Beijing GNSS Meteorological Application in 2006's Weather Service Rehearsal for the Olympic Game 2008

Xia Qing , Cao Yunchang

China Meteorological Administration

Outline

- 2006's Weather Service Rehearsal for the Olympic Game 2008
- Beijing GNSS Network
- GNSS Meteorological Application – GMA
- GMA in 2006's Weather Service Rehearsal

2006's Weather Service Rehearsal

2006's Weather Service Rehearsal

- The Beijing 2008 Olympics are to be conducted from 8 to 24 August 2008. It is a major international event in which weather can have a significant impact.

2006's Weather Service Rehearsal

- The aim of the 2006's Weather Service Rehearsal is to test the weather service for the Olympic Game 2008. The weather service system includes:
  - **Sounding system:**
    - Meteorological Satellite
    - Radar
    - AWS (Auto weather station)
    - Radiosonde
    - GNSS
    - LDS (Lightening detect system)
  - **Data transmission system**
  - **Weather forecasting system**
  - **the supporting facility system**

2006's Weather Service Rehearsal

- ## Two phases divided in the WSR

Phase 1. July 8～24, 2006

   a simulation exercise focusing on weather services for torch relays, the opening ceremony, various sports events during the games and public incidents, as well as the test of relevant

facilities and technicians.

Phase 2. Aug. 11- Sep. 5, 2006

   was carried out during the three international sports events scheduled between the latter half of August and early September in Qingdao and Beijing

WWRP B08FDP/RDP were also tested.

Concluded on Sep. 25, 2006

2006's Weather Service Rehearsal

- Over 14 members participated in the rehearsal.
  - *Beijing Meteorological bureau*
  - *National Meteorological Center*
  - *National Climate Center*
  - *National Satellite Meteorological Center*
  - *Chinese Academy of Meteorological Sciences*
  - *Chinese Atmospheric Sounding Center*
  - *Qingdao Meteorological bureau*
  - *Shanghai Meteorological bureau*
  - *The Hong Kong Observatory*
  - *The Huafeng Group*
  - *……*

2006's Weather Service Rehearsal

- The weather services covers
  - Beijing,
  - Qingdao, which will host the Olympic sailing events,
  - Hong Kong, which will hold the Olympic equestrian competition,
  - Tianjin, Qinhuangdao, Shenyang and Shanghai, which will stage football matches,
  - The cities that are to participate in Olympic torch relays.
- The rehearsal tested the operation of the systems and their coordination.

2006's Weather Service Rehearsal

Advanced Sounding system

2006's Weather Service Rehearsal

- Observational network is composed of satellite, Doppler Radar, lightening detector, sonde, profiler , GPS, etc.
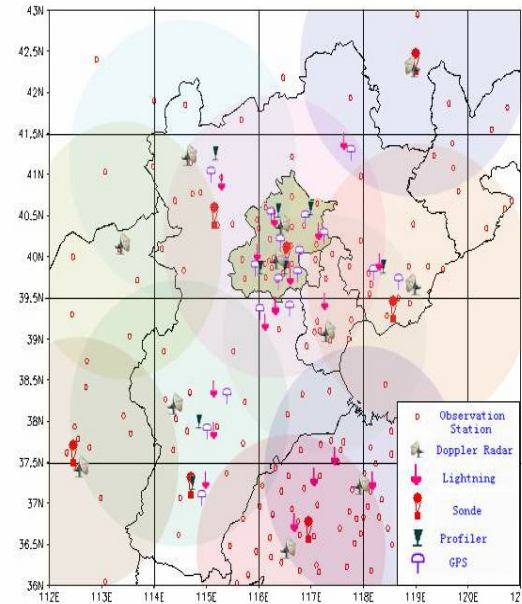
2006's Weather Service Rehearsal

- Transmission of the sounding system

No	Items	Transmission time before the rehearsal	Transmission time after the rehearsal
1	AWS	NA	~2 min
2	Radar data of Tianjin	9 min	1 min
3	FY-2C image	51 min	27 min
4	Radar image (GIF)	once an hour	>98%
5	GNSS data	Once an hour	Once every half hour
6	Radiosonde	2 times/ day	4 times/day

2006's Weather Service Rehearsal

GPS PWV 00UTC Aug 04, 2006
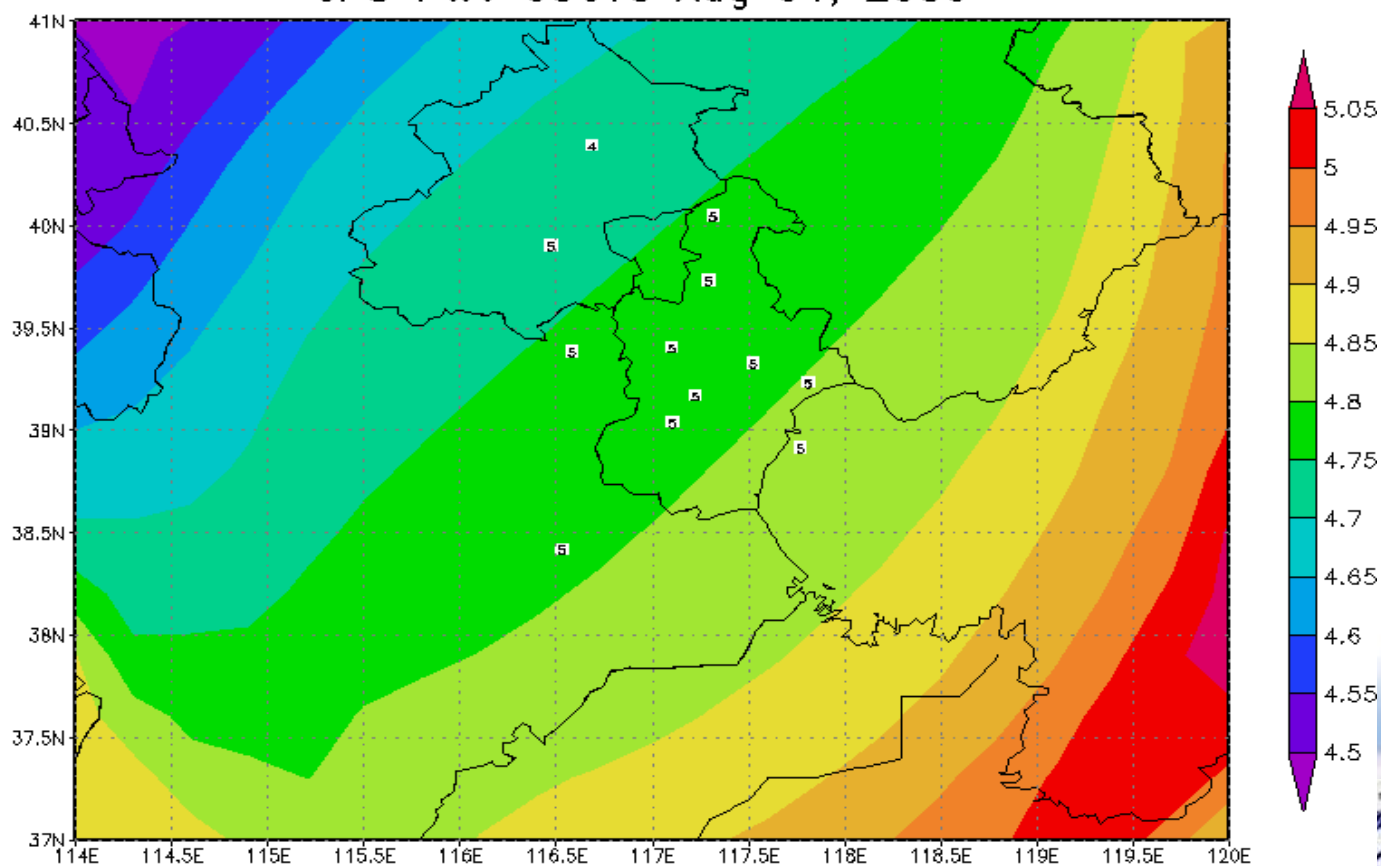
GNSS precipitable water vapor distribution

2006's Weather Service Rehearsal
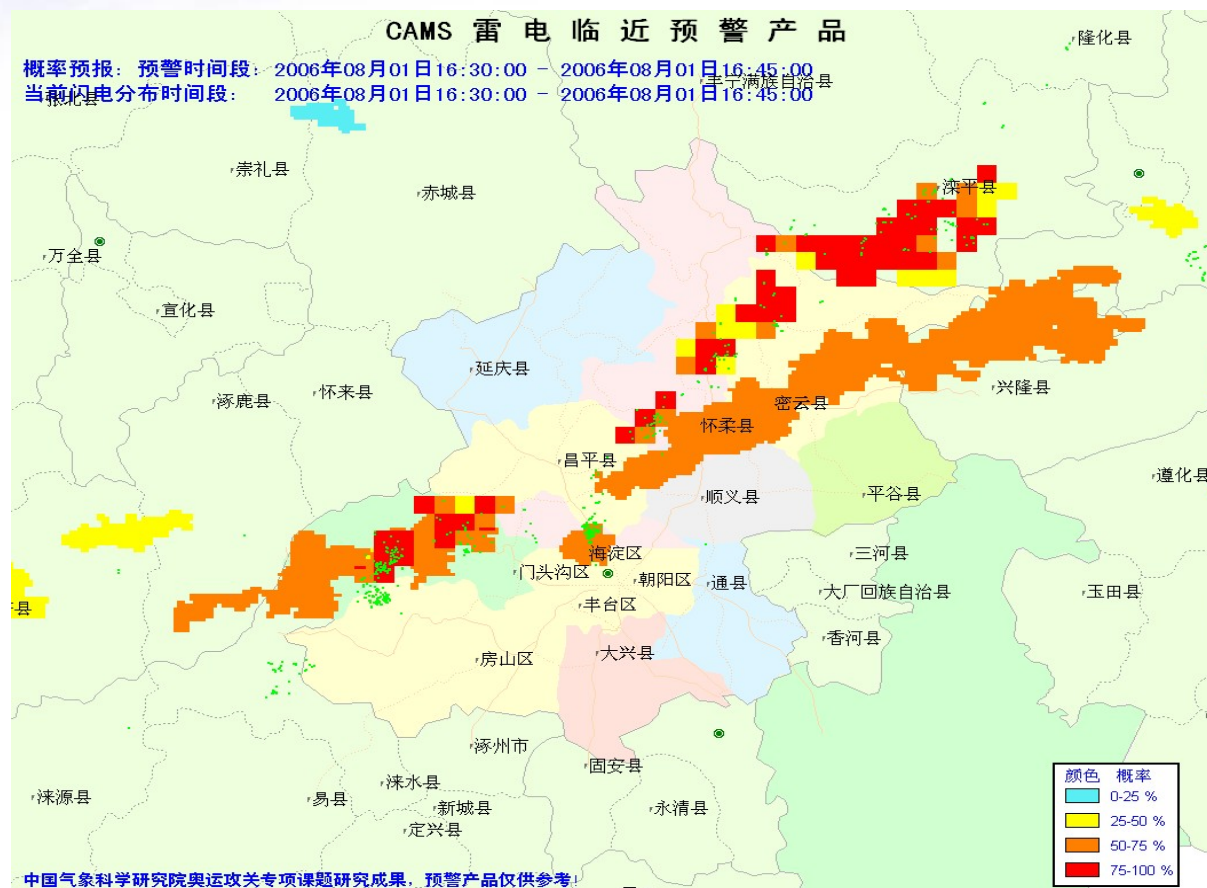
- Lightening prediction product

2006's Weather Service Rehearsal

laps 06 年 8 月 16 日 02 时地面温
度分析场与该时次 aws 观测
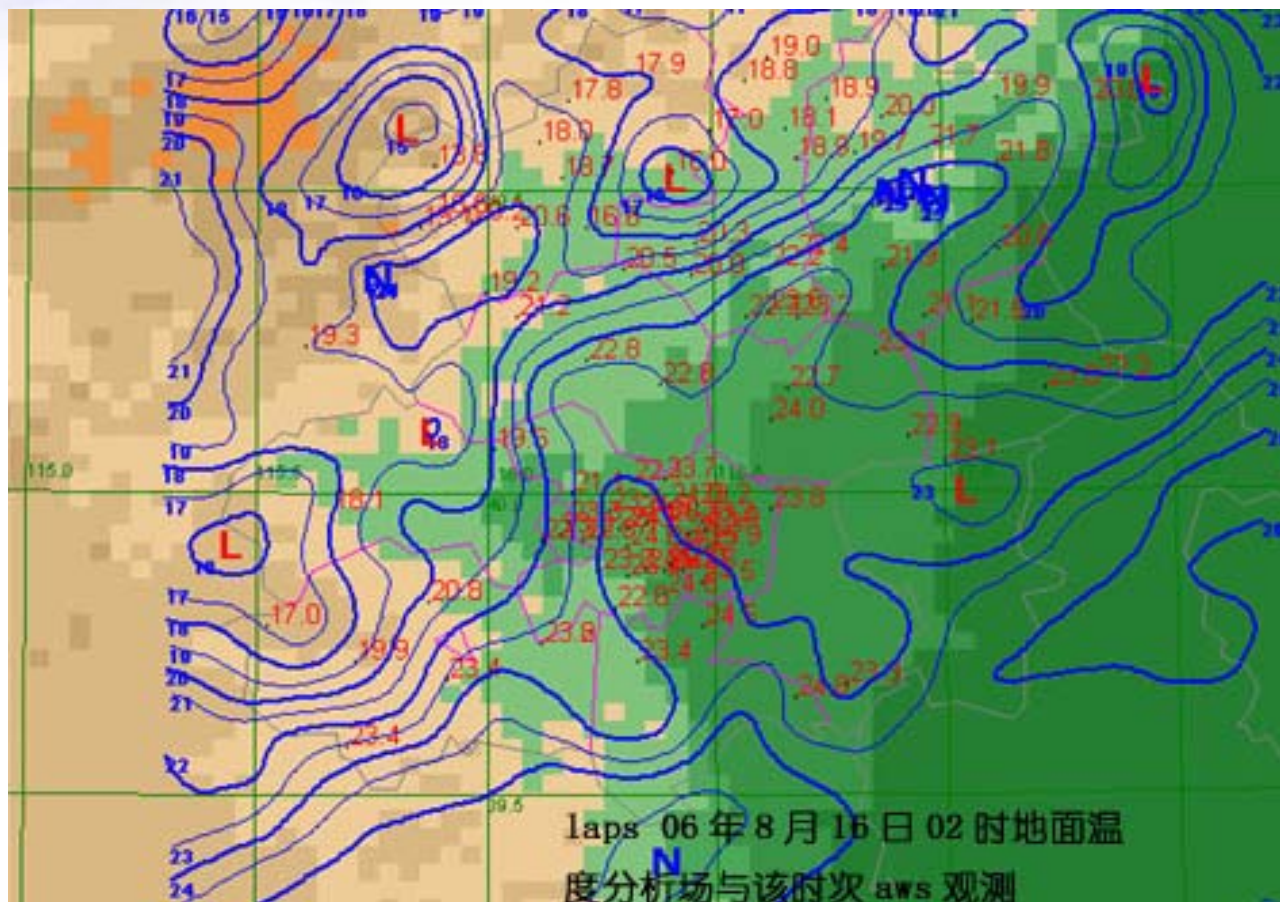
Weather Models – LAPS

2006's Weather Service Rehearsal

IUM Beijing 2004/08/17/05:00-24:00

PRR (a.u.)
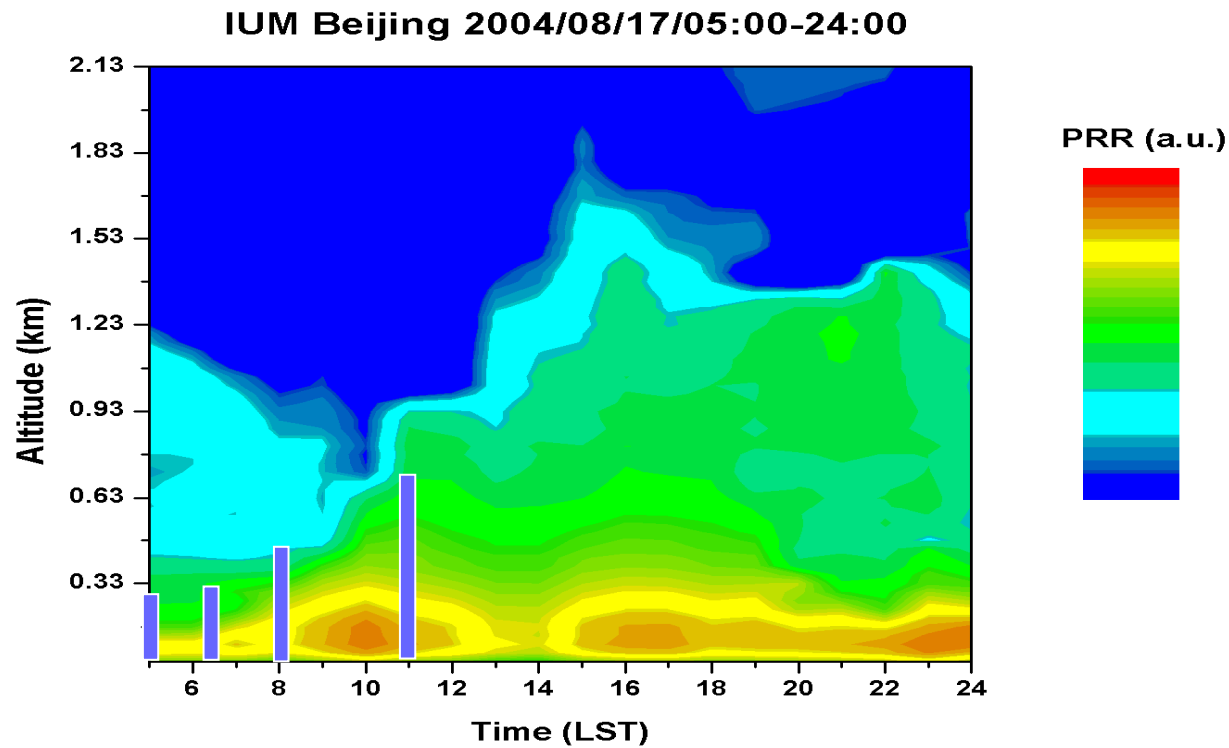
边界层高度时间演变（激光雷达探测）

- Time series of Planetary boundary layer

2006's Weather Service Rehearsal

- **Conclusions of 2006's Weather Service Rehearsal**
  - The sounding system works well and still needs to be enhanced.
  - The information transmission system can meet the need, but risk also exists.

16

Beijing GNSS Network
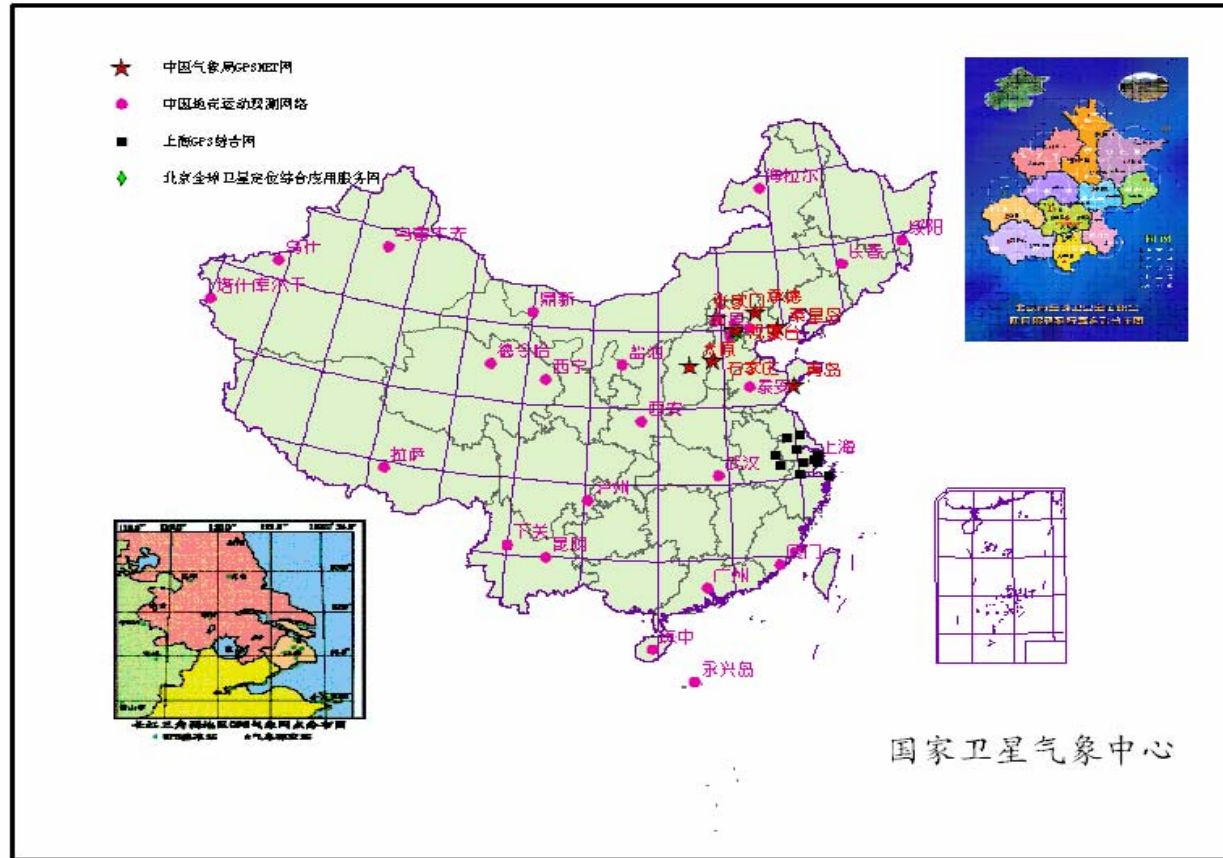
GNSS sites of China Meteorological Administration

Beijing GNSS Network

Beijing GNSS Network
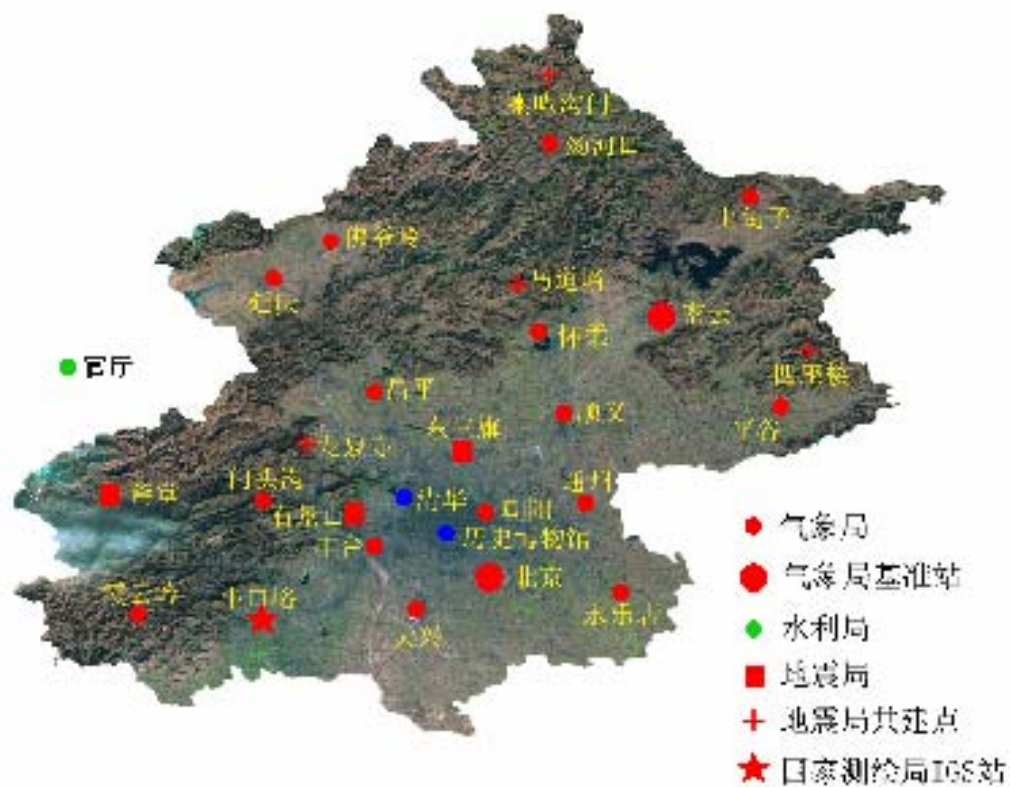
- GNSS network of Beijing Information Office

Beijing GNSS Network
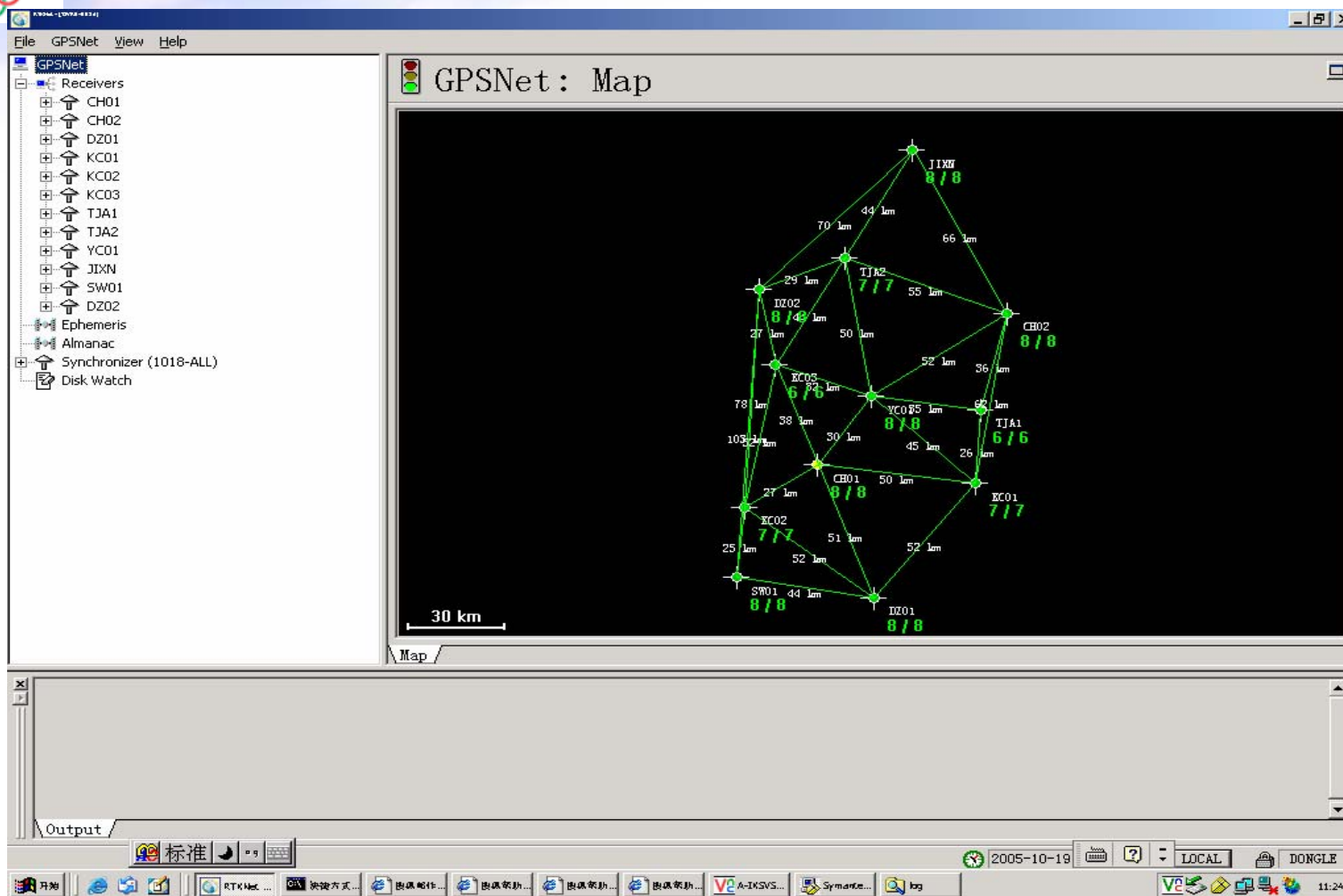
- Tianjin GNSS network

Beijing GNSS Network

- GNSS station - Yanqing
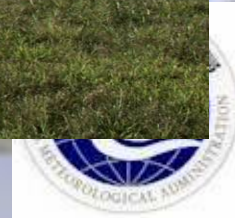
GNSS Meteorological Application
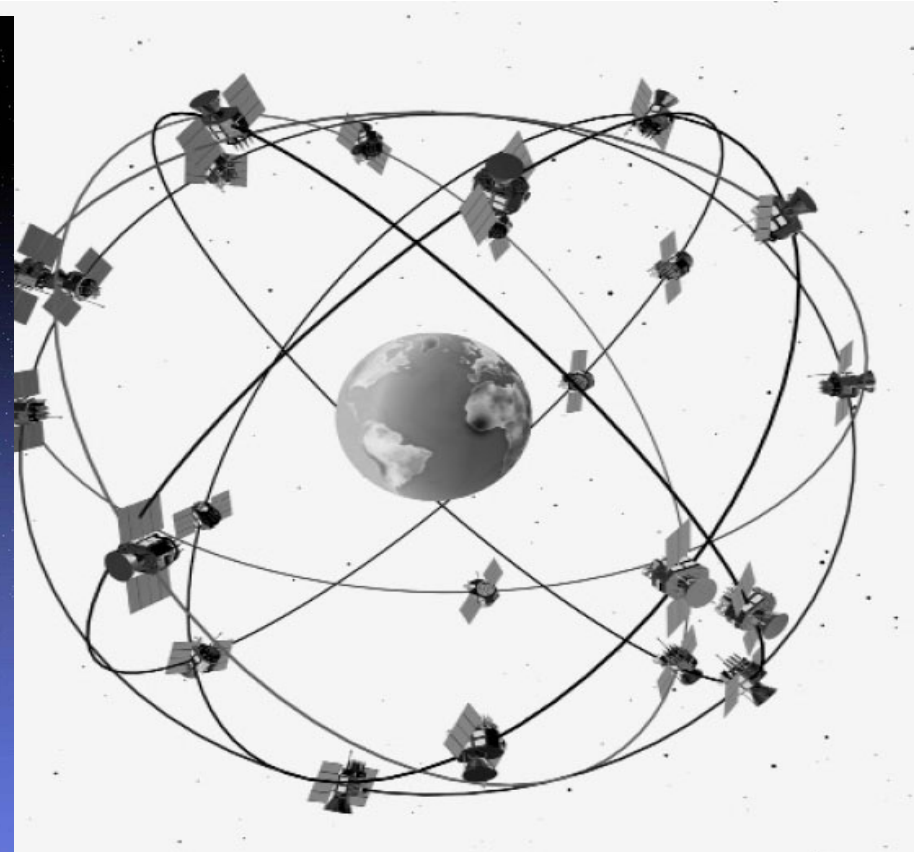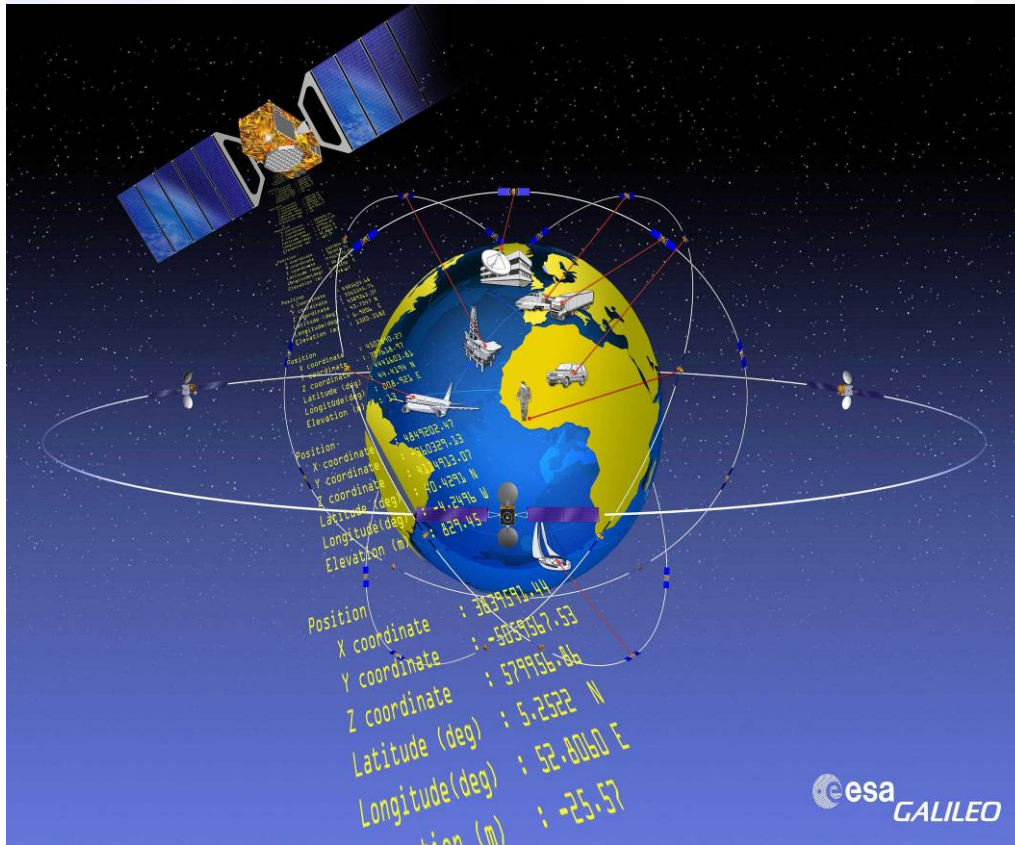
- GPS and Galileo

GNSS Meteorological Application
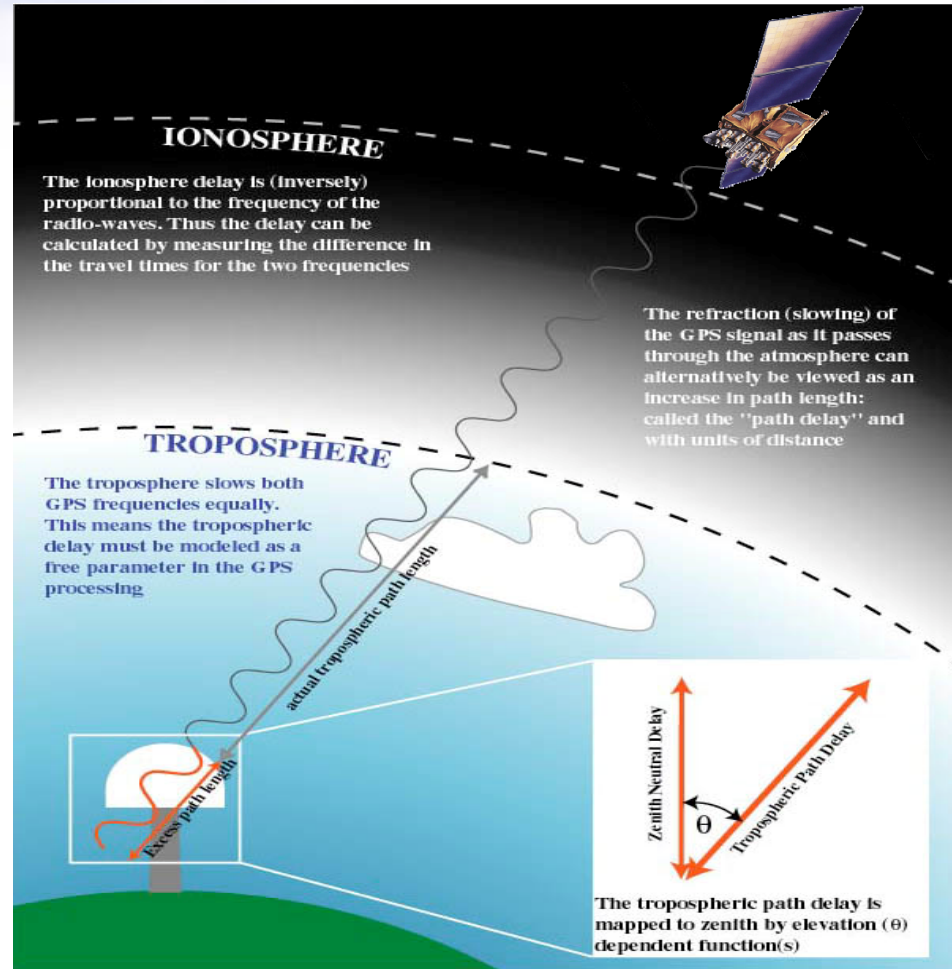
GNSS Meteorological Application
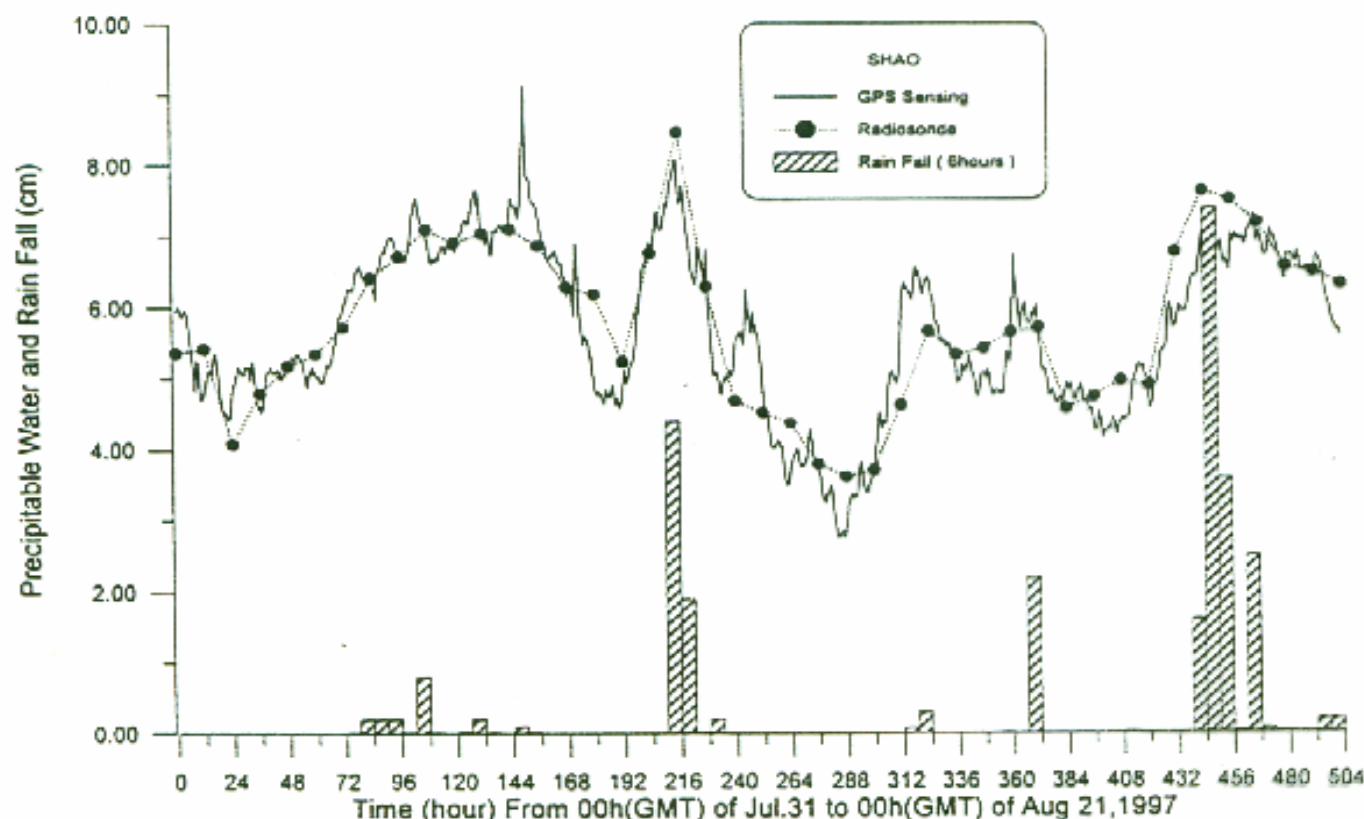
图 10 上海站 GPS 遥感水汽与探空水汽对照（直方图为地面 6 小时降水）

Relationship between PWV and the rainfall

24

GNSS Meteorological Application
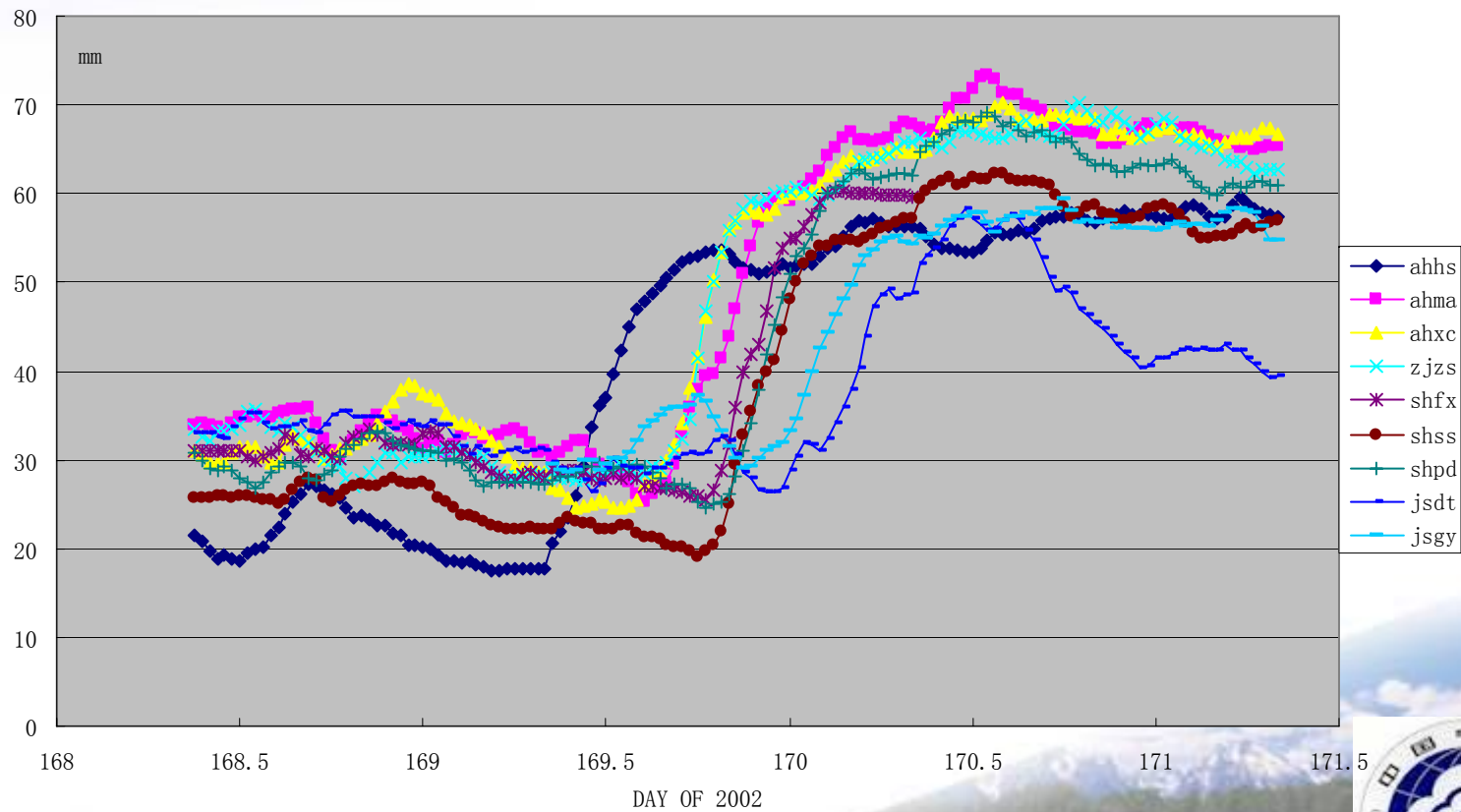
PWV changes during the Meiyu season

GNSS Meteorological Application
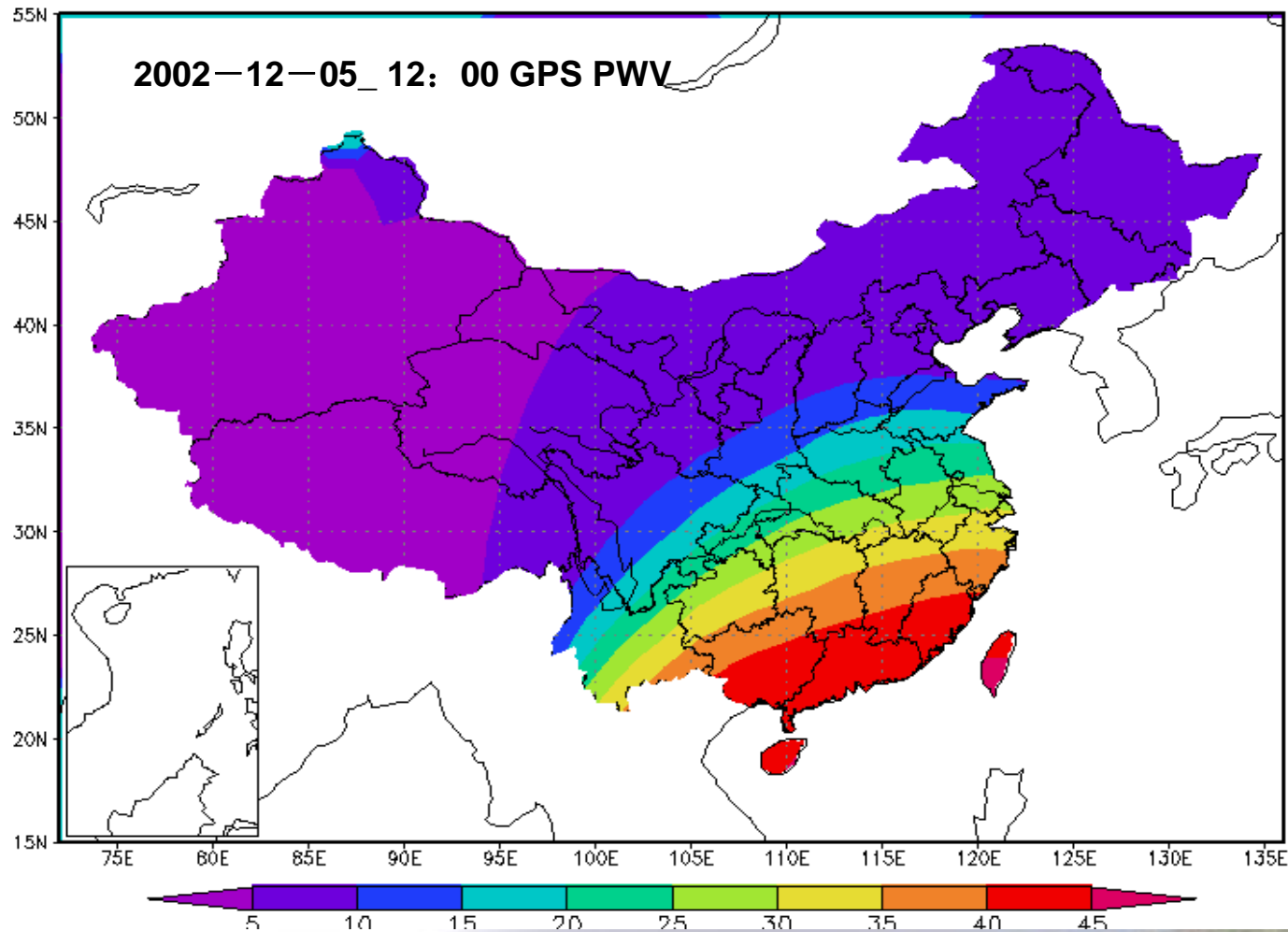
PWV distribution over China

GNSS Meteorological Application
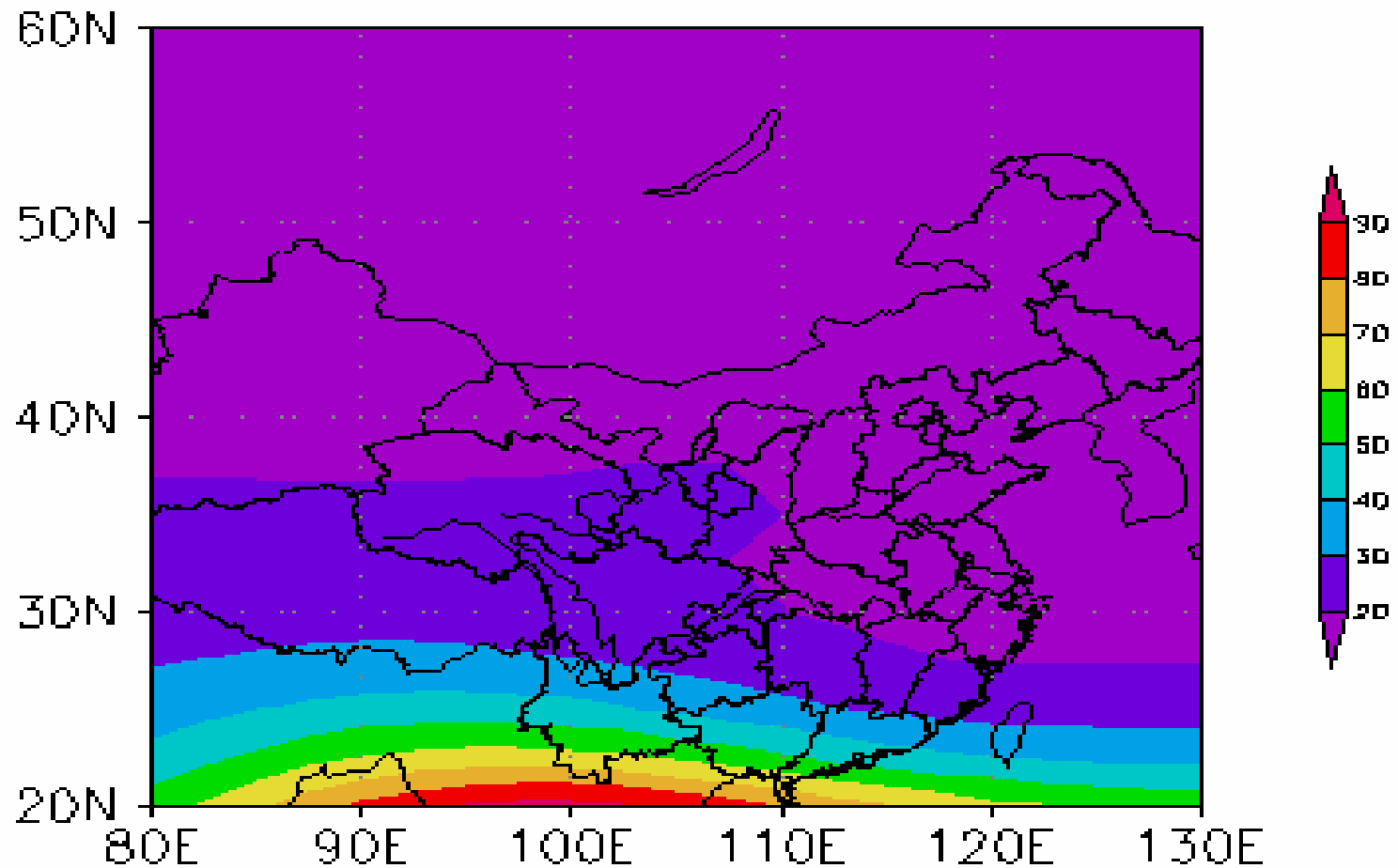
TEC distribution on 12UTC, April 27, 2004

GMA in 2006's Rehearsal
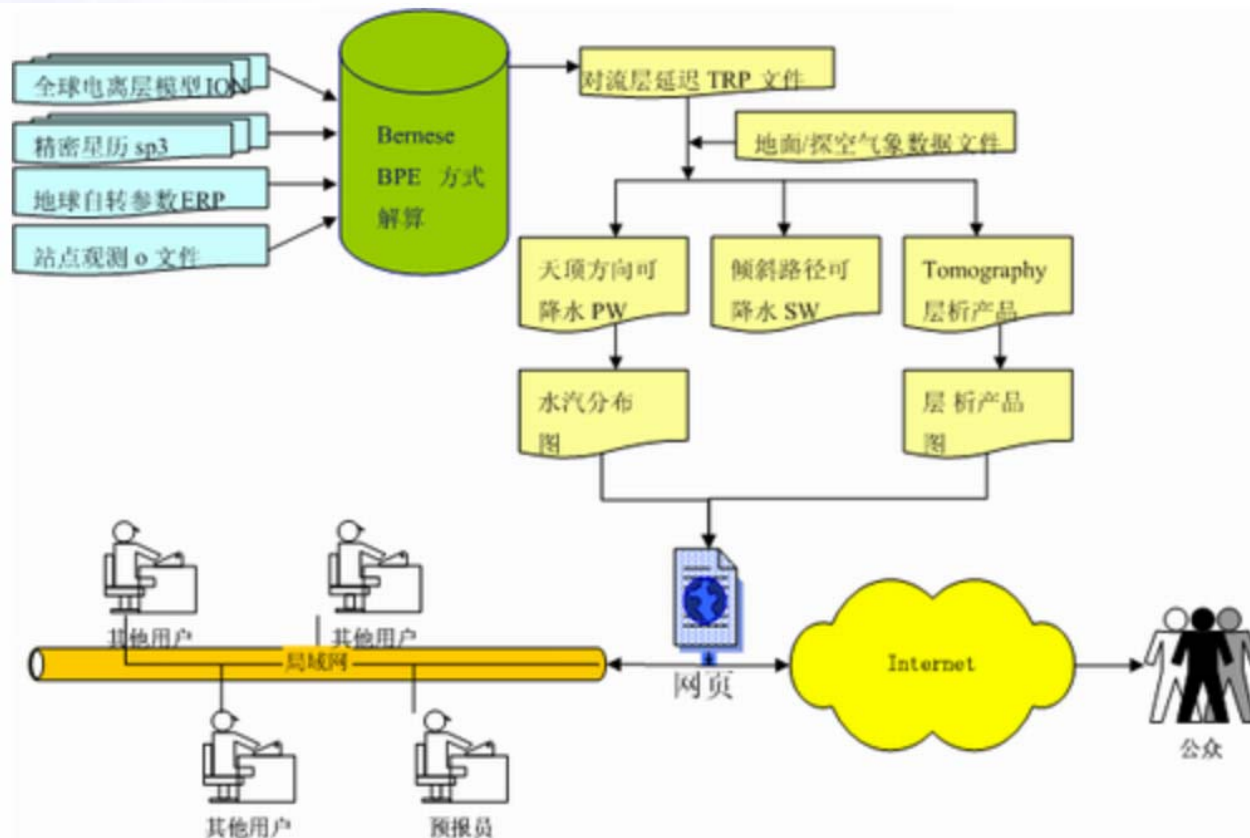
GMA data processing system

GMA in 2006's Rehearsal

GPS PWV 02UTC Aug 05, 2006
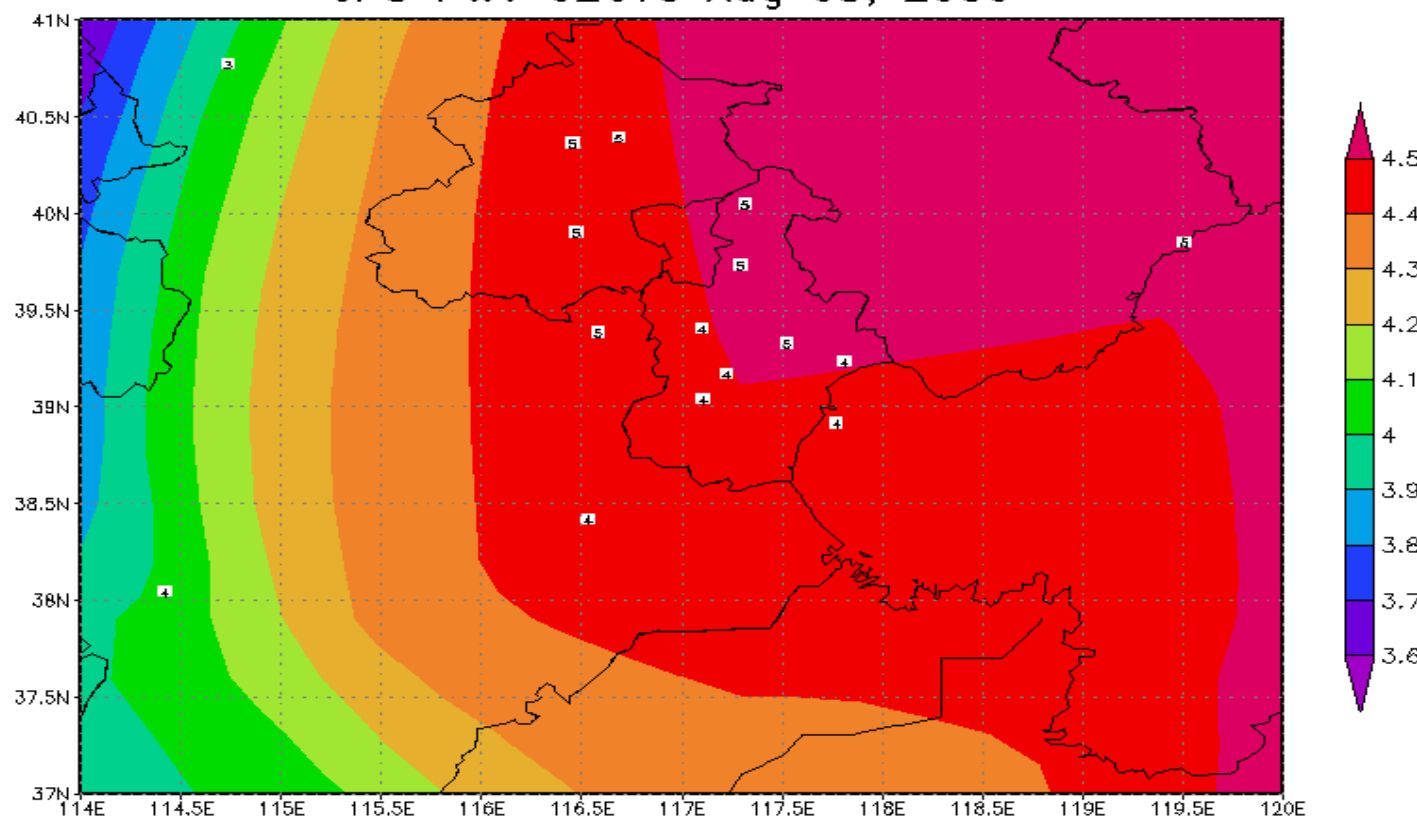
Horizontal distribution of PWV in Beijing

GMA in 2006's Rehearsal

Web service of GMA for Beijing

GMA in 2006's Rehearsal
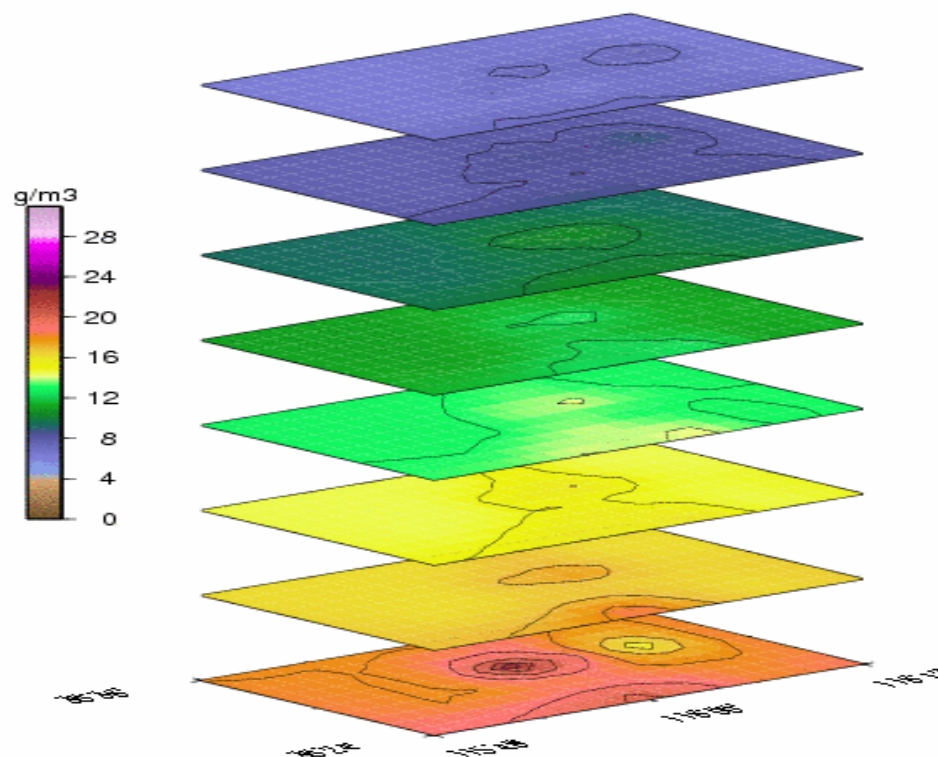
3D water vapor distribution over Beijing
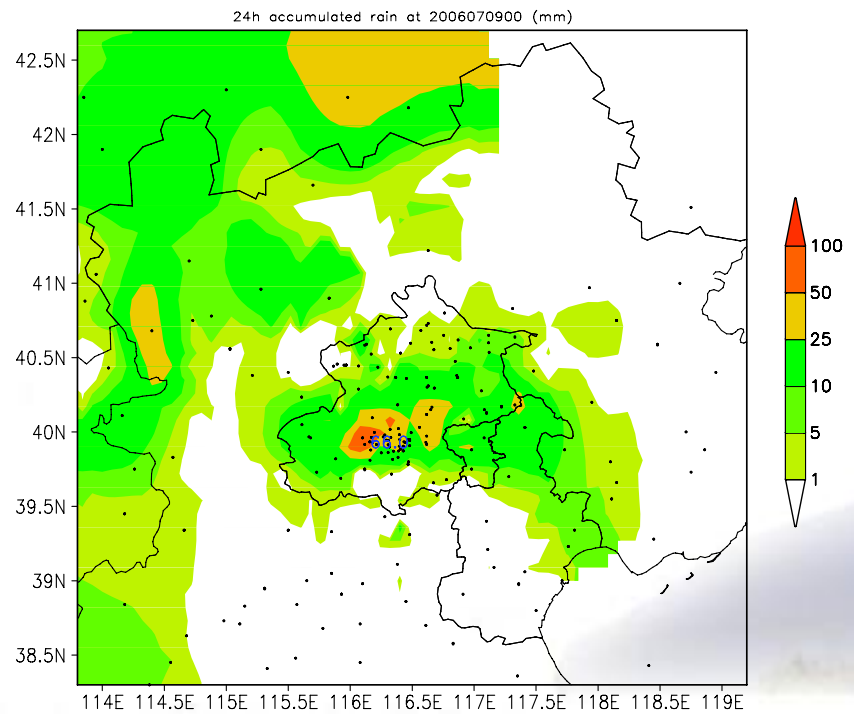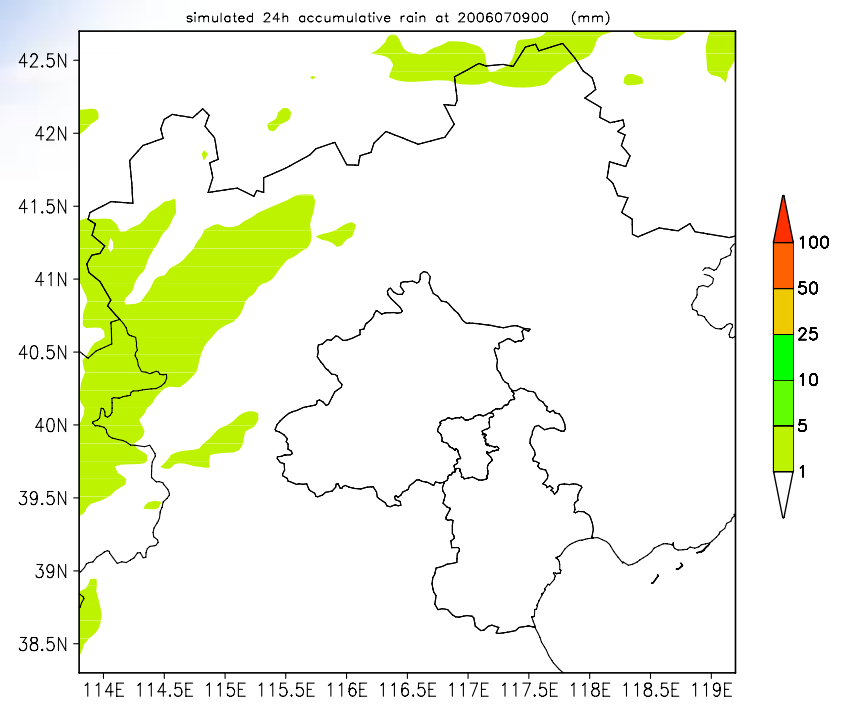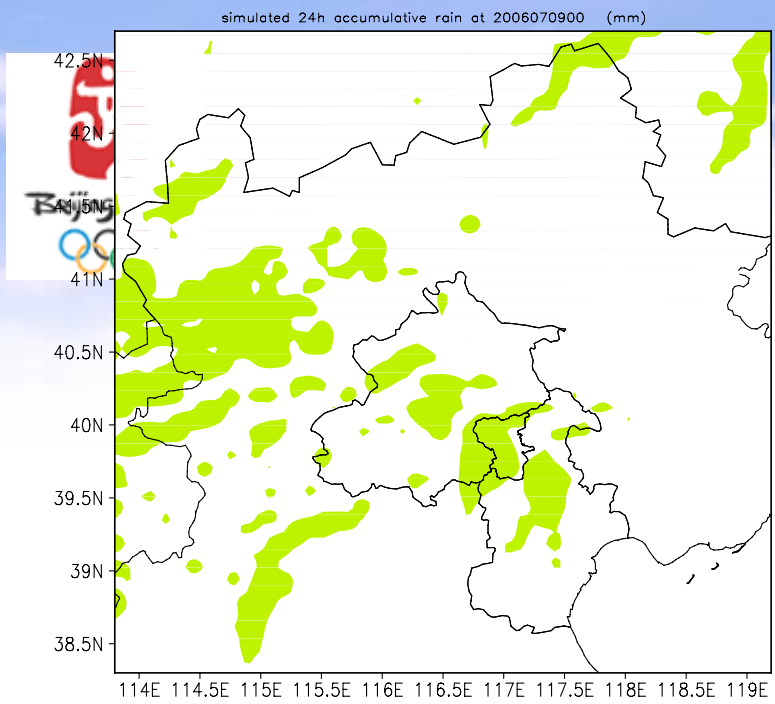
using a tomographic method

GMA in 2006's Rehearsal

An operational numeric weather model produces the forecast products using GNSS PWV data, which indicates an improvement in the rainfall forecast.

simulated 24h accumulative rain at 2006070900　(mm)

simulated 24h accumulative rain at 2006070900　(mm)

24h accumulated rain at 2006070900 (mm)

24 hour accumulation precipitation distribution 　（070800～070900）

Time of the precipitation：070819~22

Left top：evaluation test （with GPS PWV）

Right top：control test （No GPS PWV）

Left top：rainfall observation

33

Thank you for your attention