



# Overview of Progress of World Meteorological Center Beijing and Future Perspective

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**WMC Beijing Office/NMC/CMA**

**15 Nov 2019 Haikou China**

1

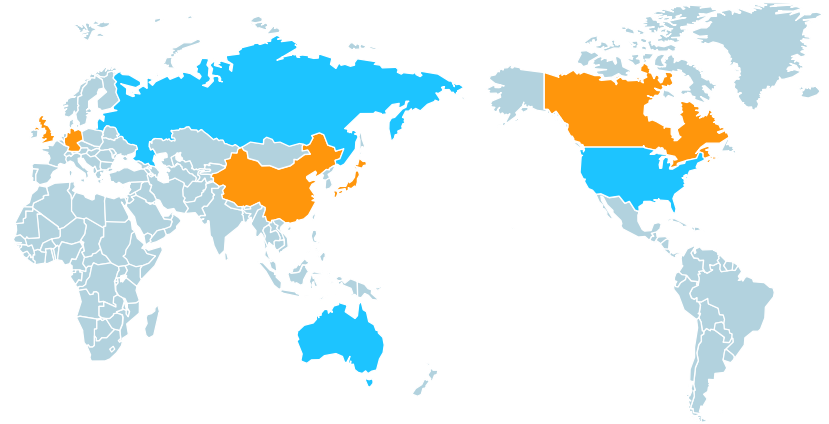
Overview of WMC

2

Progress of WMC-Beijing

3

Future Perspective



- WMO: **World Meteorological Organization** has **193** Members (countries) and coordinates the activities of the National Meteorological and Hydrological Services (NMHSs)
  - WWW, **World Weather Watch** : Core WMO programme since 1963 (WMO Cg-4)
  - Key WWW components:
    - (a) global observational data coverage → GOS
    - (b) a worldwide coordinated telecommunication system → GTS
    - (c) data processing systems → GDPFS



Pre-launch tests of meteorological satellite TIROS (1960)

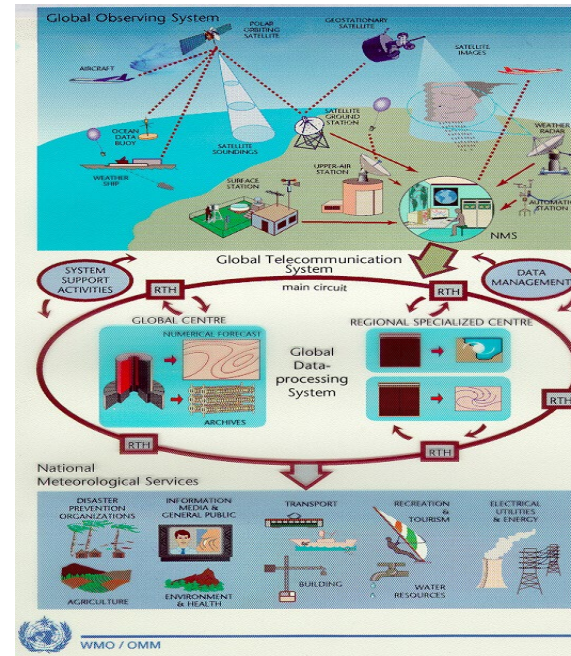


First mosaic photo by TIROS IX (13 Feb 1965)

- WIGOS: **WMO Integrated Global Observing System**
- WIS: **WMO Information System**
- GDPFS: **Global Data-Processing and Forecasting System**



## WMO WWW Programme



WIGOS

WIS

GDPFS

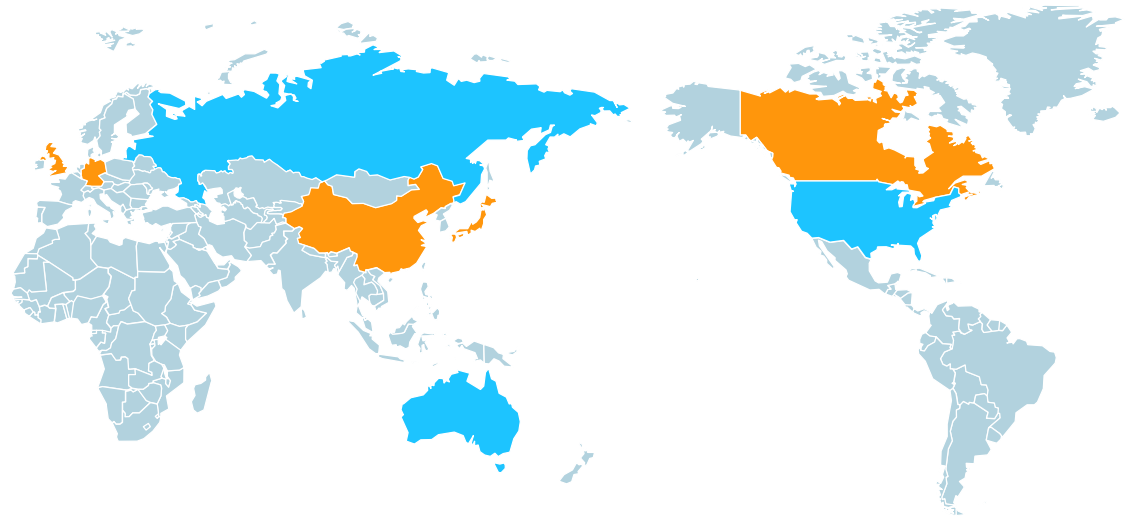
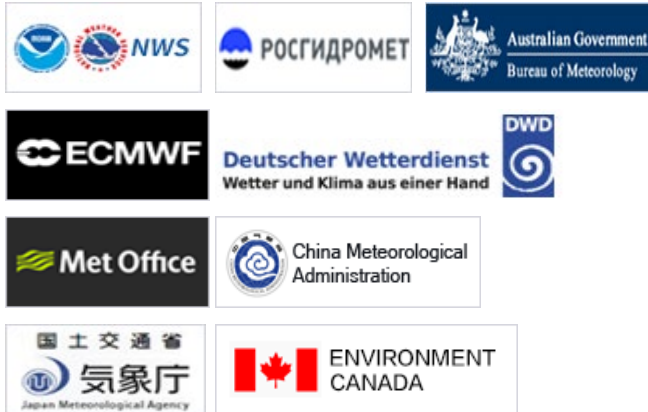
Service  
delivery

# GDPFS Centres



- GDPFS is organized as a **three-level** system to carry out functions:
  - **World Meteorological Centres** (WMCs)
  - **Regional Specialized Meteorological Centres** (RSMCs)
  - **National Meteorological Centres** (NMCs)

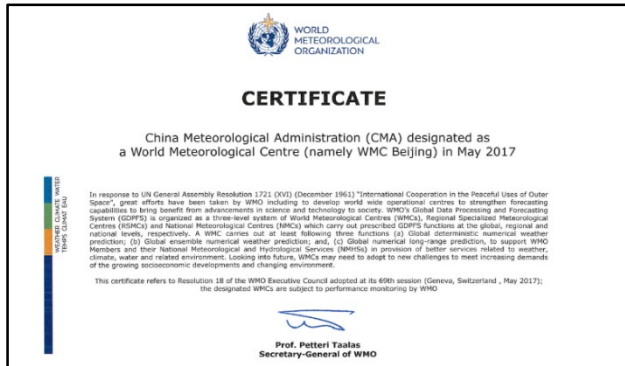
## WMO WMC



Designated in 1967

Designated in 2017

- On 17 May 2017, WMO designated China Meteorological Administration (CMA) as a **World Meteorological Centre (WMC)**
- On 16 Jan 2018, CMA Headquarters awarded the plaque of the "**World Meteorological Centre (Beijing)**" to the National Meteorological Centre (NMC)



# WMC-Beijing Office



**CMA**

Department of Forecasting and Networking

Department of International Cooperation

Coordinate and manage the implementation of WMC-Beijing's operation and development plans

National Met. Center

Office of WMC Beijing

Established in **2018**

National Climate Center

National Satellite Met. Center

National Met. Information Center

CMA Public Met. Service Center

Chinese Academy of Met. Science

CMA Training Center

⋮

Global deterministic NWP

Global ensemble NWP

Global numerical long-range prediction

Severe weather forecast International desk

WMO Programs and International Cooperation

Operational technical training

Expert Teams

Task Working Groups

1

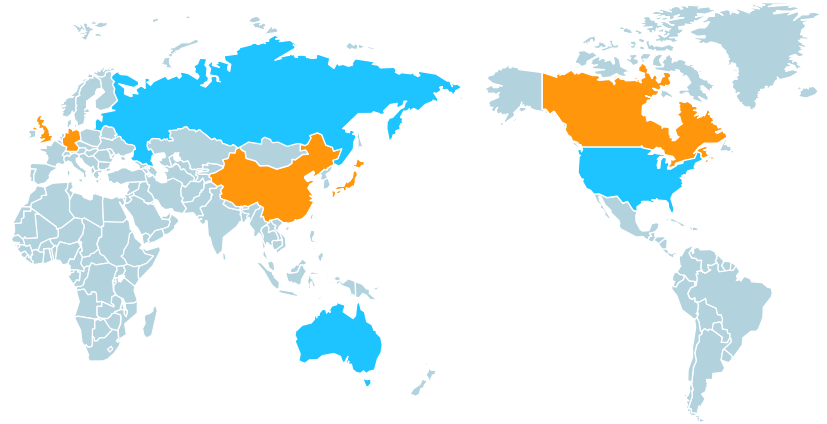
Overview of WMC

2

Progress of WMC-Beijing

3

Future Perspective

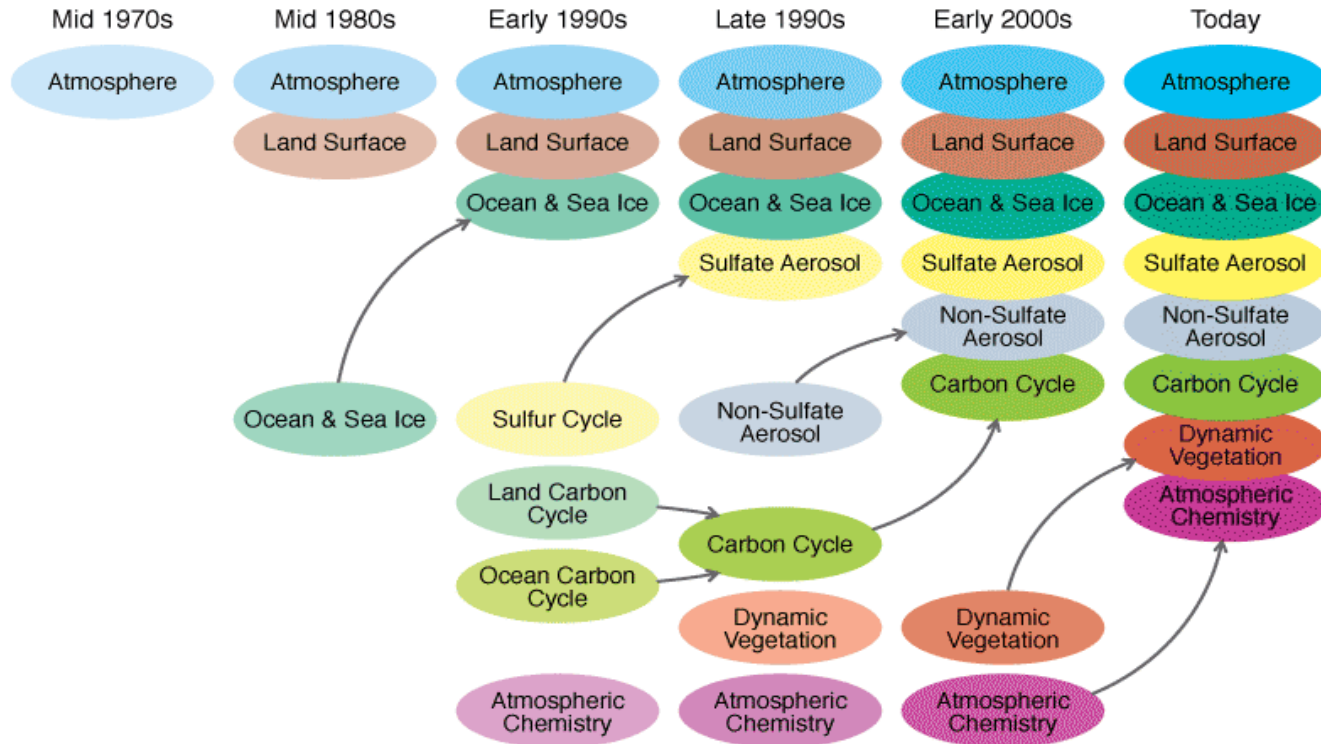




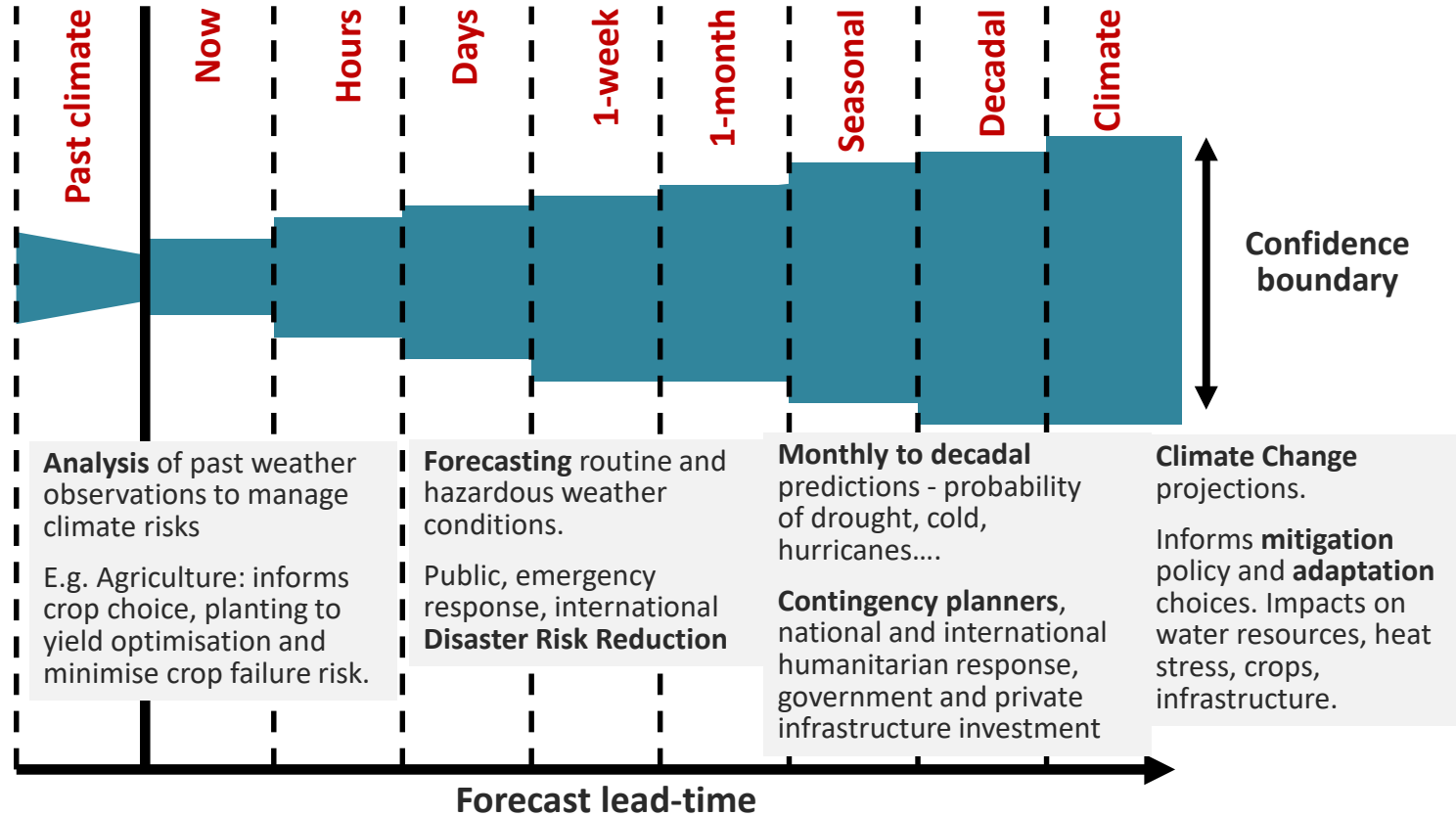
## 1<sup>st</sup> Workshop of WMO World Meteorological Centres 26-29 Mar 2019, Beijing, China



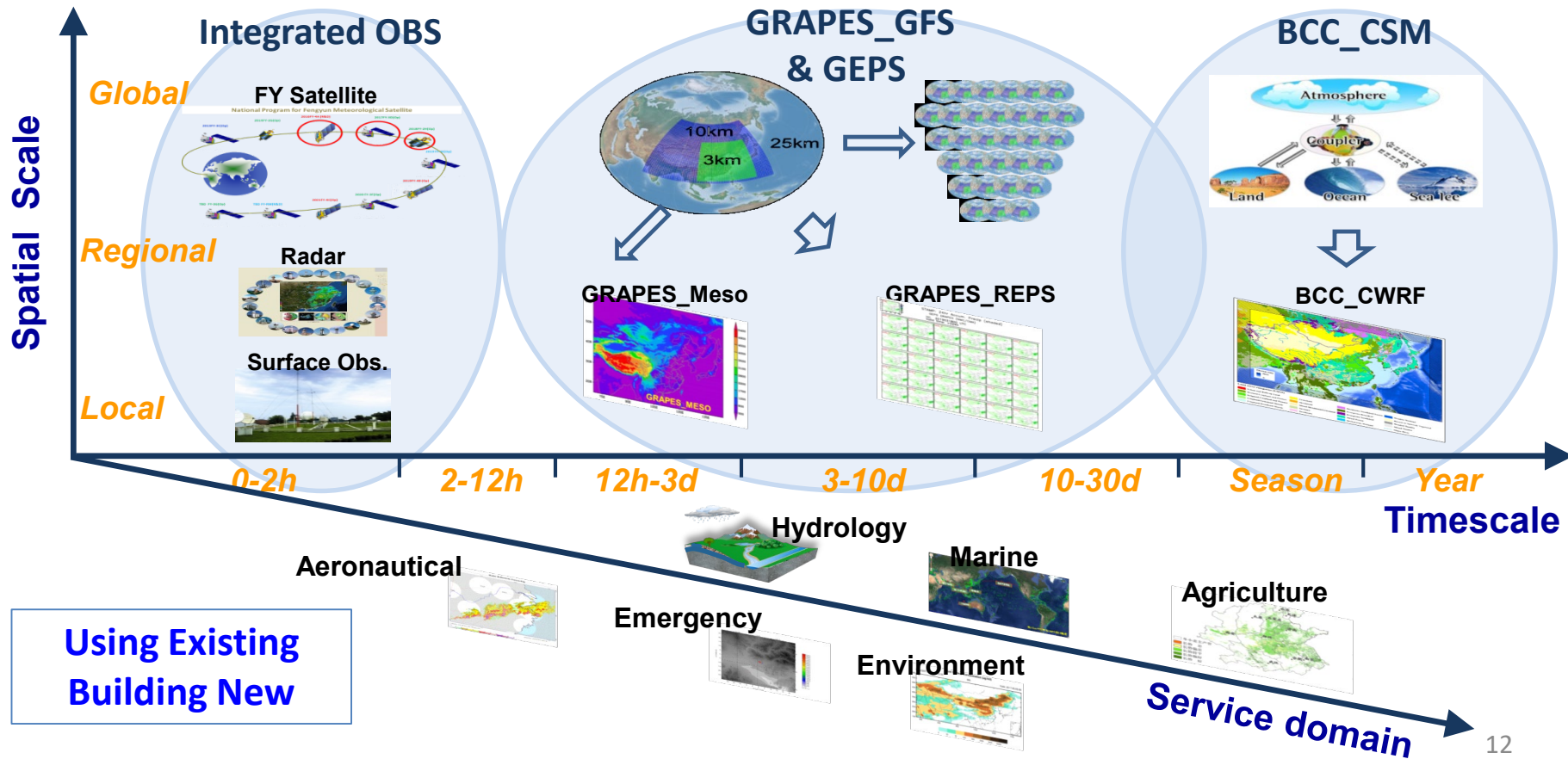
## Evolution to Earth System Models



## Seamless Prediction across timescales



# Seamless Prediction of WMC-Beijing

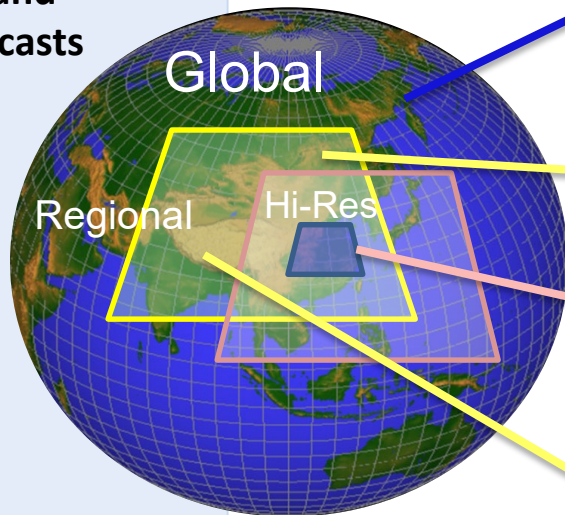


# Operational NWP Systems



## Global/Regional Assimilation Prediction System

Deterministic and ensemble forecasts



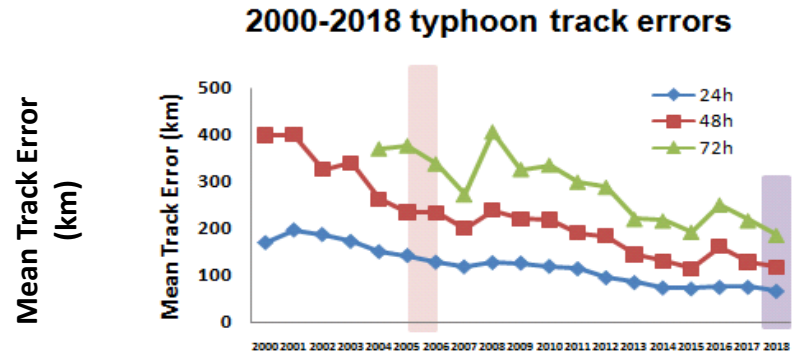
On global and regional scales

- **Global 10d forecast**
  - GRAPES\_GFS 25kmL60
- **Global 15d EPS**
  - GRAPES-GFS 50kmL60, 30members
- **Regional 3-5d forecast /8 times**
  - GRAPES\_Meso 10kmL50
  - GRAPES\_Meso 3kmL50
- **Typhoon 5d forecast**
  - GRAPES\_TYM 12kmL50
- **Regional EPS 3d**
  - GRAPES-REPS 15kmL31

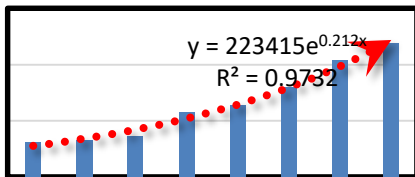
# Advancement on NWP



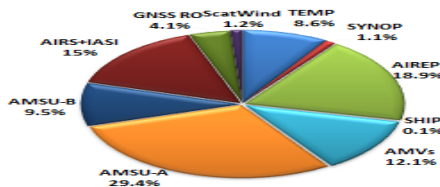
Techniques	2006	2018
Data Assimilation	3DVAR	4DVAR
Percentage of Satellite Data	30%	70.3%
System	Global	Global and Regional Global EPS (15Mems)
Model Resolution	60km/L31 (GFS)	25km/L60 (GFS) 12km/L50 (Reg)
TC Products	TC Track	TC Track TC Intensity TC Track Probability



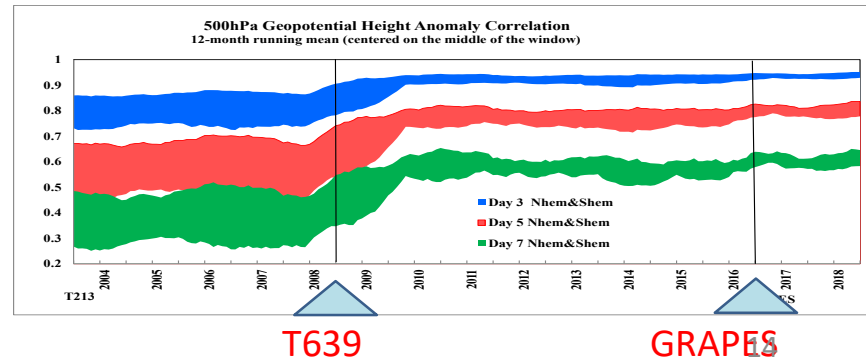
## Amount of satellite data



## Percentage of assimilated data



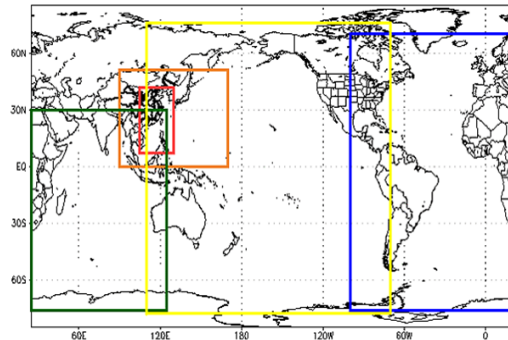
## ACC of 500hPa height



# Operational Ocean Wave Model



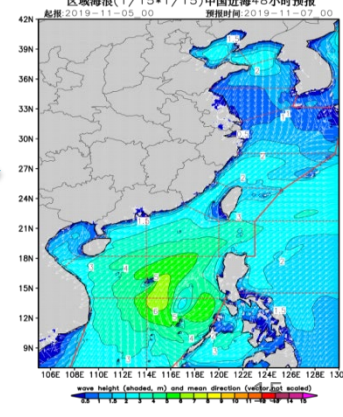
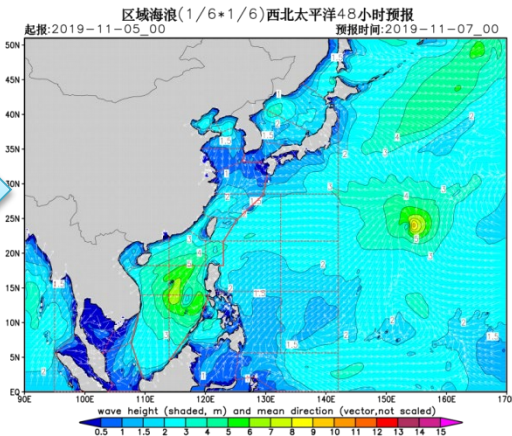
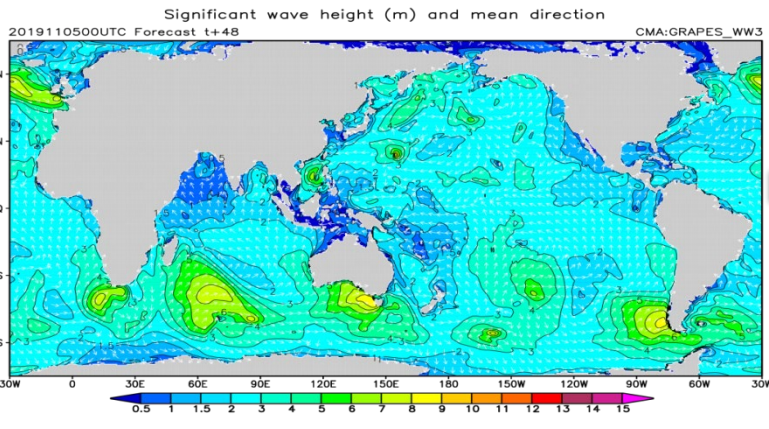
- The global ocean wave model uses sea surface wind field produced by **GRAPES\_GFS** to drive ocean wave module and generate numerical ocean wave prediction field
- About 20 wave parameters including **significant wave height**, directions, frequencies



Global : 60km (1/2°)  
240 hour forecast

Regional 18km(1/6°)  
120 hour forecast

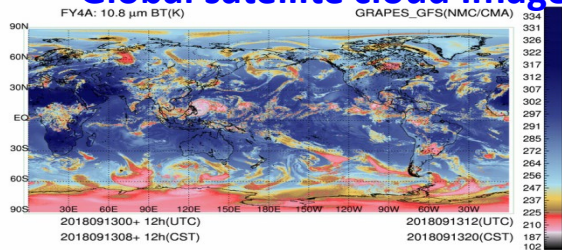
Coastal 7km (1/15°)  
72 hour



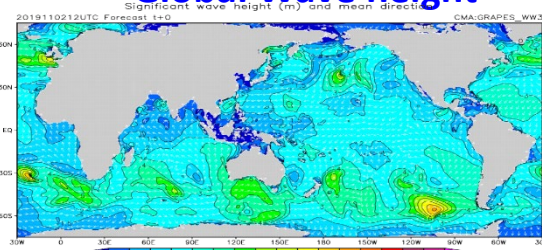
# NWP Products — Examples



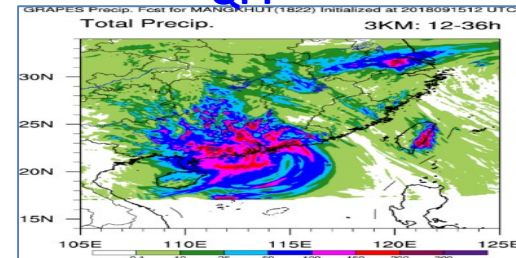
## Global satellite cloud Image



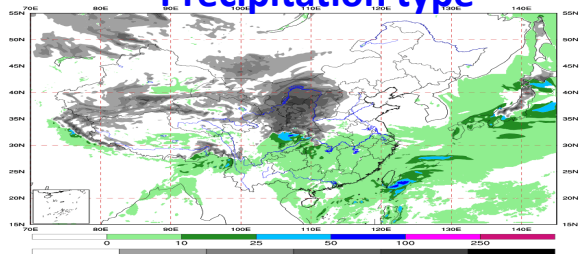
## Global Wave height



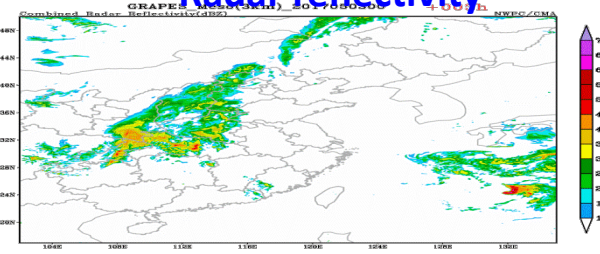
## OPF



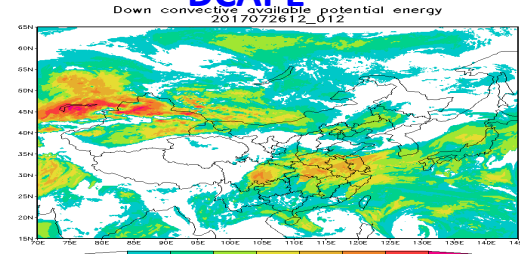
## Precipitation type



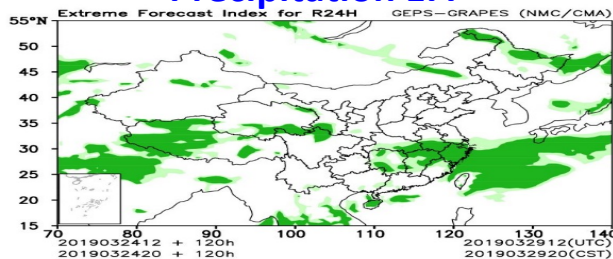
## Radar reflectivity



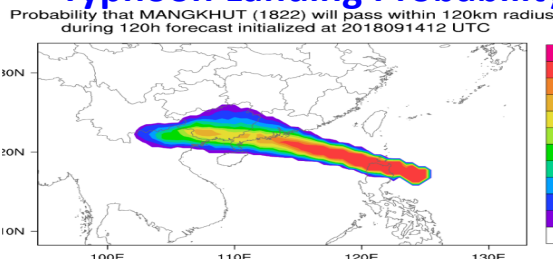
## DCAPE



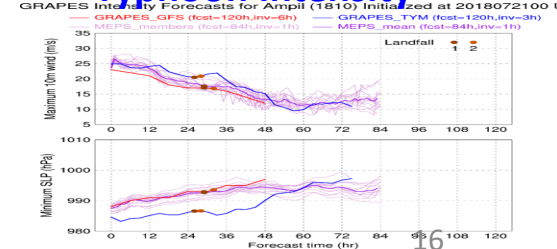
## Precipitation EFI



## Typhoon Landing Probability



## Typhoon intensity

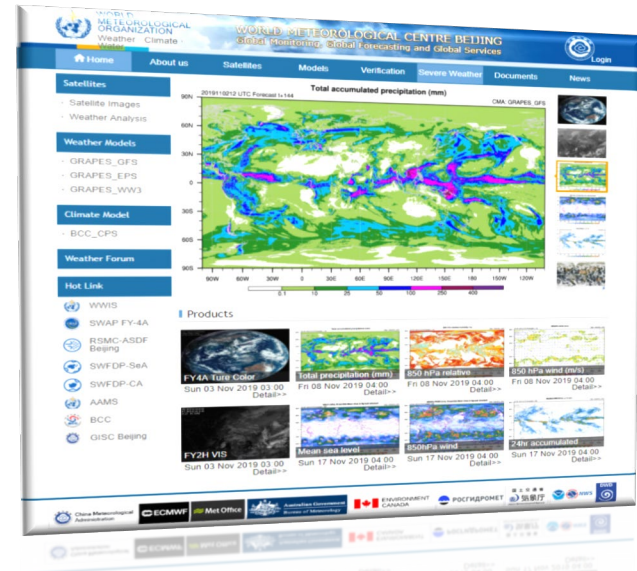




# WMC-Beijing Website



- Officially **launched on 6 Jun 2018** and operated by WMC-Beijing office
  - Contribution to WMC-Beijing's functions
  - Platform of CMA for Global Monitoring, Global Forecasting, Global Serving
- **Real-time graphical products**
  - Daily FY-4A FY-3D images
  - Daily GRAPES\_GFS NWP
  - Daily GRAPES\_EPS NWP
  - Monthly and seasonal prediction
- **News and publications**
  - Global significant weather event
  - Specification on NWP models and products
  - Annual report on the activities of WMC-Beijing
  - Links to RSMC undertaken by CMA



[www.wmc-bj.net](http://www.wmc-bj.net)

# WMC-Beijing Website



WORLD METEOROLOGICAL CENTRE BEIJING  
Global Monitoring, Forecasting and Services



Login

About Us

Verification

Documents

News

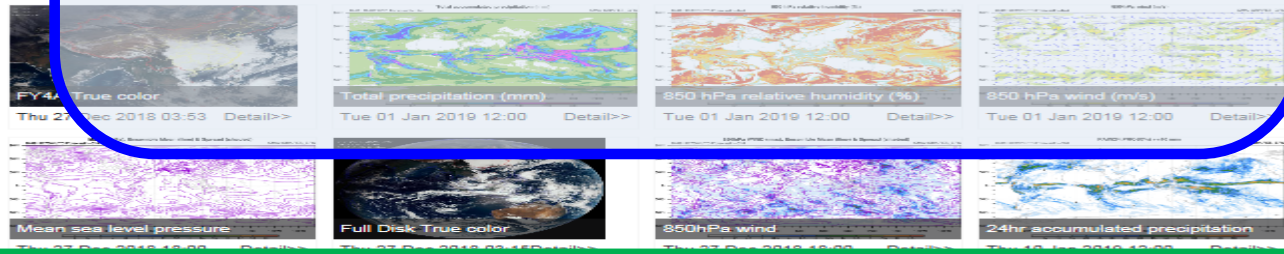
Catalogue

Real-time  
Operational  
Products

SWFDP

RSMC

Products



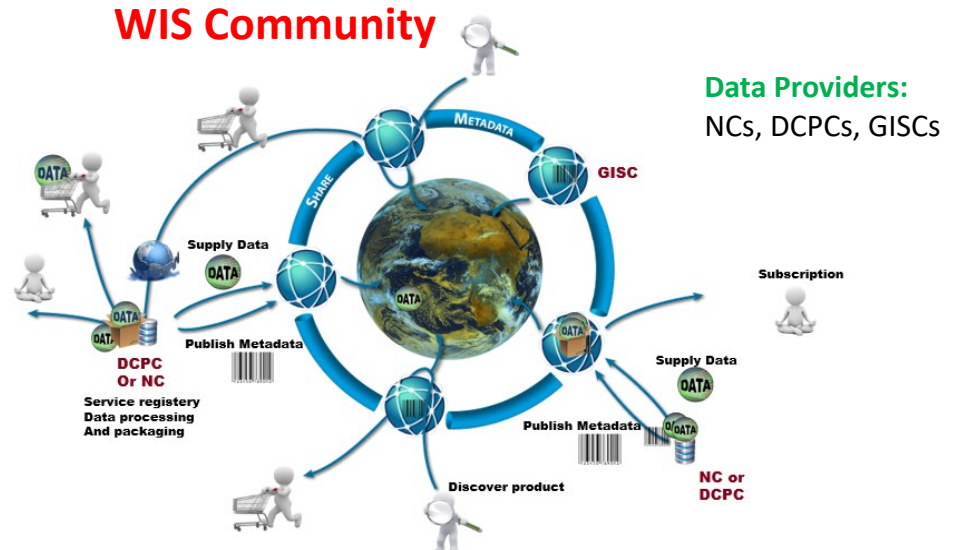
WMCs Links



# Access of WMC-Beijing Data via WIS



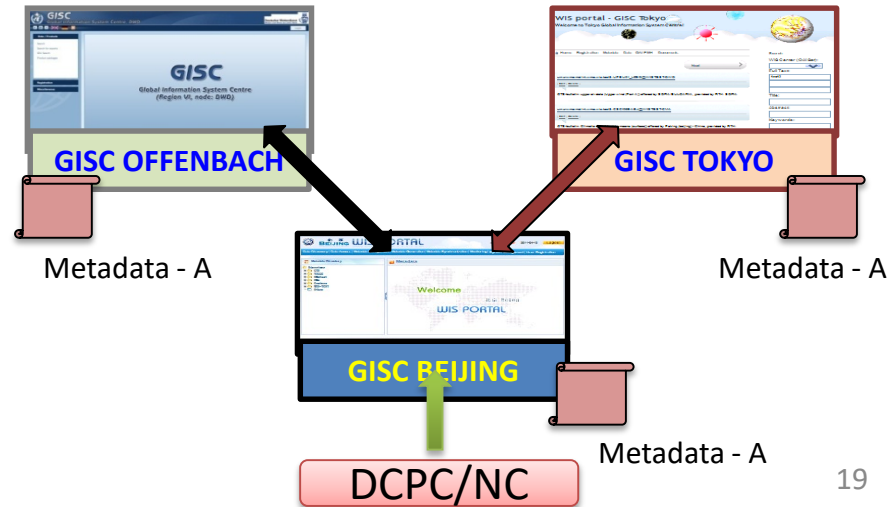
- **Global Information System Centre (GISC)**
  - Core component of the WIS
  - Collect and distribute info for global provision
  - Provision of search portals for the **whole WIS catalogue** for discovery and access to **193** WMO members



# Access of WMC-Beijing Products and Data

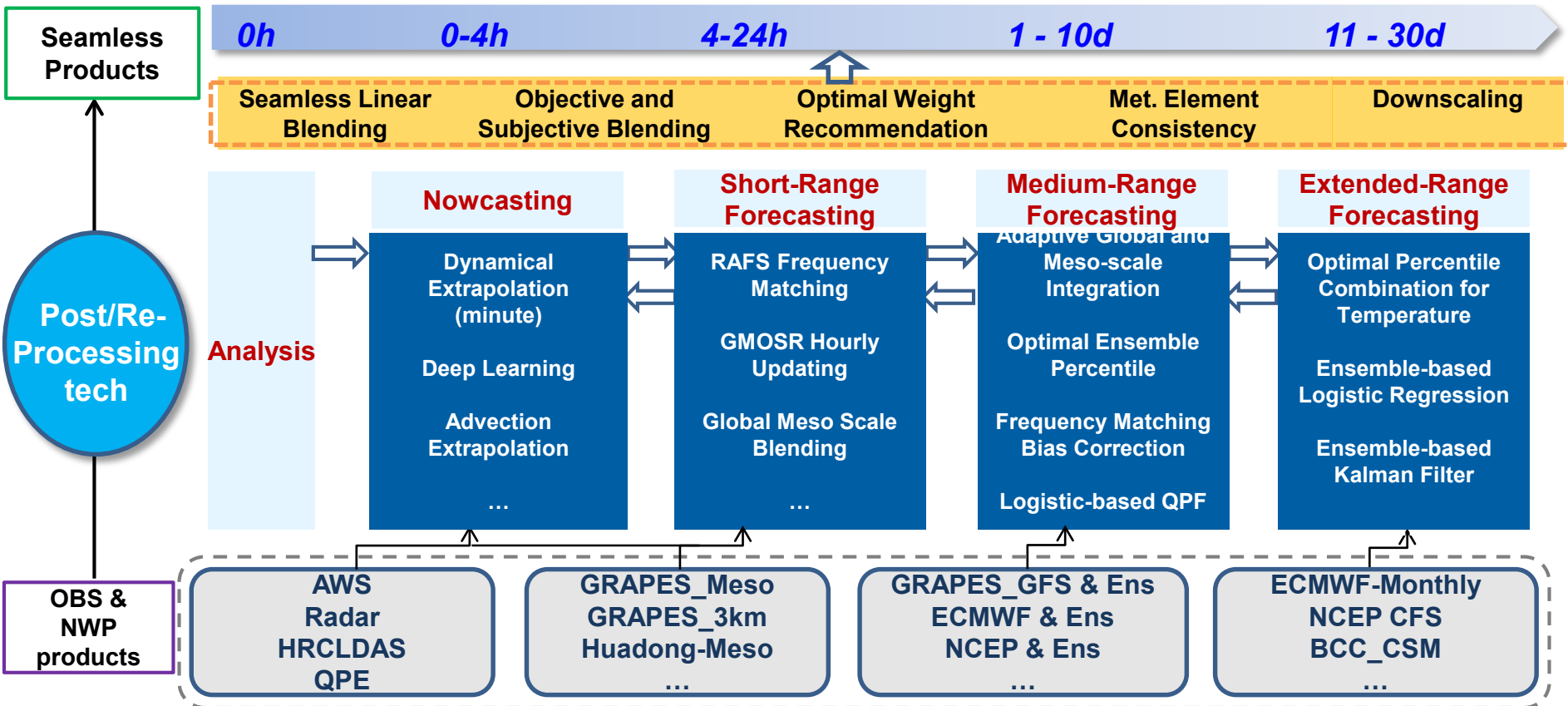


- Discovery Metadata for WMC-Beijing is available on **GISC-Beijing** operated by NMIC
  - GRAPES\_GFS Metadata**
  - GRAPES\_EPS Metadata**
  - BCC\_CSM Metadata**
  - Related RSMCs Metadata
    - Regional Sand and Dust forecasts
    - Marine Services
  - Tropical Cyclone
- Metadata links are also accessible on “what we do” of **WMC-Beijing website**





# Post/Re-Processing Framework



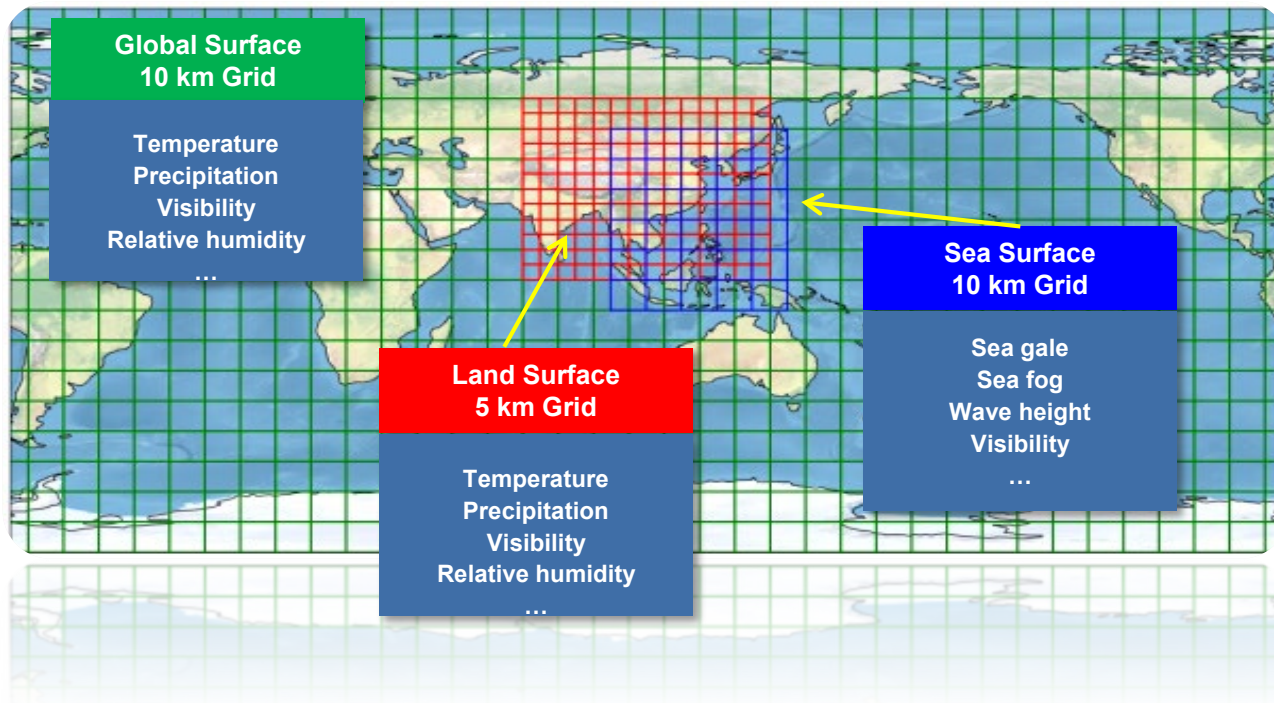
## Met. Elements

Temperature, Precipitation,  
Visibility, Relative humidity,  
Wind speed and direction,  
Cloudiness, Fog, Haze,  
Hail, Heavy rainfall,  
Thunderstorm gale

...

## Time Resolution

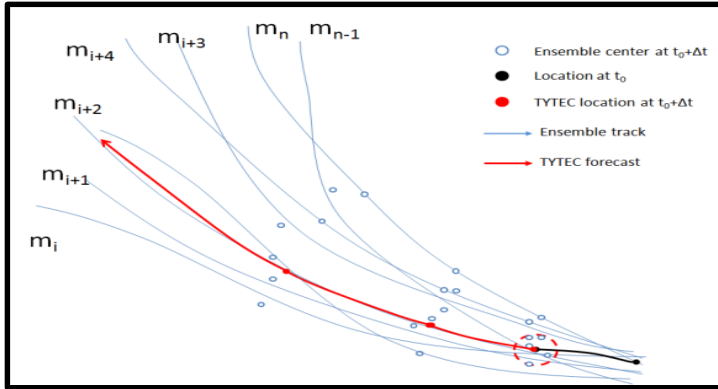
0-12h: 1h  
12-72h: 3h  
4-10d: 6h  
11-30d: 12h



# Example: Re-processing Tech on EPS

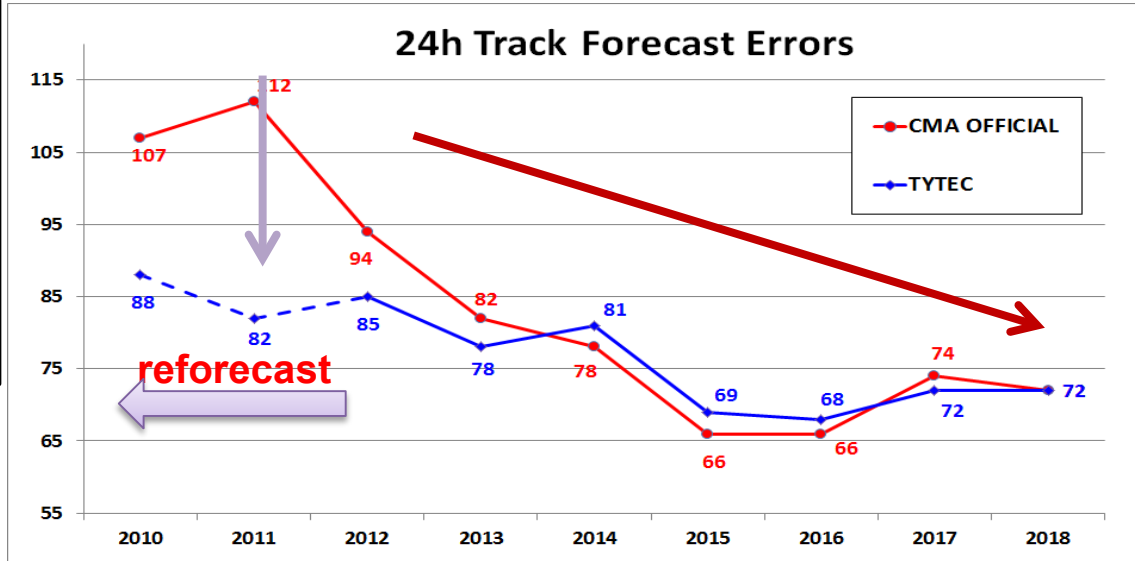


## Schema of TYTEC



Since 2012 developed and continued to improve TC objective forecast technique **TYTEC** (TYphoon Track Ensemble Correction)

## 24h Track Forecast Errors



### TYTEC Evolution:

Initiated to develop TYTEC

Improved the selection of good members

From single ensemble to multi-ensembles

Improving TYTEC based on track types

Introducing more ensembles

2012

2013

2014

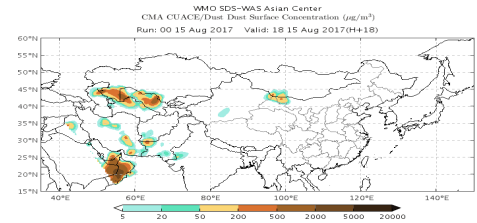
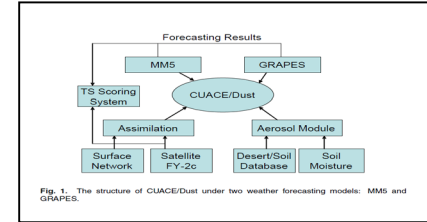
2015

2016

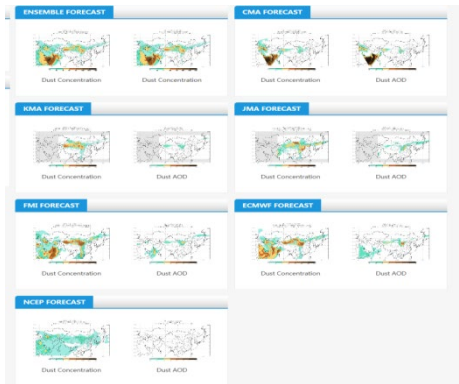


## CUACE/Dust (Chinese Unified Atmospheric Chemistry Environment /Dust)

- Designed as a unified chemistry module to be easily coupled onto any atmospheric models at various temporal and spatial scales
- Through a common interface to communicate with a host model
- **4 functional blocks:**
  - emission processor
  - gas phase chemistry
  - aerosol algorithm
  - data assimilation system



## RSMC ASDF-BJ website



## SDS Forecast products

### Model

CAMS

NGAC

SILAM

CUACE/Dust

MASINGAR

ADAM

### Institution

European center for Medium-Range Weather Forecast, U.K.

National Centers for Environmental Prediction, U.S.

Finnish Meteorological Institute, Finland

China Meteorological Administration, China

Japan Meteorological Agency, Japan

Korea Meteorological Administration, Korea

### Domain

Global

Global

Regional

Regional

Global

Regional

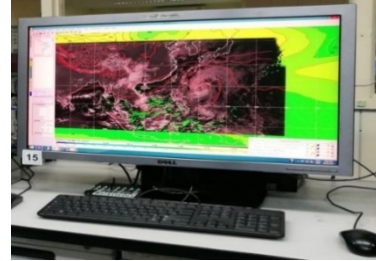
# Operation Platform Transmission to DCs and LDCs



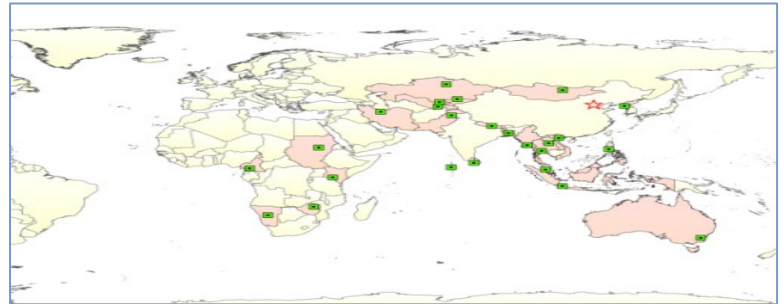
**MICAPS:** (**M**eteorological **I**nformation **C**omprehensive **A**nalysis and **P**rocess **S**ystem), fully supports short to medium range weather forecasting process :

**Monitoring, Analysis, Forecast and Verification**

Introduced to more than **25** Asian and African NHMSs, including **5 TC** Members: **Philippines, North Korea, Laos, Malaysia, Thailand**



**2012-2018**



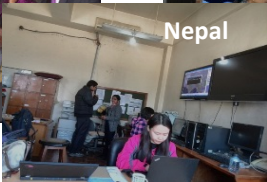
Zimbabwe



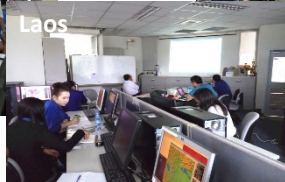
Myanmar



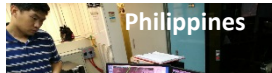
Nepal



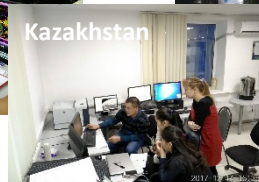
Laos



Philippines



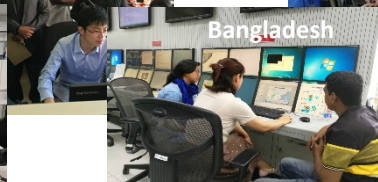
Kazakhstan



Kenya



Bangladesh



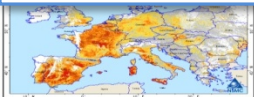
Tajikistan



# Global Significant Weather Briefing

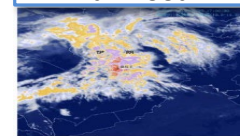


## Euro extreme heat wave



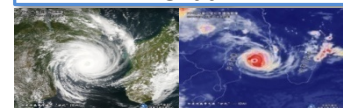
2019.7.24-26

## Iran flood



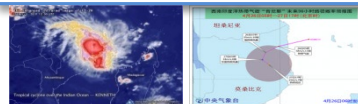
2019.3.25

## TC Idai



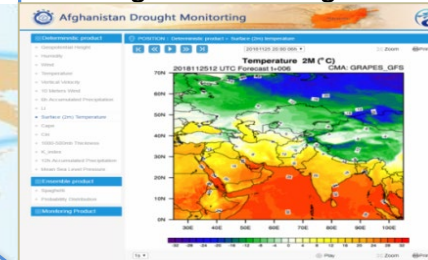
2019.3.14

## TC Kenneth

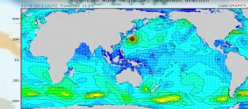


2019.4.26

## Afghanistan drought

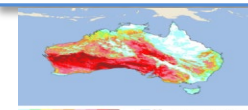


## TC Hagbis



2019.10.10-12

## Australia heat wave



2019.1.24-30





# International Training Activities



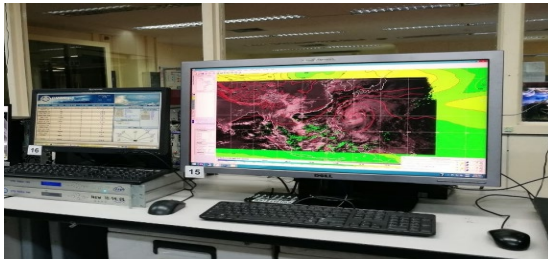
## SWFDP-Sea and SWFDP-CA Training Workshops



## Typhoon Forecast Training



## MICAPS System and Operational Skill Training



1

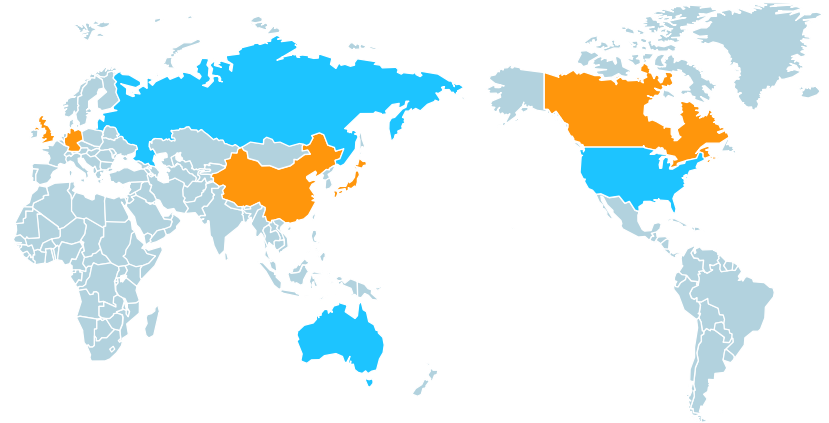
Overview of WMC

2

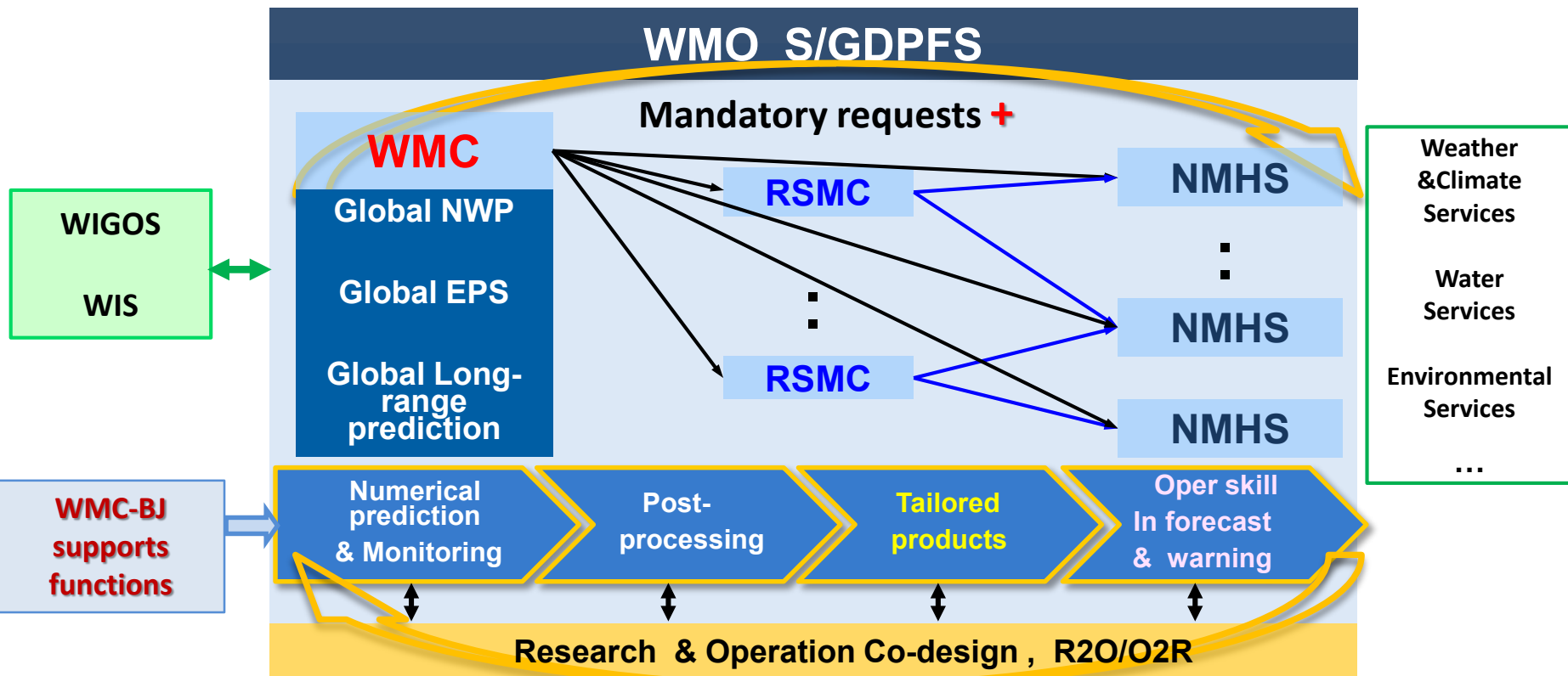
Progress of WMC-Beijing

3

Future Perspective



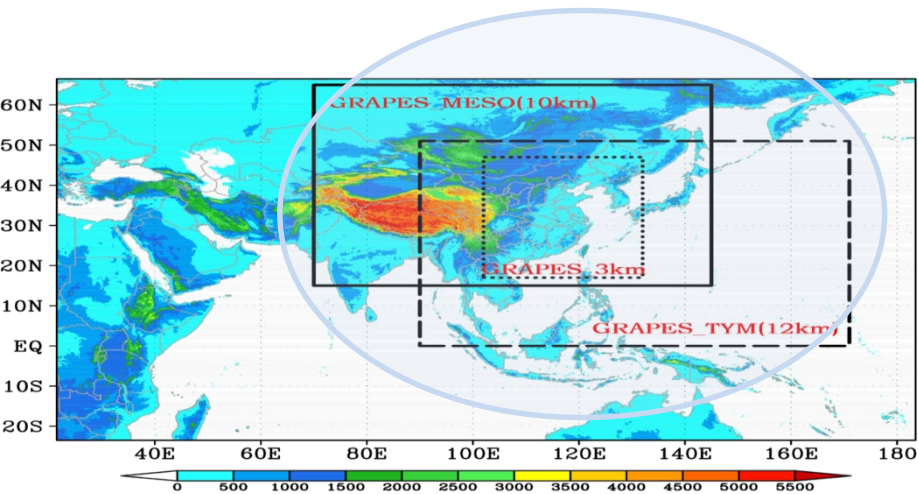
# Key functions for Seamless GDPFS



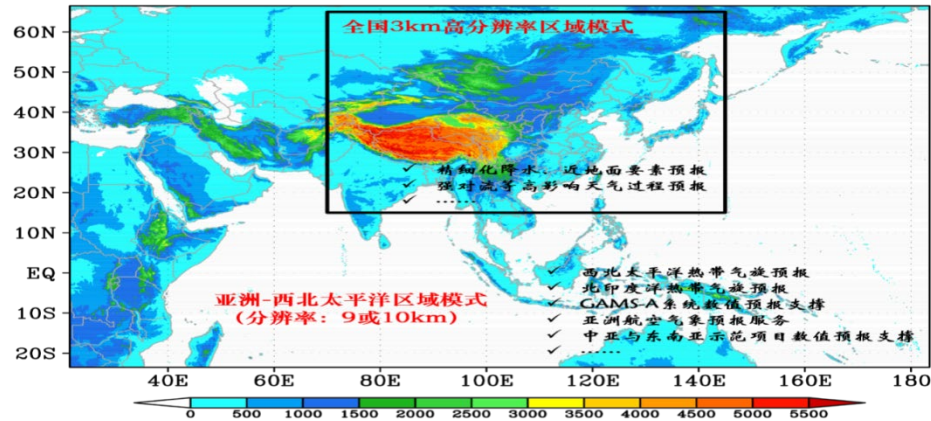
**To enhance the usage of NWP and OBS products**

— Improving better services particularly for developing NHMSs including LDCs and SIDS

# Advancement on NWP



Domain of GRAPES\_MESOs in operation



Expand Domain for GRAPES\_MESOs by 2020



# Interactive Web Charts



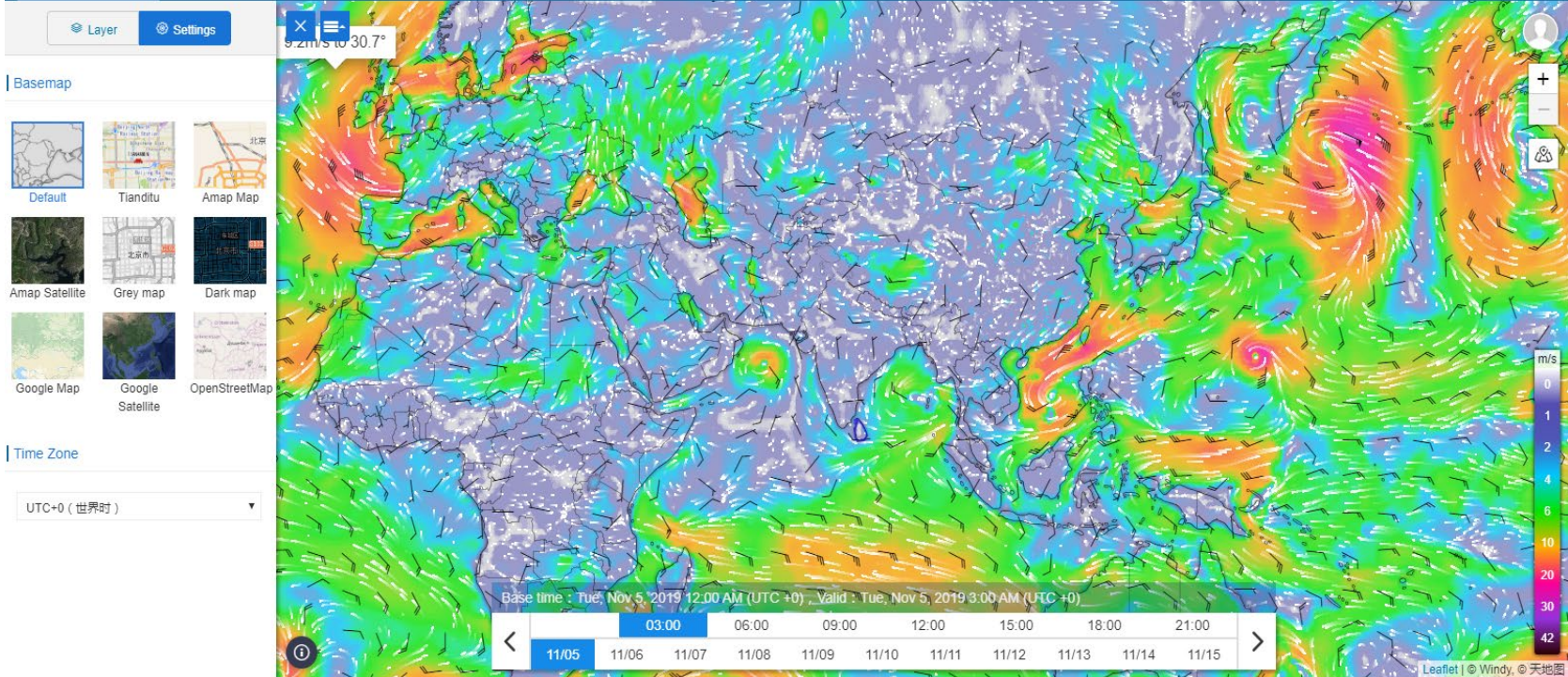
WORLD METEOROLOGICAL CENTRE BEIJING

Global Monitoring, Global Forecasting and Global Services



test1 ▾

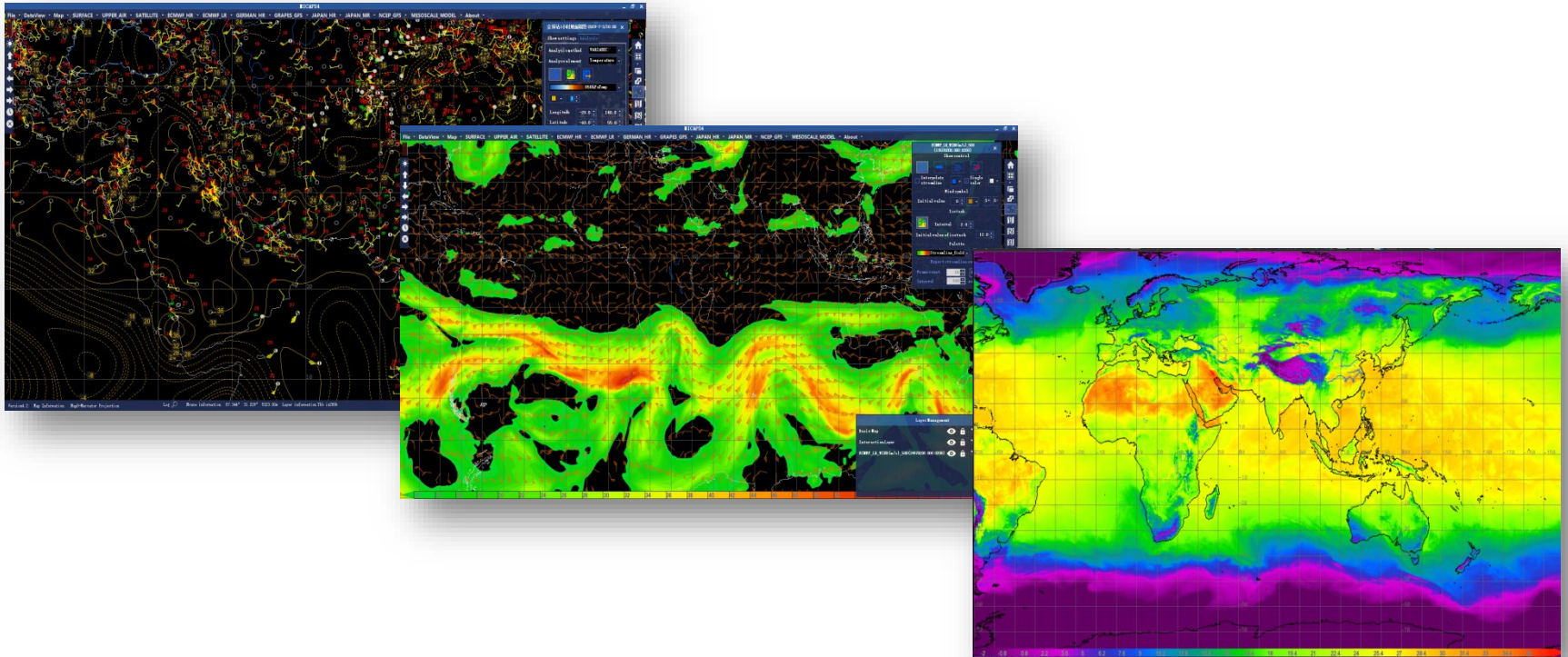
- Home
- About us
- Satellites
- Models
- Verification
- Severe Weather
- Documents
- News



# MICAPS4 International Version



- Efficient Analysis Method Provide Rich Display
- Convenient and Integrated information Display



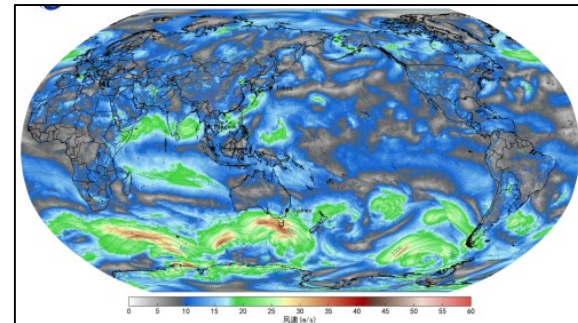
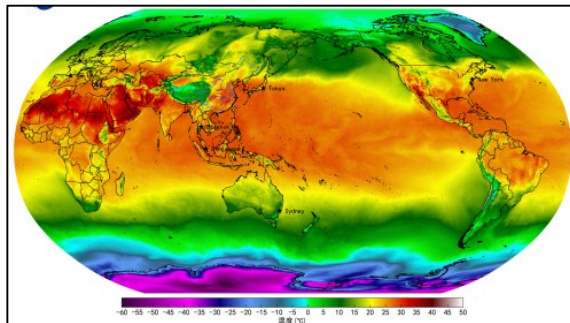
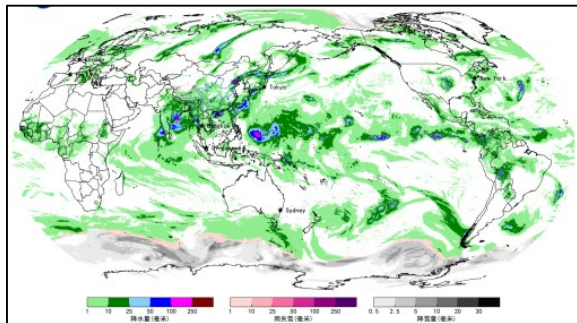
# WMC-Beijing is committed to



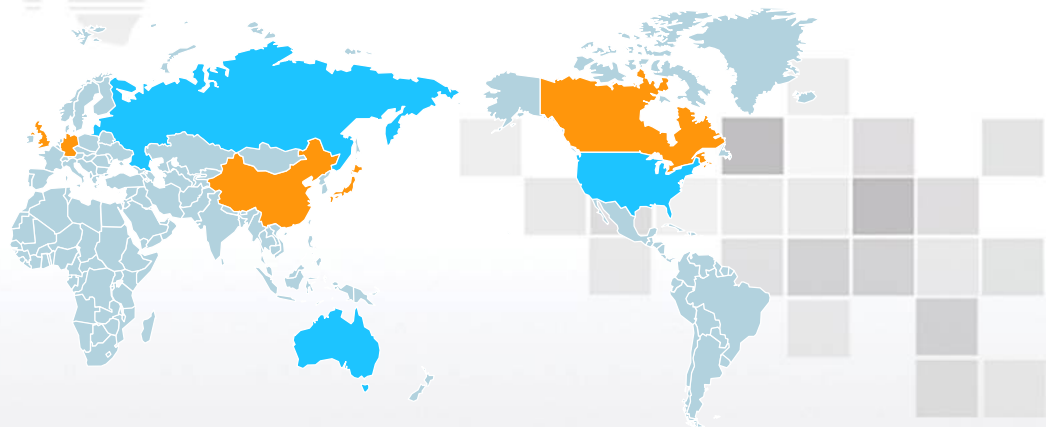
- Global Monitoring
- Global Forecasting
- Global Services



[www.wmc-bj.net](http://www.wmc-bj.net)



**Thank you  
For your  
attention**



**Web: <http://wmc-bj.nmc.cn> Email: [wmc-bj@cma.gov.cn](mailto:wmc-bj@cma.gov.cn)**