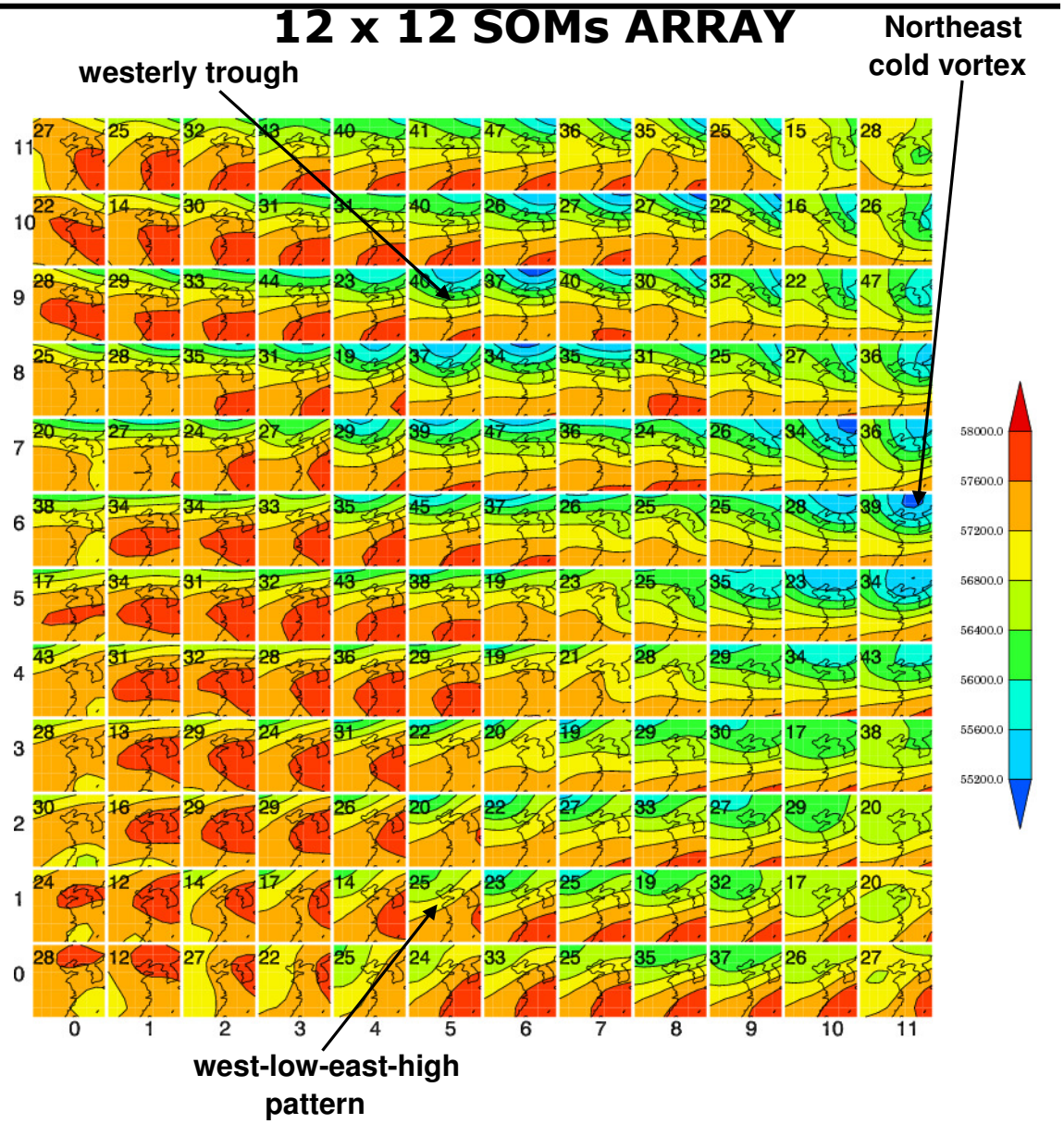
- Each node represents a typical synoptic weather type
- Synoptic types are spread in a continuum across the 2D node space
- Divided into two groups: subtropical high and midlatitude synoptic system
- Similar synoptic types are located adjacent to one another, while dissimilar types are at opposite extremes:

—At the top left corner, subtropical high is dominant

—At the top right corner, extratropical cyclone is dominant

—At the lower left corner, tropical cyclone is dominant

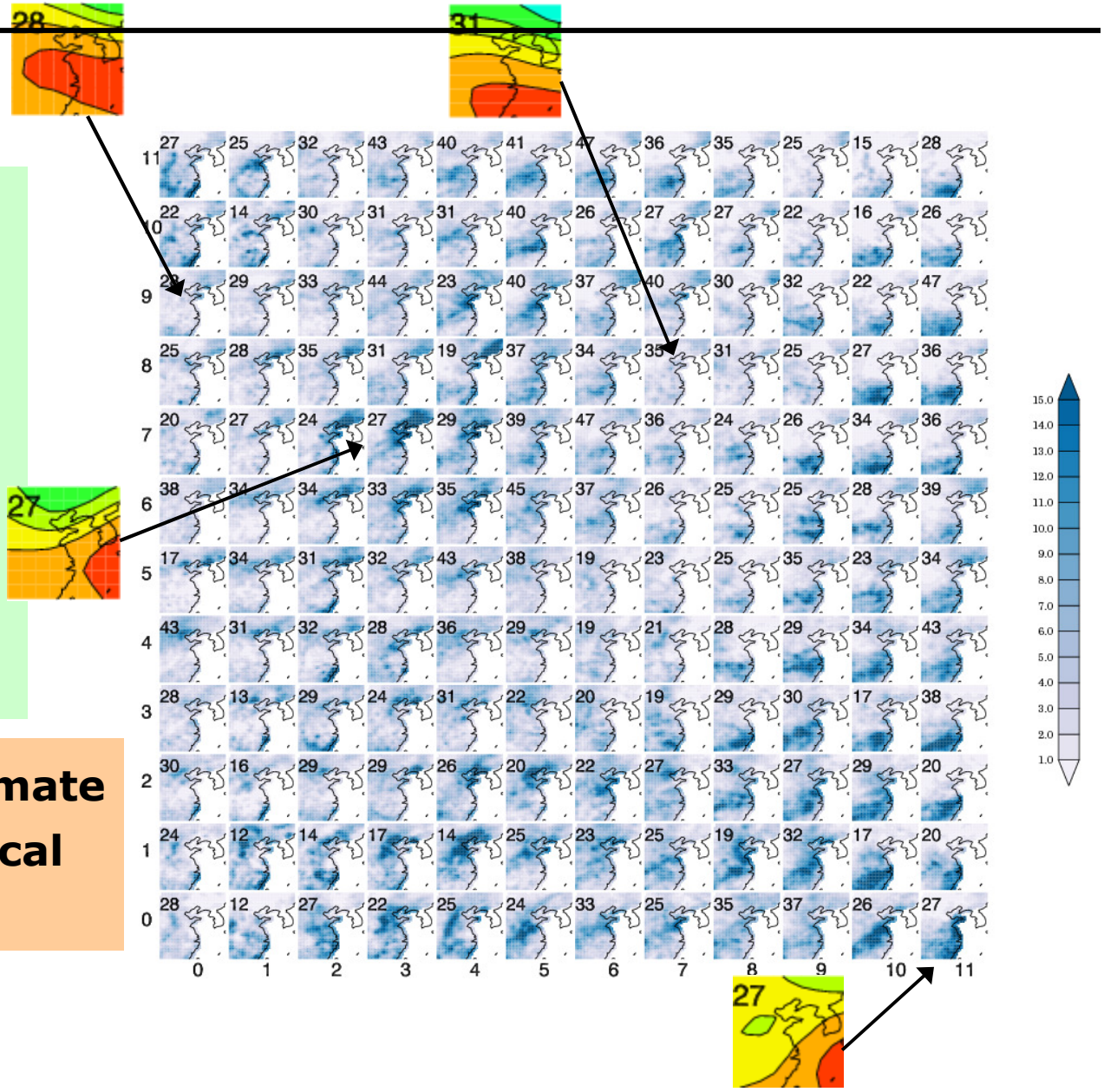
—At the lower right corner, southwest vortex is dominant



3.3 Identification of Typical Weather Events in Summer over China

- Less rainfall nodes are found in the upper left, upper right and central parts of SOMs array, corresponding to continental high or subtropical ridge types
- More rainfall nodes are distributed in the upper center and right lower portions, associated with westerly trough or cyclone synoptic types

Local precipitation climate associated with typical synoptic types



3.3 Identification of Typical Weather Events in Summer over China

Case study:

Using the obtained 144 types as the basic patterns, typical weather events are identified from TIGGE ensemble products. Case study for verification :

- ECMWF ensemble products: 50 perturbed members
- Run time: 00:00UTC, 9th July,2007
- Lead time: 012h、024h、…、360h

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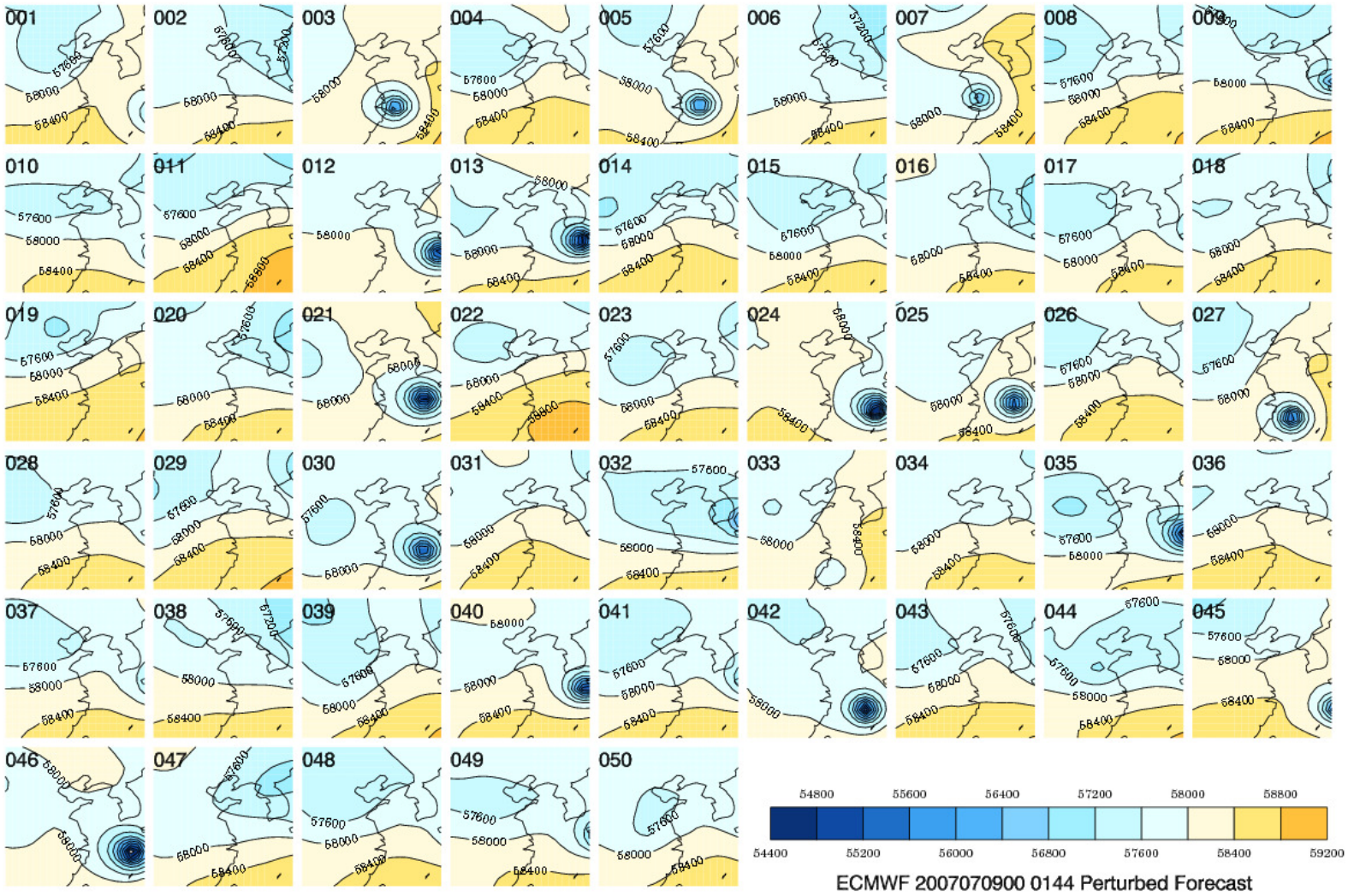
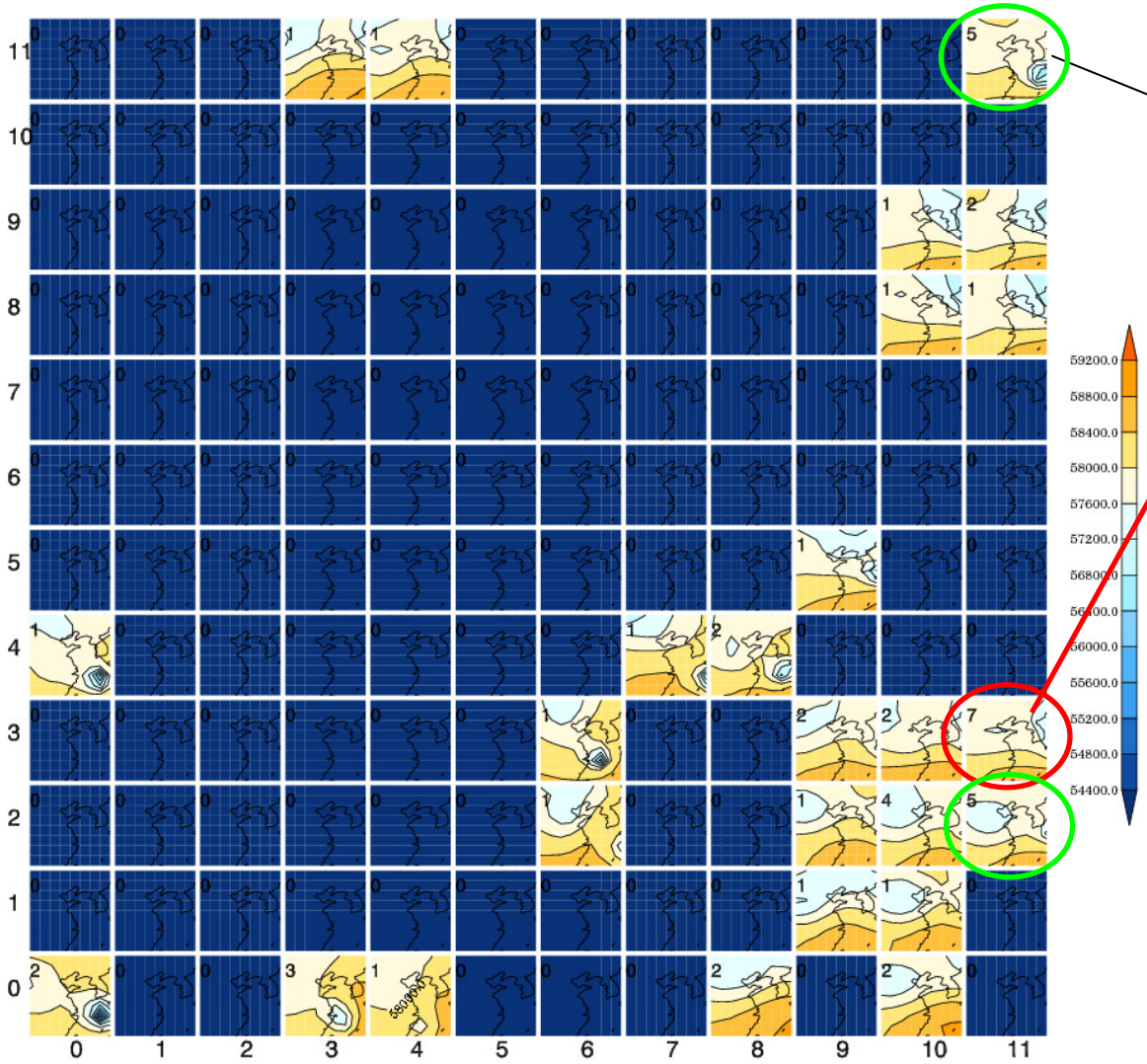
3.3 Identification of Typical Weather Events in Summer over China

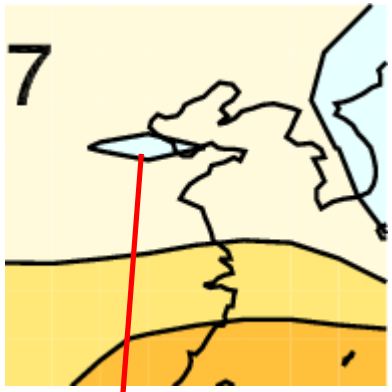


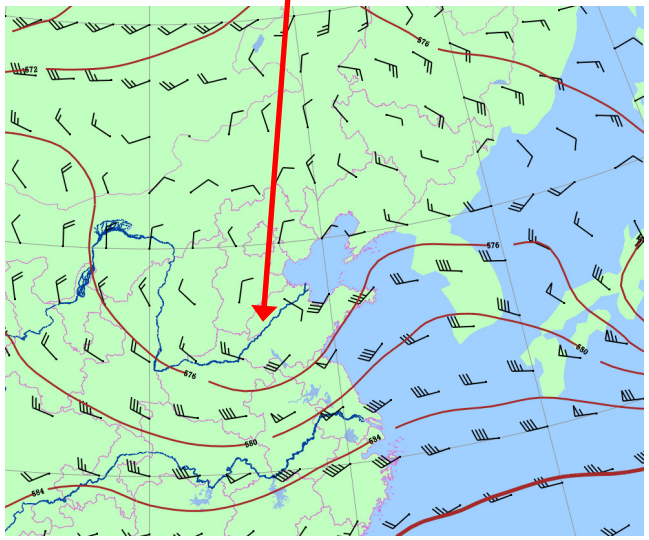
Verify the 144h weather-type-identification forecast

3.3 Identification of Typical Weather Events in Summer over China



Type [11,3] has more confidence than type [11,11]

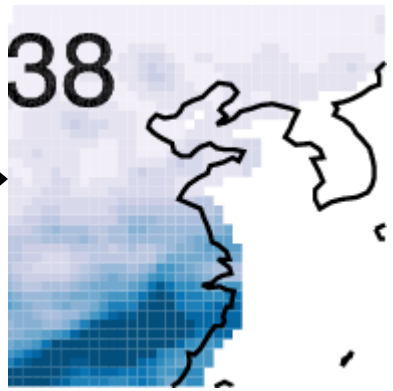




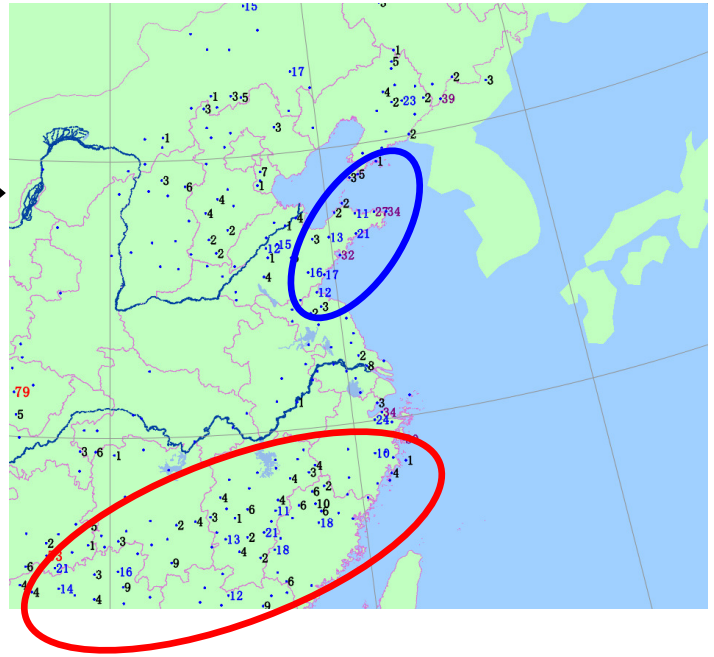
3.3 Identification of Typical Weather Events in Summer over China

Weather type forecasting

Local weather forecasting



Observation



Compared with rainfall observations, the local weather forecasting well catches the precipitation in South China, but misses rainfall in Shandong Province. Possible reasons are the precipitation is not only influenced by 500mb height, also by other factors, such as wind and moisture.

Local weather forecasting

4 Future Plan

- Operational application of research result
- Issue the medium range probability forecast by the end of 2010
- Further research on improving HIW forecast skill based on EPS

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Thank You!

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