Zentralanstalt für Meteorologie und Geodynamik

The Beijing 2008 FDP/RDP project

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Outline

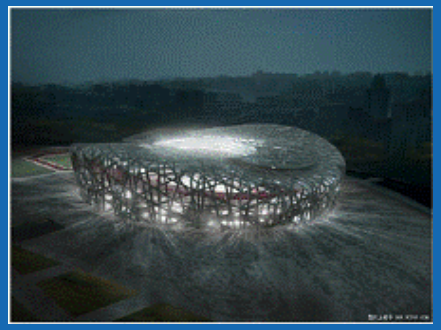
- General description (goals, organization, time schedule, participating systems, …)
- Preliminary results (verification, case studies, super ensemble system)
- Outlook

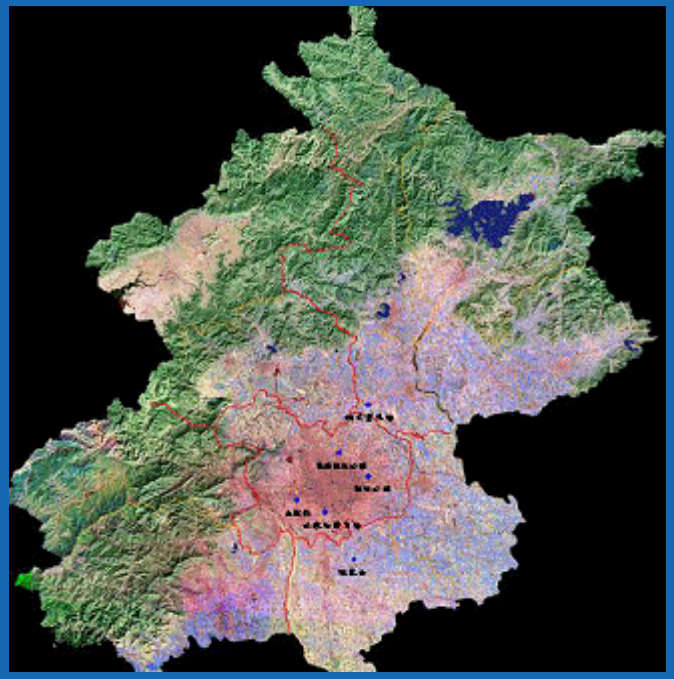
What is B08FDP/RDP about?

- WWRP research project over 5 years period (2005-2009)
- Forecast and Research Demonstration for **August 2008 (Beijing Olympic Games)**
- B08RDP/FDP consists of 2 sub-projects:
  - B08FDP: Forecast Demonstration for 0-6 hour forecasts based on Nowcasting
  - B08RDP: Research and Development for 6-36 hour forecasts based on mesoscale ensemble prediction

Beijing 20**08** Olympics Mesoscale Ensemble Prediction **R**esearch and **D**evelopment **P**roject

Beijing Olympic Games 2008, 8 – 24 August





climatological information:

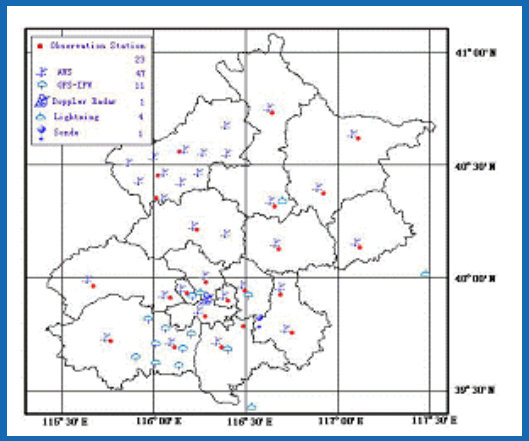
	值
Mean Temp (℃)	25.2
Mean Max Temp (℃)	29.9
Extreme max temp (℃)	35.7
Mean Min Temp (℃)	21.1
Extreme min temp (℃)	14.3
Mean RH (%)	75
Mean wind (m/s)	1.8
Precipitation (%)	49.2
Thunderstroms (%)	25.9

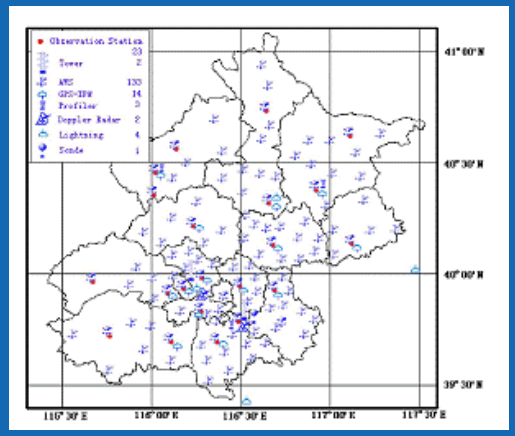
Preparations of the Olympic Weather Services

The most important forecast information includes:

- Hourly forecasts (0-24 hours) for T, RH, RR, FF, FX
- Weather Warnings in the case of:
  Heavy rain, lightning, strong winds, hail, heat waves
- Specific information/service for different sport events

Observation Network 2004



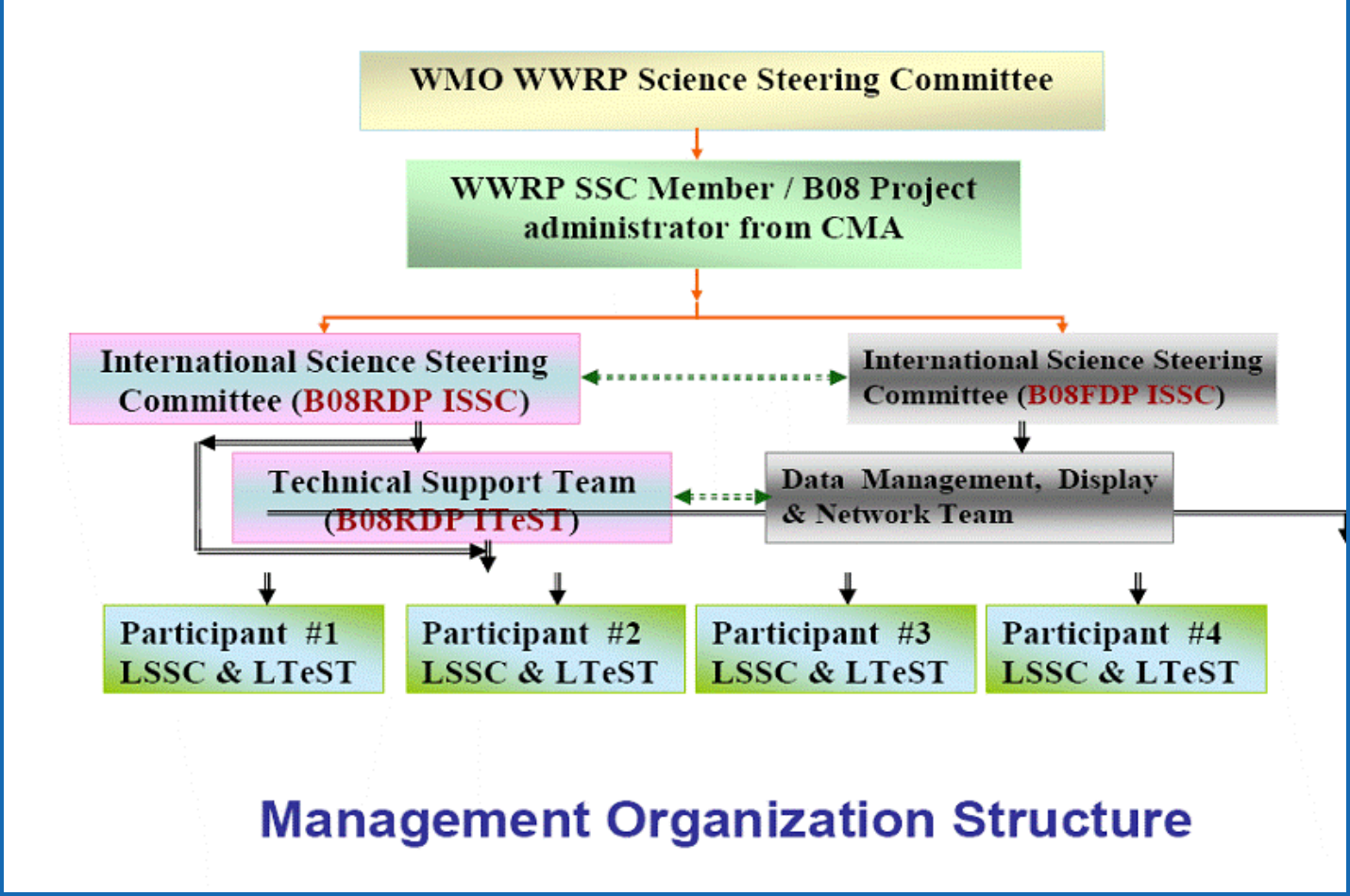


Observation Network 2008

Main goals of the RDP project

- Improvement of understanding in terms of high-resolution and very short-range probabilistic prediction processes through numerical experimentation
- Share experiences in the development of a real-time Multi-Ensemble-Prediction (MEP) system
- study and develop adequate methods to assess the capability and forecast skill of MEP system
- Demonstration how MEP system can improve quality of forecasts compared with deterministic runs and/or global EPS
- Training of forecasters to use ensemble forecasting products & provide a better meteorological service for 2008 Olympic Games
- Setup of a shareable database for future research in the community

Management organization structure of B08FDP/RDP

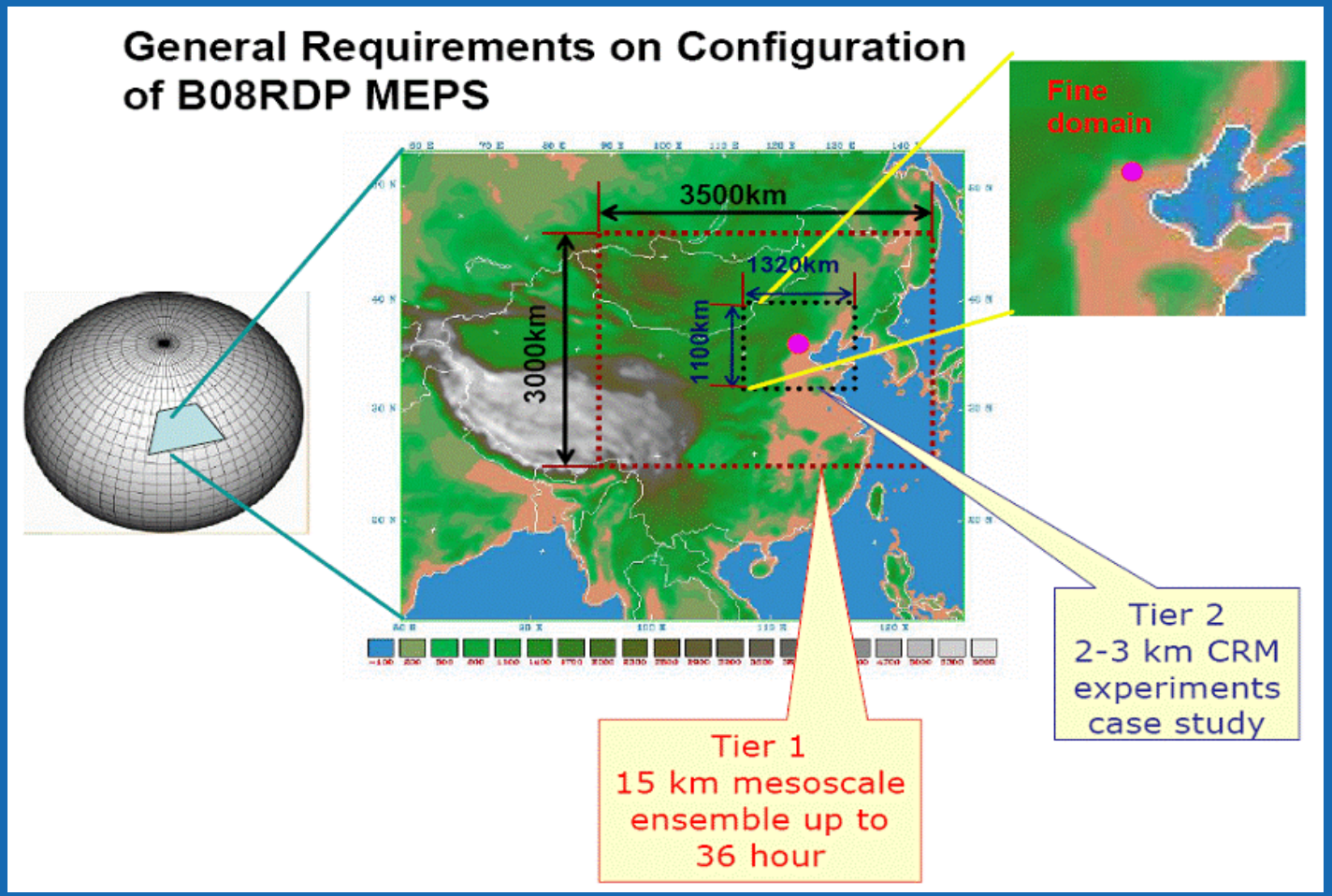


International Science Steering Committee

- **Geoff DiMego (NCEP)**
- **Bill Kuo (NCAR)**
- **Martin Charron (MSC)**
- **Kazuo Saito (JMA)**
- **Yihong Duan (CMA)**
- **Lawrence Wilson (MSC)**
- **Yong Wang (ZAMG/Météo-France)**

- **Jiandong Gong (CMA), secretary of ISSC**

Requirements for participants



Time schedule

Year\Month	January - May	June	July	August Septembe r	October	Nov.-Dec.
2004			WWRP team visit to Beijing		WWRP approve B08FDP/RDP proposal	Beginning implemen -tation
2005	1st B08RDP workshop		Technique & System development Relevant research		Pre-test on data transfer	
2006	Initial setup of meso-scale ensemble system		Preliminary running & data transfer test; 2nd B08RDP workshop;basic training		Products archive; verification; Continued work on setup of Meso-EPS	
2007	Modification of the systems	Prepa -ring for test	Quasi real-time running & data transfer test; 3rd B08RDP workshop; forecaster training		Products archive; Verification	Report to WWRP
2008	Further modification	Prepa -ring for test	Quasi operational running		Full verification	
2009	4th B08RDP international workshop					

Tier-1 MEP system 2007

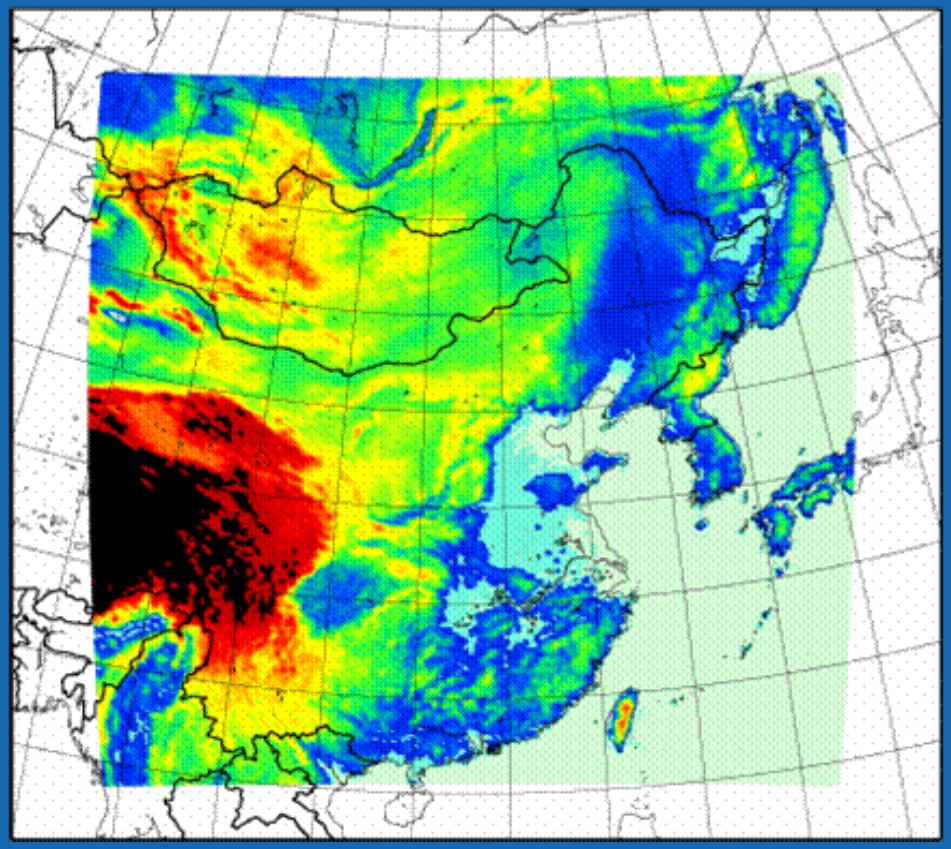
Tier-1 MEP systems 2007

Participants	Model	IC	IC perturbation	LBC
NCEP*	WRF-NMM WRF-ARW	NCEP Global 3DVAR	Breeding	Global EPS
MRI/JMA	JMA-NHM	JMA Regional 4DVAR	Targeted Global SV	JMA Regional Forecast
MSC	GEM	MSC Global 4DVAR	Targeted Global SV	MSC Global EPS
ZAMG & Meteo-Fr.	ALADIN	ECMWF Global 4DVAR	ECMWF Global SV	ECMWF Global EPS
NMC/CMA	WRF-ARW	WRF-3DVAR	Breeding	Global EPS
CAMS/CMA	GRAPES	GRAPES-3DVAR	Breeding	Global EPS

*EP system of NCEP is as of the 2006 experiment: NCEP submitted results by global EPS in the 2007 experiment

Experiment: 24 July 2007 to 31 August 2007

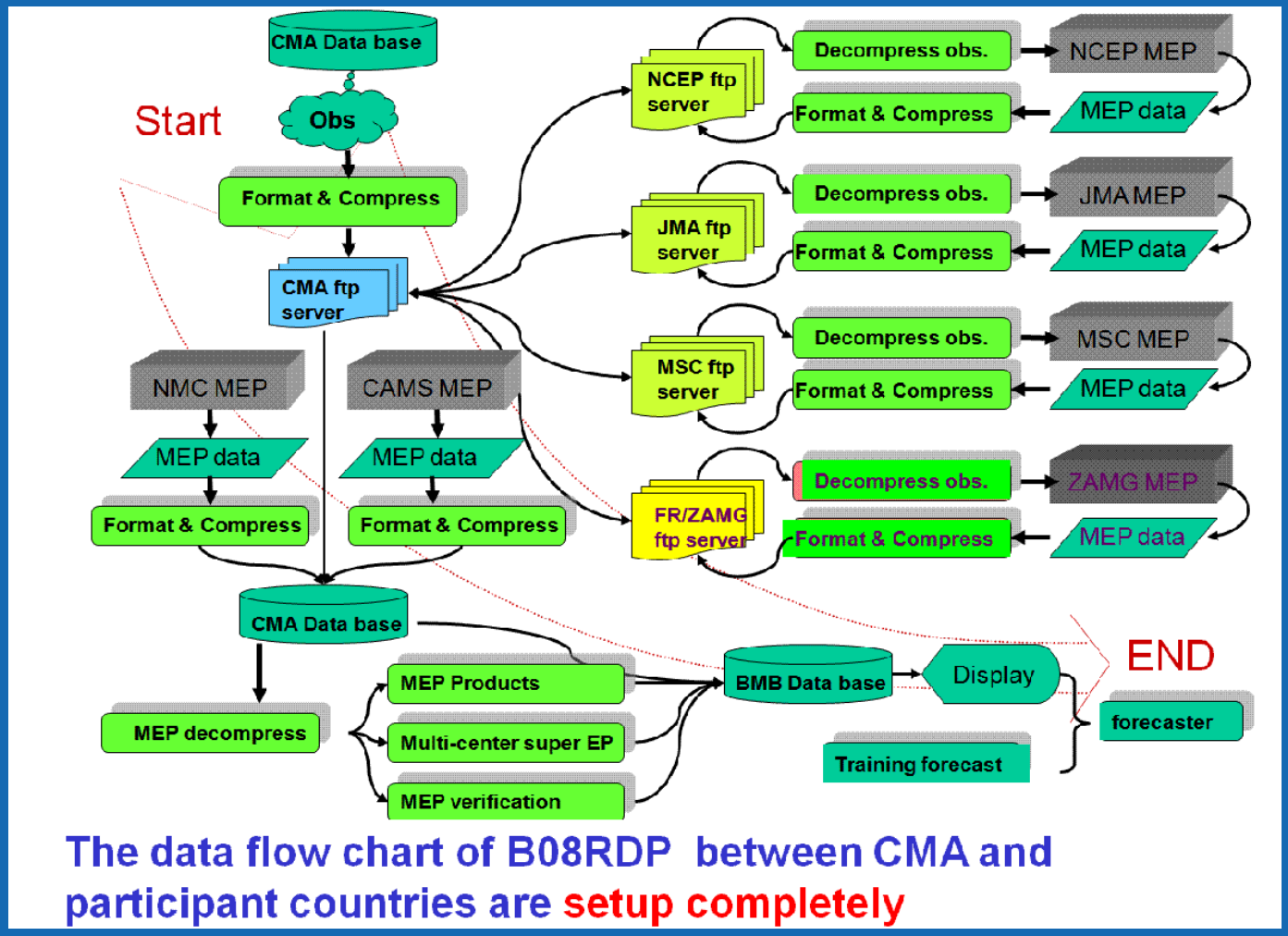
ZAMG/MF contribution for B08RDP Tier-1



ALADIN-LAEF for B08RDP:

- 15km
- 37 levels
- 277x277 (4125x4125km)
- 18 members
- CY32T1
- 00/12 UTC up to 54h
- 3h output in GRIB2

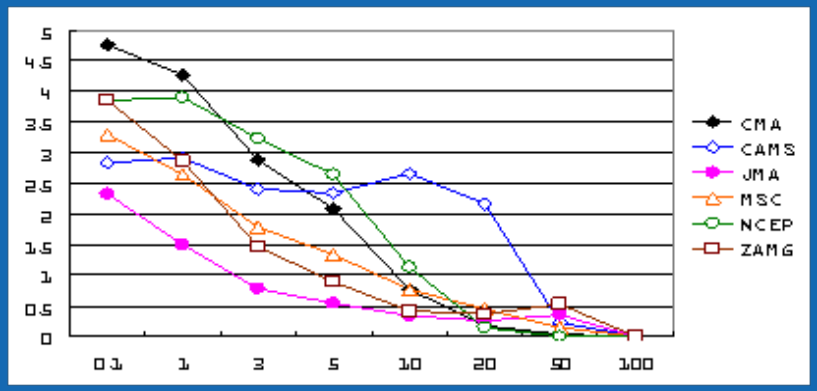
Data flow



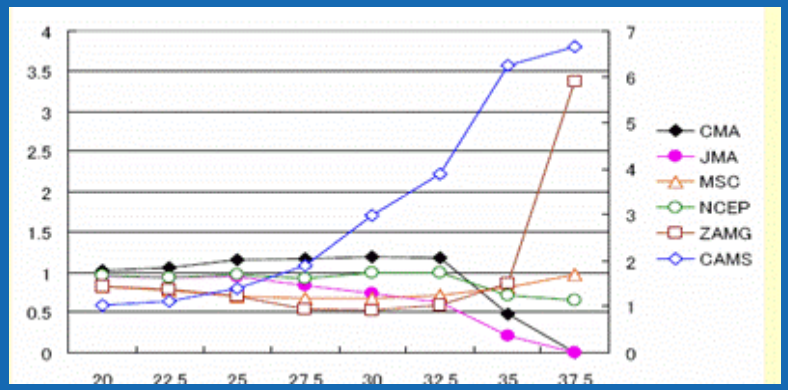
The data flow chart of B08RDP between CMA and participant countries are setup completely

Preliminary results for Tier-1 experiments in 2007

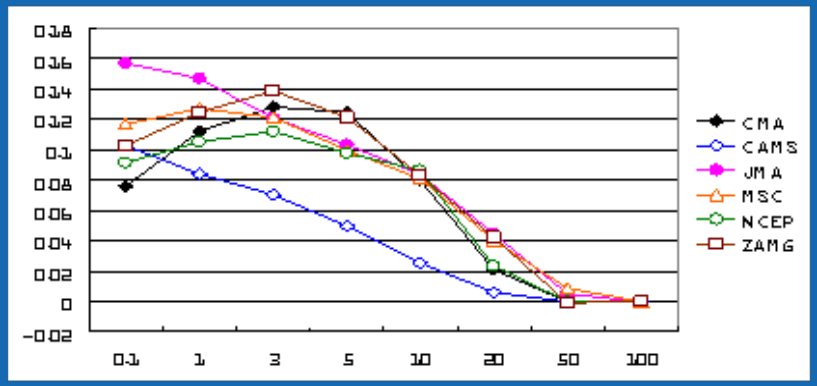
MAE scores



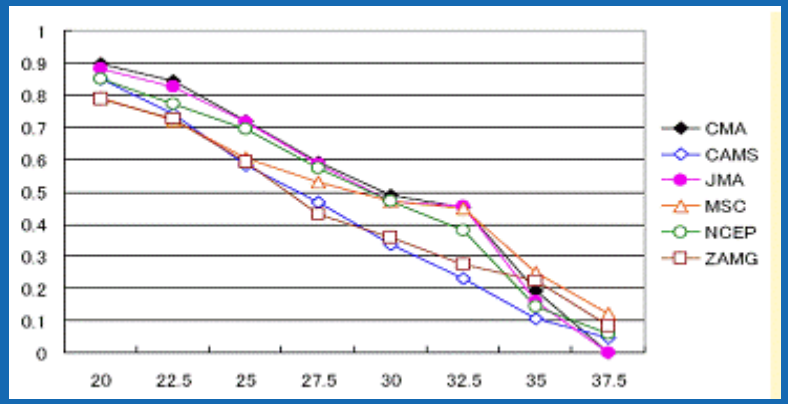
MAE scores



ETS



TS



6h precipitation

2m temperature

After K.Saito (2007)

Verification of Tier-1 experiment 2007

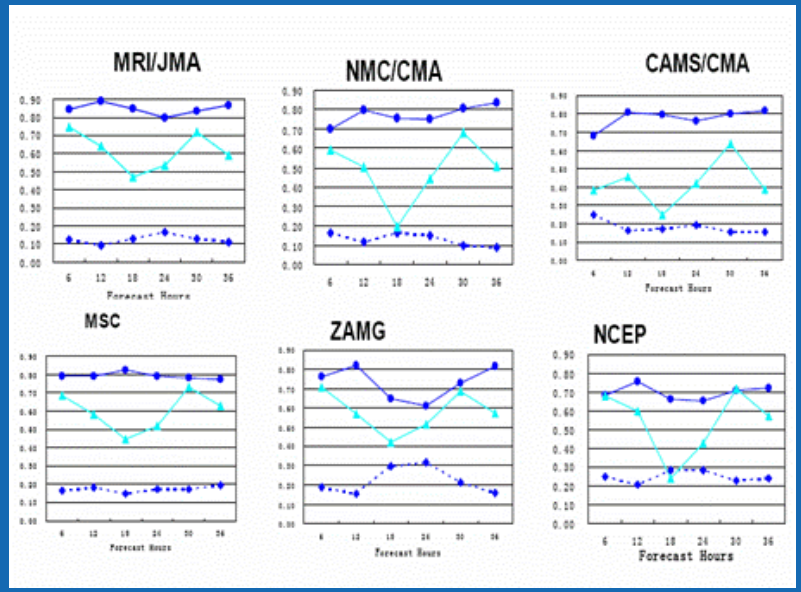
T2M, RH2M, U10/V10, RR, MSLP, H500, T500, T850, U850/V850, RH850

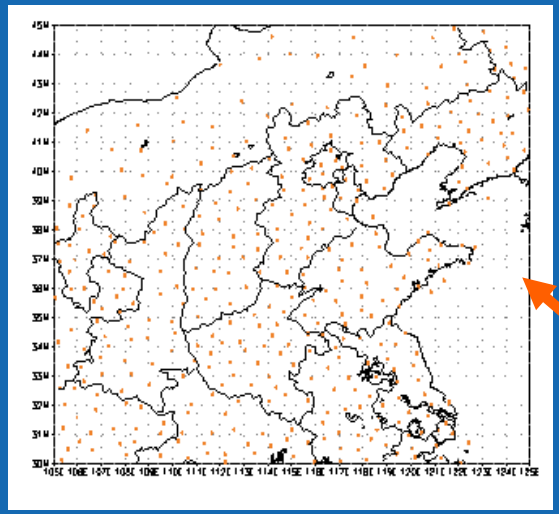
Error and spread growth:

RMSE, spread, Talagrand

Performance of probability:

BS, BSS, ROC, Reliability

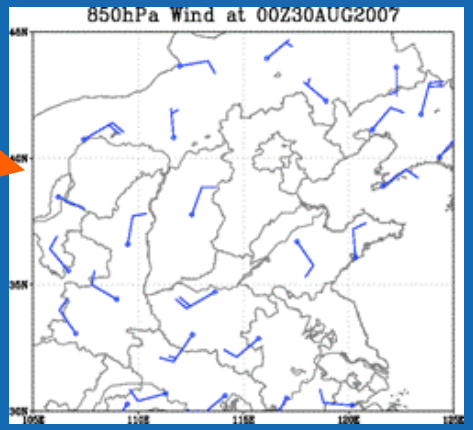




20 RASOs

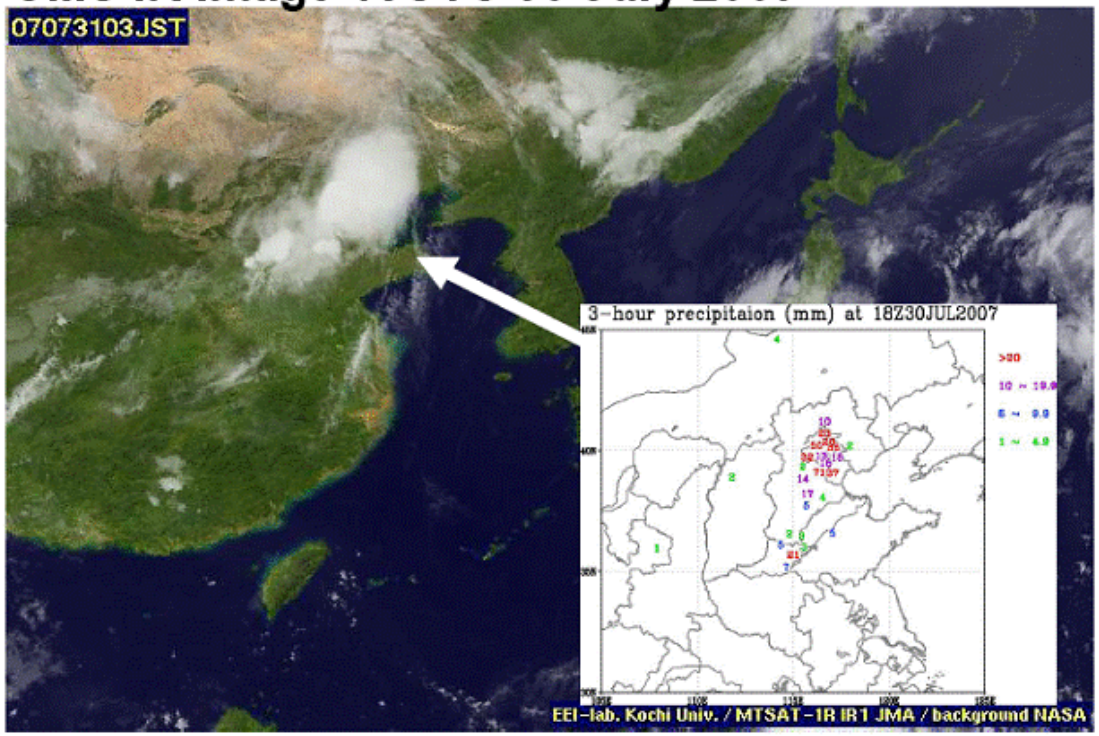
400 synops

After Y.Li (2007)



Case study 31st July 2007, Tier-1

GMS IR image 18UTC 30 July 2007

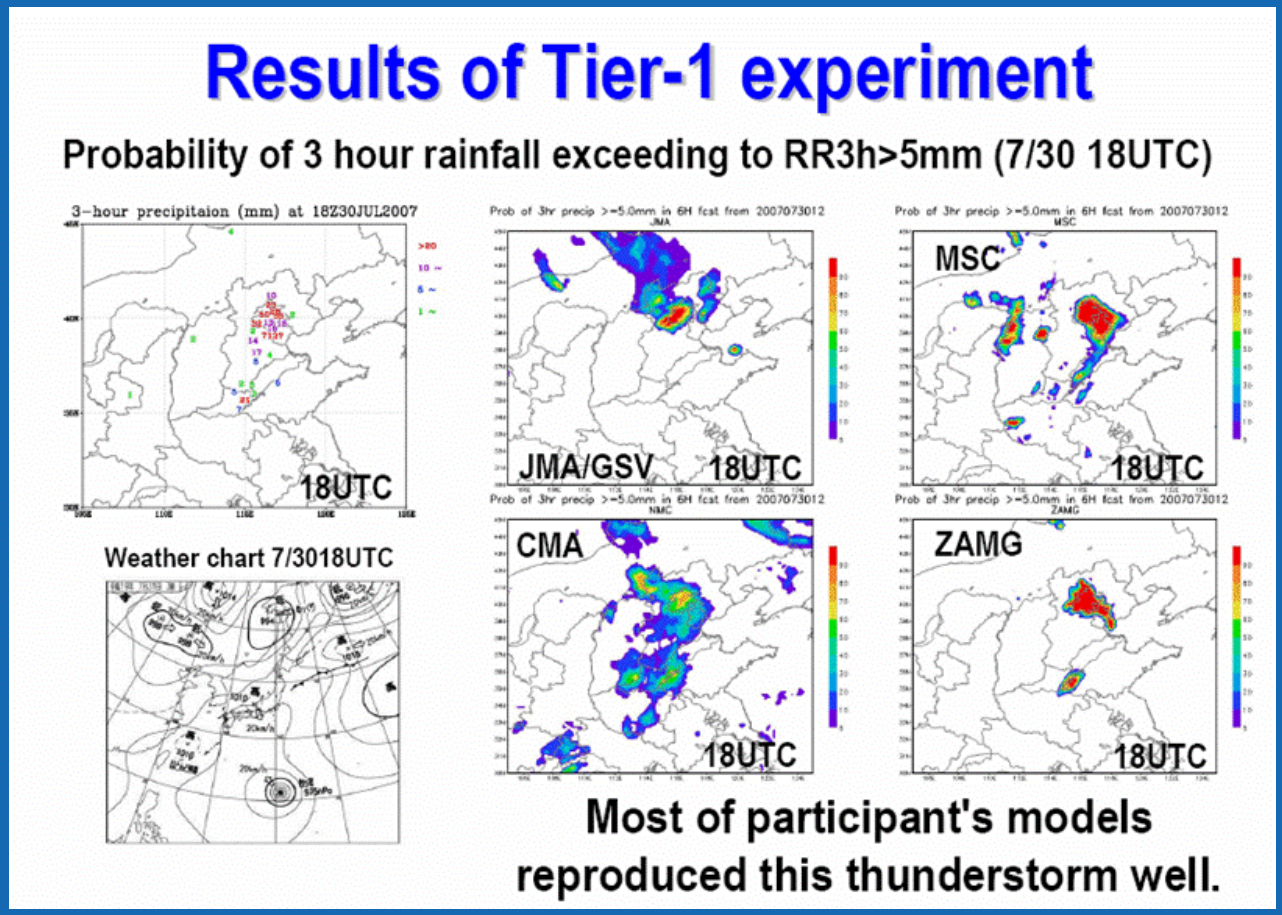


At 18UTC, the rainfall exceeding to 70mm/3hour was observed in Beijing area.

After H. Seko (2007)

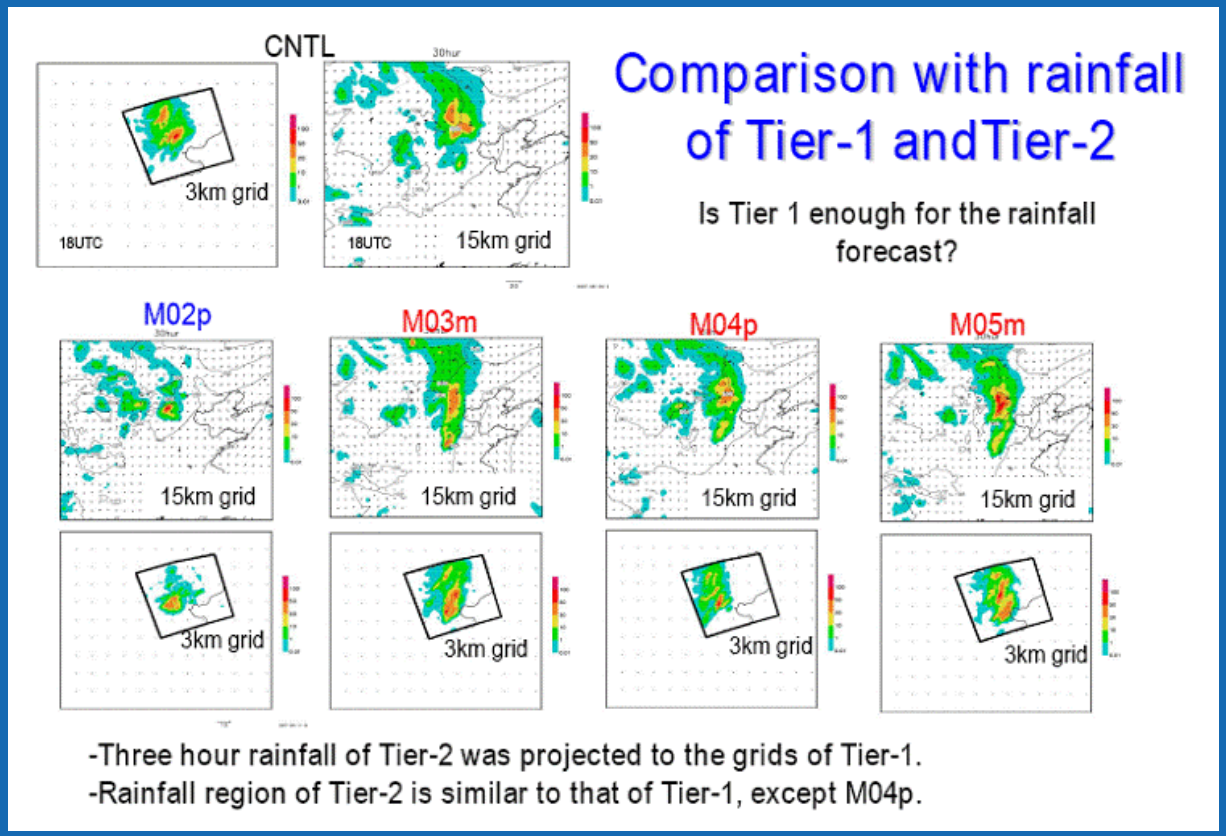
After H. Seko (2007)

Case study 31st July 2007, Tier-1



After K.Saito (2007)

Case study 31st July 2007, Tier-2



participating system:

- **JMA/MRI: JMA-NH 3 km**
- **CMA/MMC: WRF 3km**
- **NCAR-BMB: MM5 3 km, WRF 3 km**
- **NCEP: WRF 3km**

After H. Seko (2007)

Bias correction and combination of the EP systems

Bias correction

- **Goal**
  Improve reliability while maintaining resolution
- **Method**
  NCEP, moment-based, Kalman Filter type
- **Parameters**
  H500, T850, T2m, RH2m, RR

EPS systems:

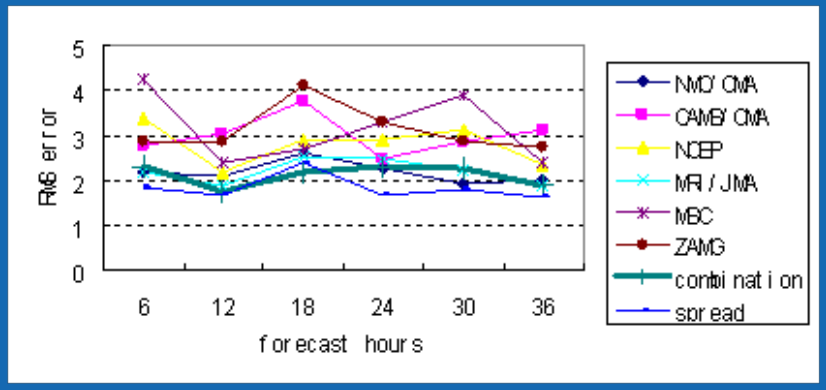
- CMAS/CMA
- NCEP
- JMA
- MSC
- ZAMG/MF
- NMC/CMA

Combination

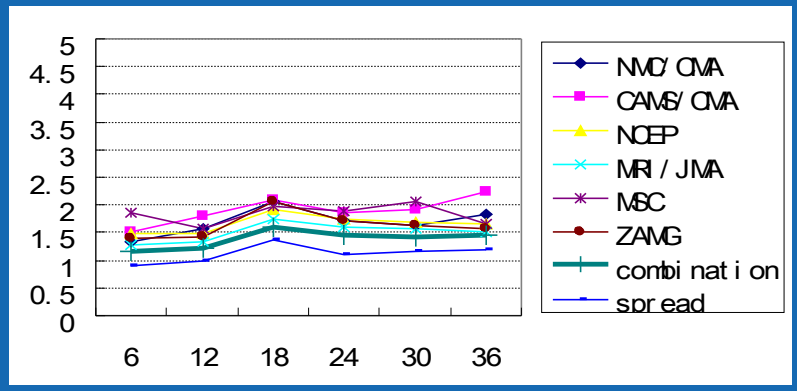
- **Goal**
  Super EPS system
- **Method**
  equal weights
  weights by CC or error
- **Parameters**
  H500, T850, T2m, RH2m, RR

Bias correction and combination: T2M

RMS error (20070814 – 20070824)



before bc



after bc

- RMS errors of all EPS after calibration have been decreased obviously.
- Diurnal changes have been lowered after calibration.
- Combined-Ensemble RMS error after calibration is the smallest of all, before calibration, it is the smallest in most cases.
- After calibration spread is more closer to RMS errors than before.

Implementation Plan 2008

- Prolongation quasi real-time period:
  - June and July as training period
  - 24th of July – 24th of August as final period
- Bias correction and combination in real time
- Verification done by NMC/CMA (objective + subjective)
- Website: more products for real time use (plumes, stamp charts …)
- Preparation of joint papers on results
- Forecaster training in May

ZAMG/MF contribution for 2008

Planned changes for the contribution of ZAMG/MF for Tier-1 2008:

- Use of multiphysics (ALARO-0, HIRLAM, Lopez, …)
- Use of NCBB
- Introduction of clustering method
- Blending (SV+breeding)

Planned contributions of ZAMG/MF for Tier-2:

- AROME case studies

Acknowledgements

Thank you for your attention!!

AND:

Thanks to all the partners of the B08FDP/RDP, in particular, the members of the ISSC and the technical support team.

Special thanks to : Y-H. Duan, J-D. Gong, Y-L. Li and L. Li (NMC/CMA), H. Seko and K. Saito (JMA) and B. Kuo (NCAR)