



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

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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

The map shows the following stations and equipment:

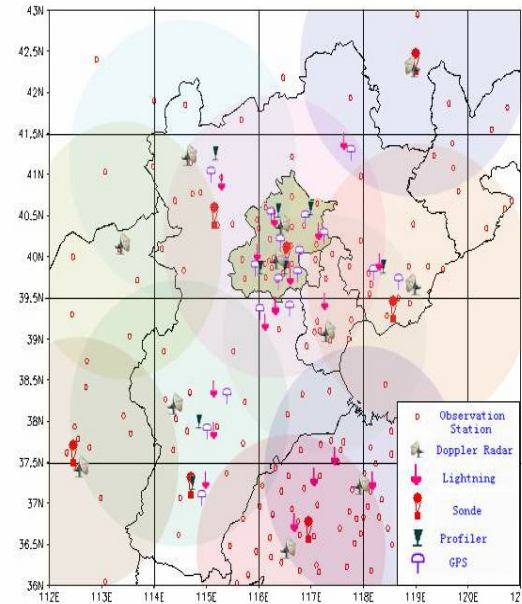
- GPS地面站 (GPS ground station)
- 延庆县 (Yanqing County)
- 怀柔GPS-MET网 (6个单频站) (Huairou GPS-MET network (6 single-frequency stations))
- 密云县 (Miyun County)
- 昌平区 (Changping District)
- 顺义区 (Shunyi District)
- 门头沟区 (Mentougou District)
- 海淀区 (Haidian District)
- 石景山区 (Shijingshan District)
- 朝阳区 (Chaoyang District)
- 通州区 (Tongzhou District)
- 丰台区 (Fengtai District)
- 大兴区 (Daxing District)
- 房山GPS-MET网 (4个单频、4个双频站) (Fangshan GPS-MET network (4 single-frequency, 4 dual-frequency stations))
- L波段探空 (L-band sounding)
- 系留气艇 (Tethered balloon)
- 车载风廓线仪 (Vehicle-mounted wind profile radar)
- 激光雷达 (Laser radar)
- 边界层风廓线仪 (Boundary layer wind profile radar)
- 系留气艇 (Tethered balloon)
- 涡旋关窗系统 (Vortex window system)

Advanced Sounding system



2006's Weather Service Rehearsal

- Observational network is composed of satellite, Doppler Radar, lightning detector, sonde, profiler, GPS, etc.





2006's Weather Service Rehearsal

- Transmission of the sounding system

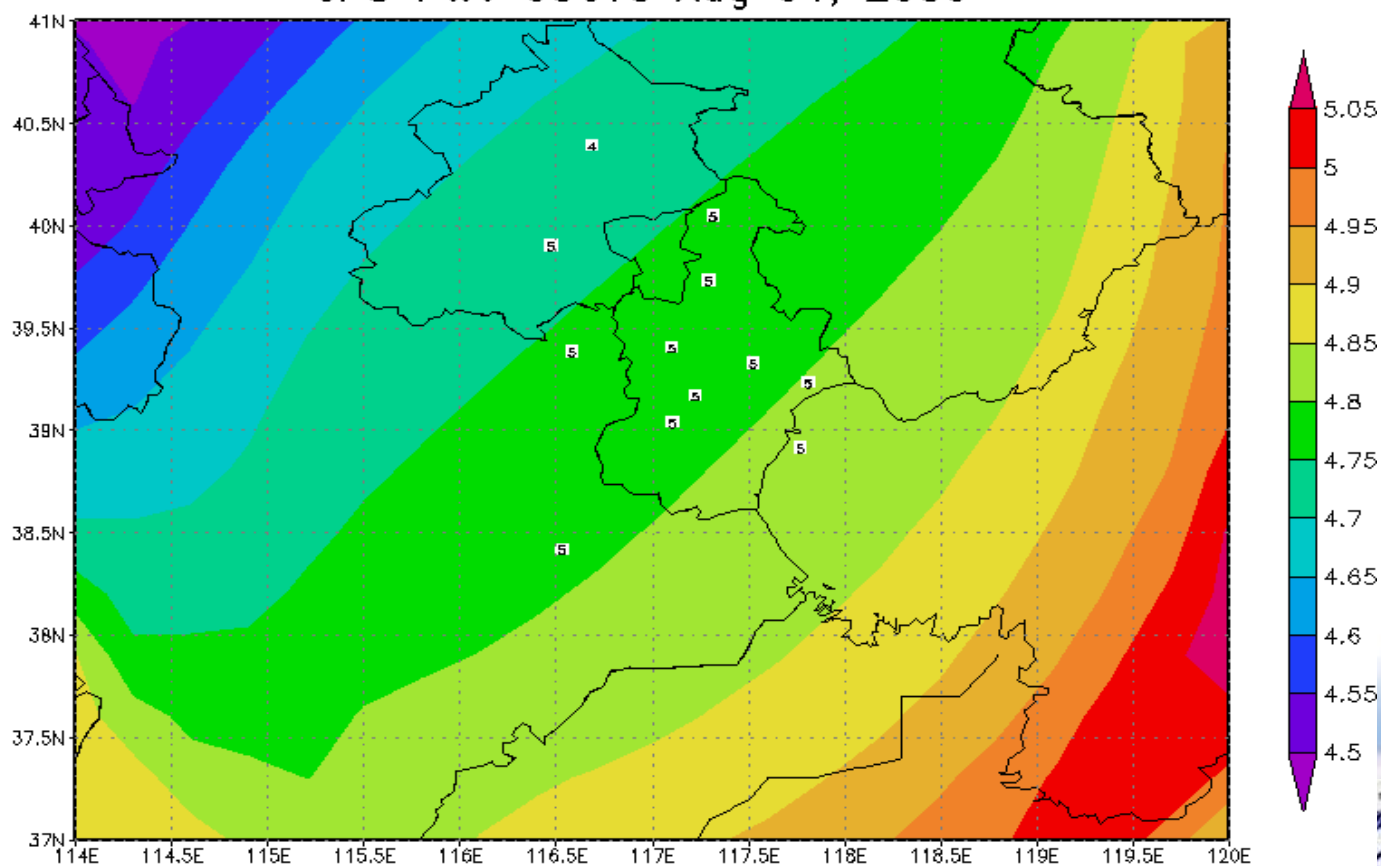
No	Items	Transmission time before the rehearsal	Transmission time after the rehearsal
1	AWS	NA	~2 min
2	Radar data of Tianjin	9 min	1 min
3	FY-2C image	51 min	27 min
4	Radar image (GIF)	once an hour	>98%
5	GNSS data	Once an hour	Once every half hour
6	Radiosonde	2 times/ day	4 times/day





2006's Weather Service Rehearsal

GPS PWV 00UTC Aug 04, 2006

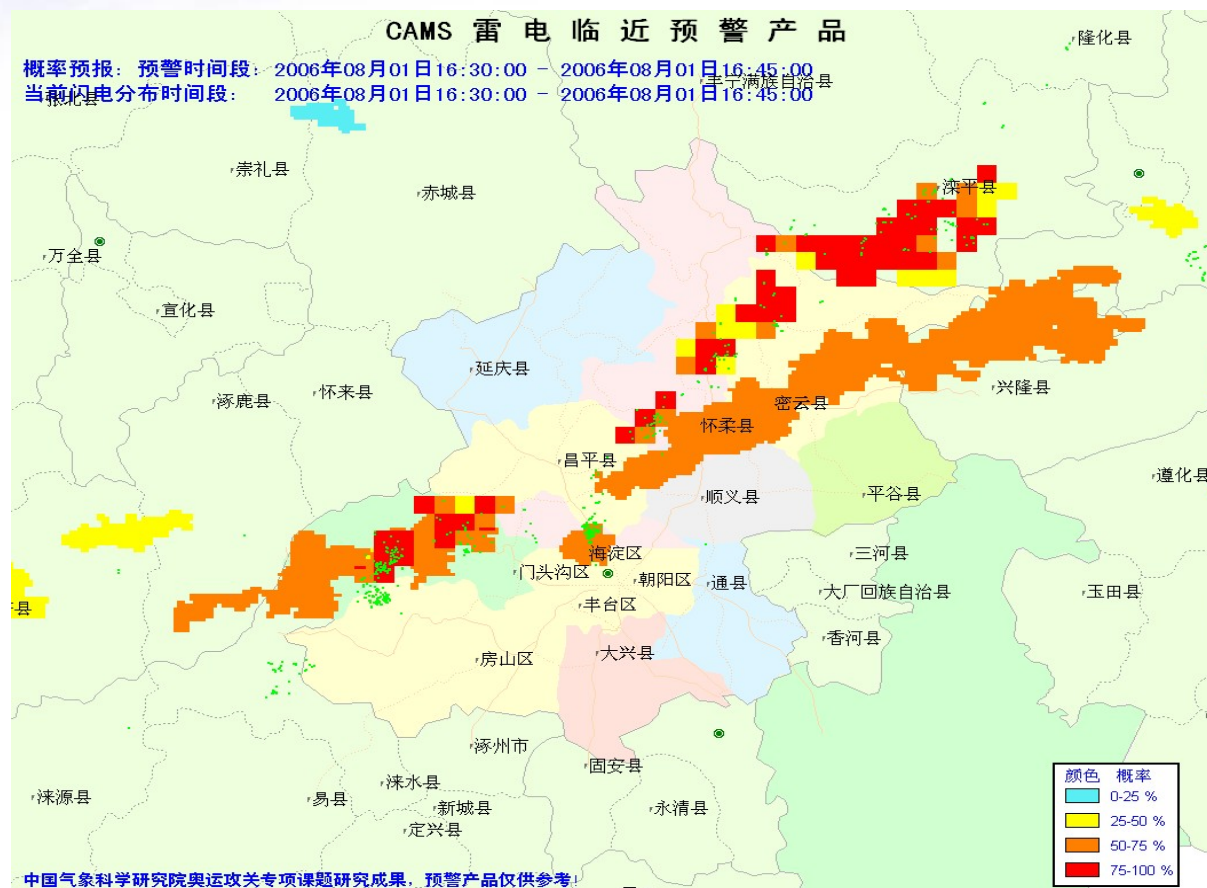


GNSS precipitable water vapor distribution





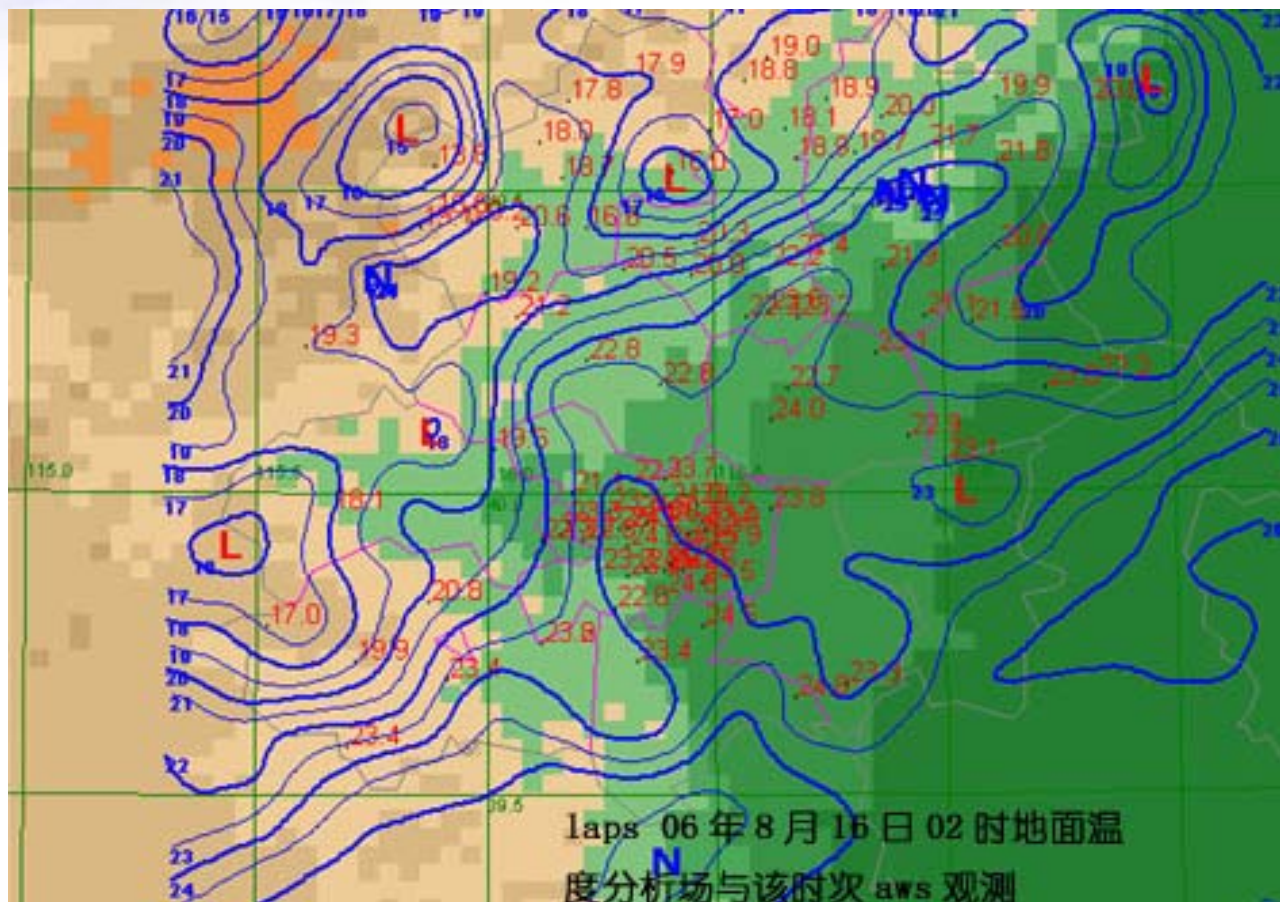
2006's Weather Service Rehearsal



- Lightning prediction product



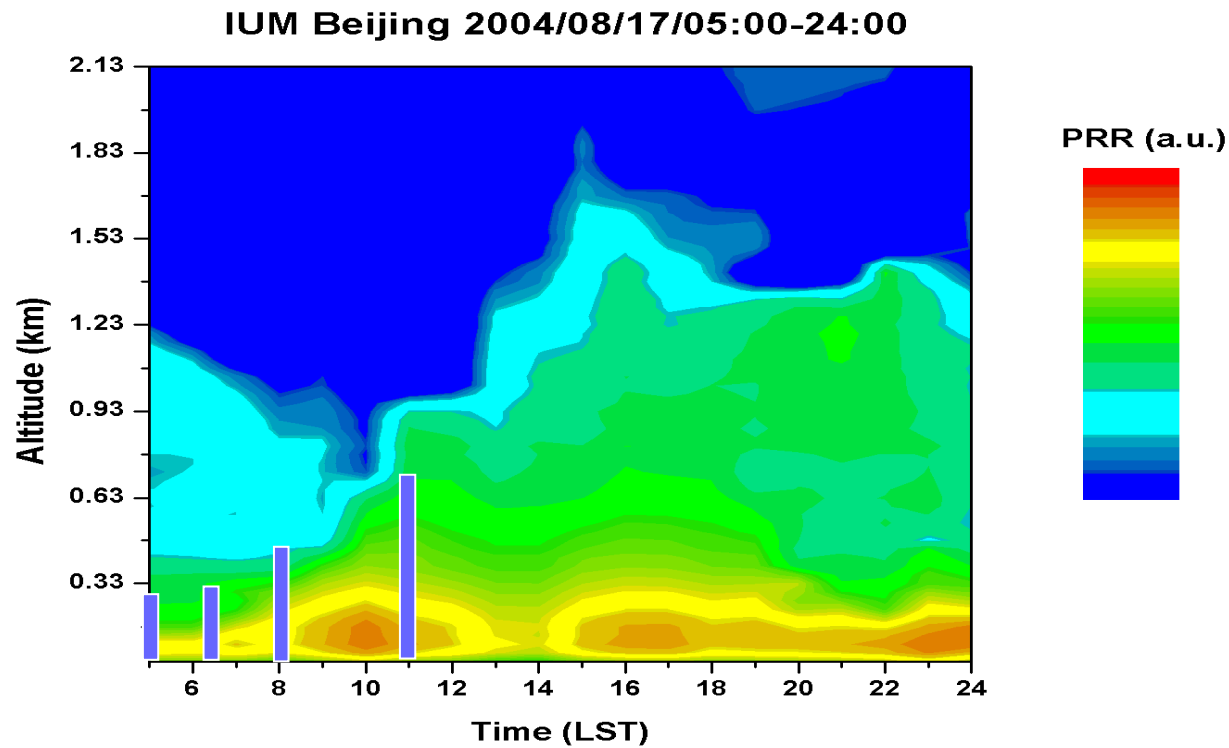
2006's Weather Service Rehearsal



Weather Models – LAPS



2006's Weather Service Rehearsal



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

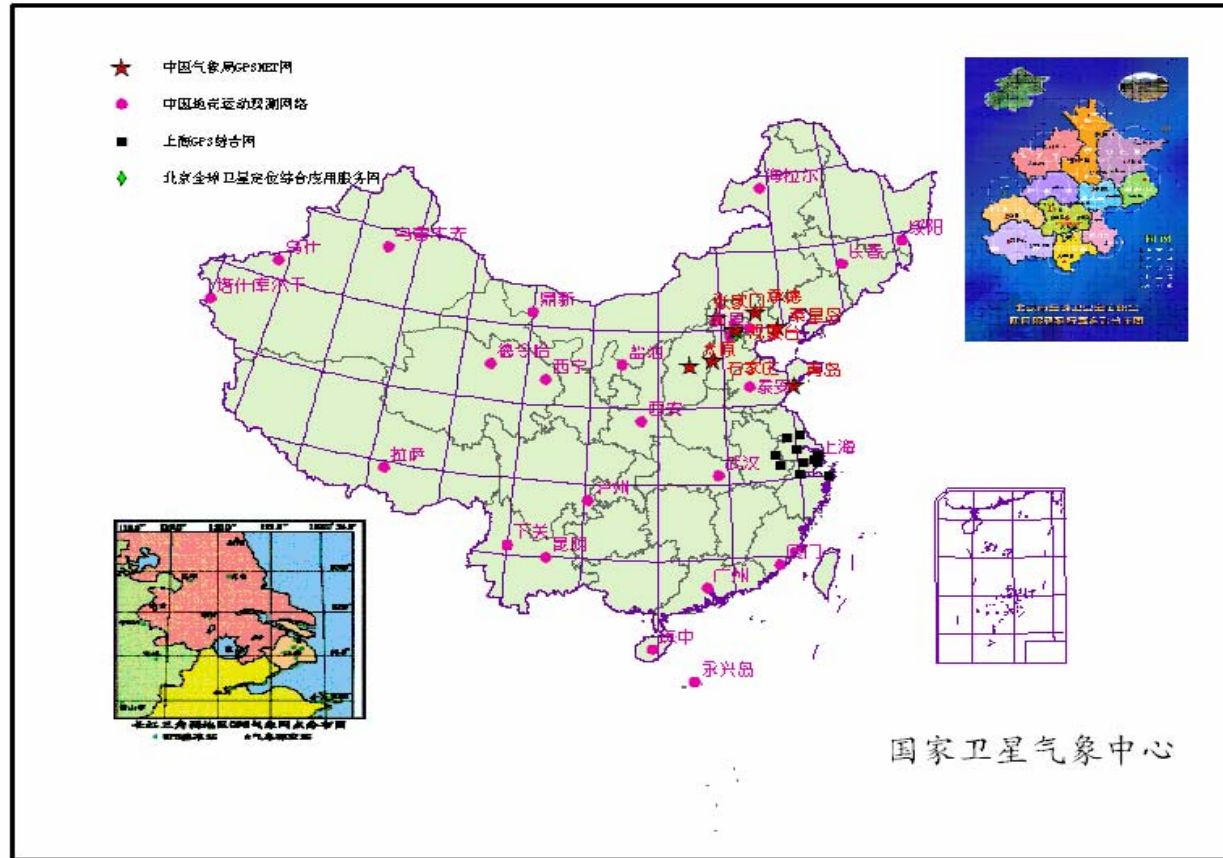
- **Conclusions of 2006's Weather Service Rehearsal**
 - The sounding system works well and still needs to be enhanced.
 - The information transmission system can meet the need, but risk also exists.





Beijing GNSS Network

中国地基GPS基准站



GNSS sites of China Meteorological Administration

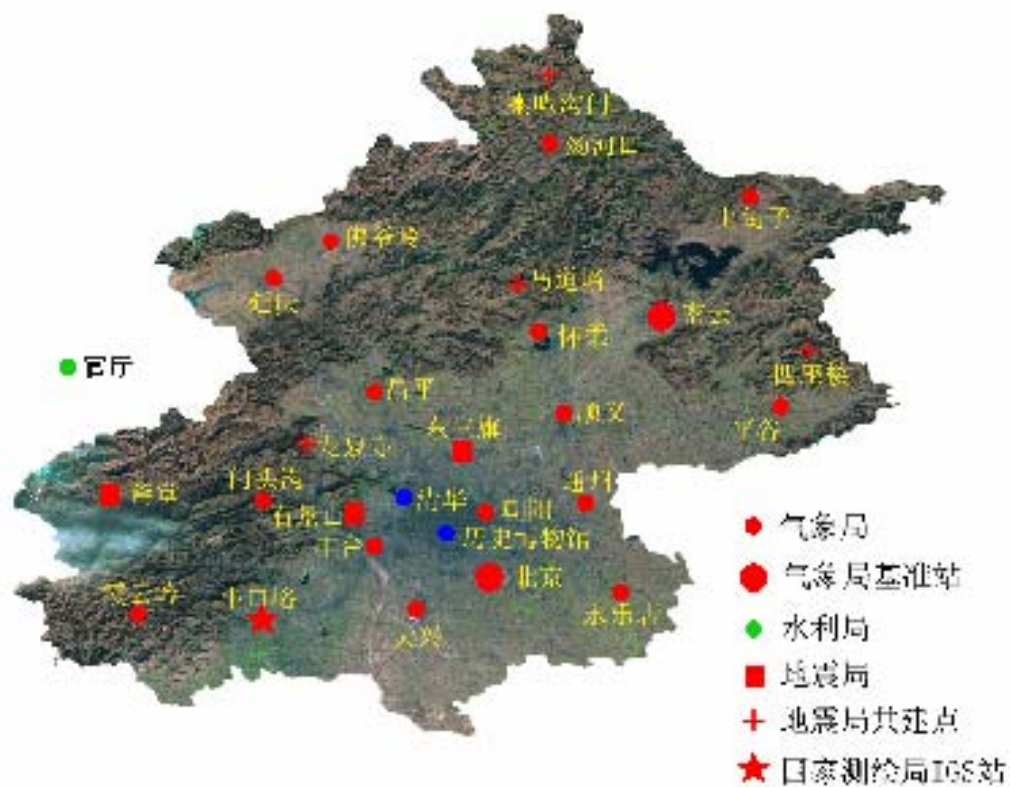


Beijing GNSS Network





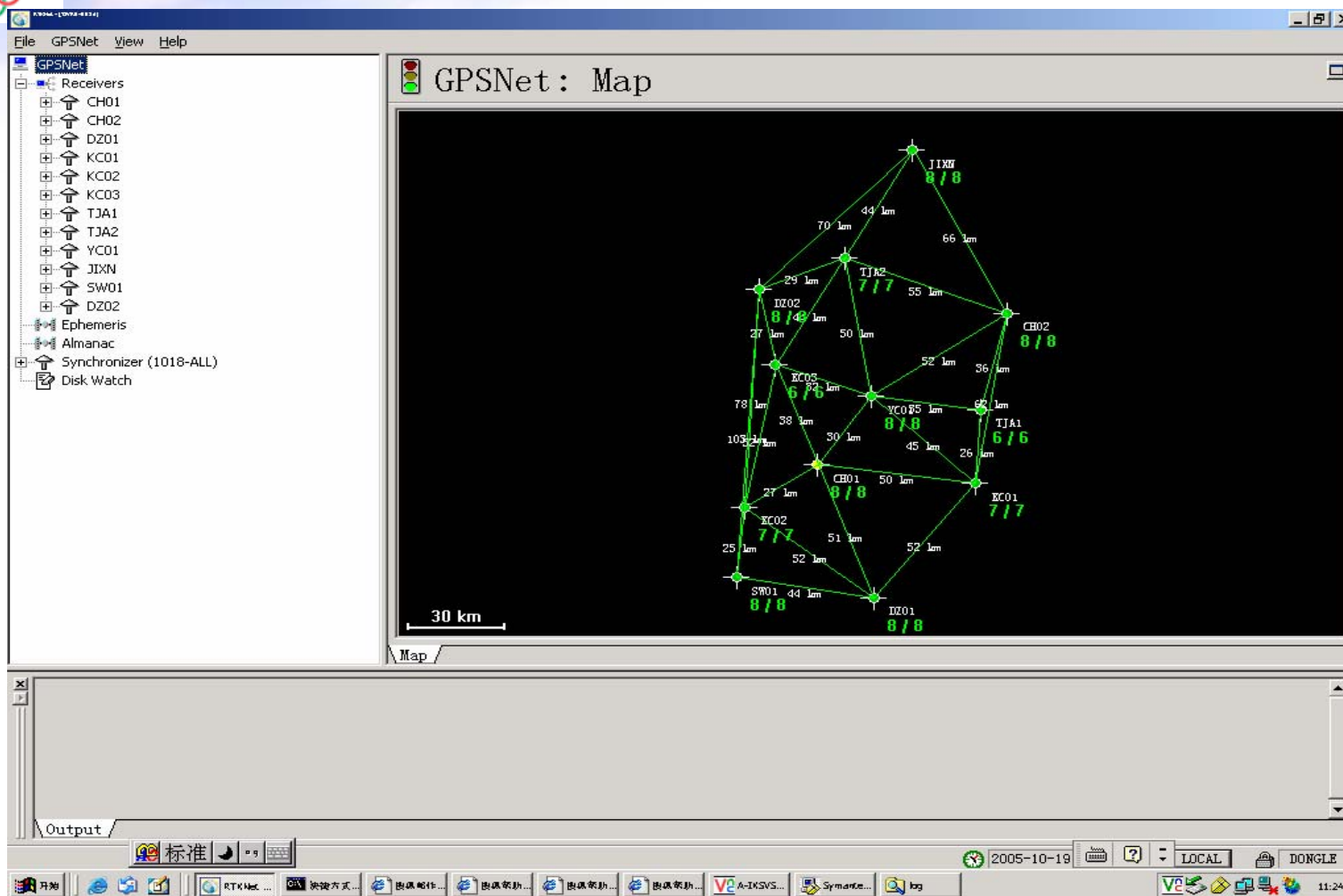
Beijing GNSS Network



- GNSS network of Beijing Information Office



Beijing GNSS Network



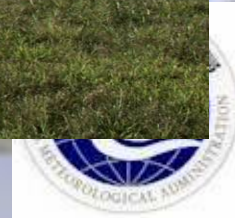
- Tianjin GNSS network



Beijing GNSS Network

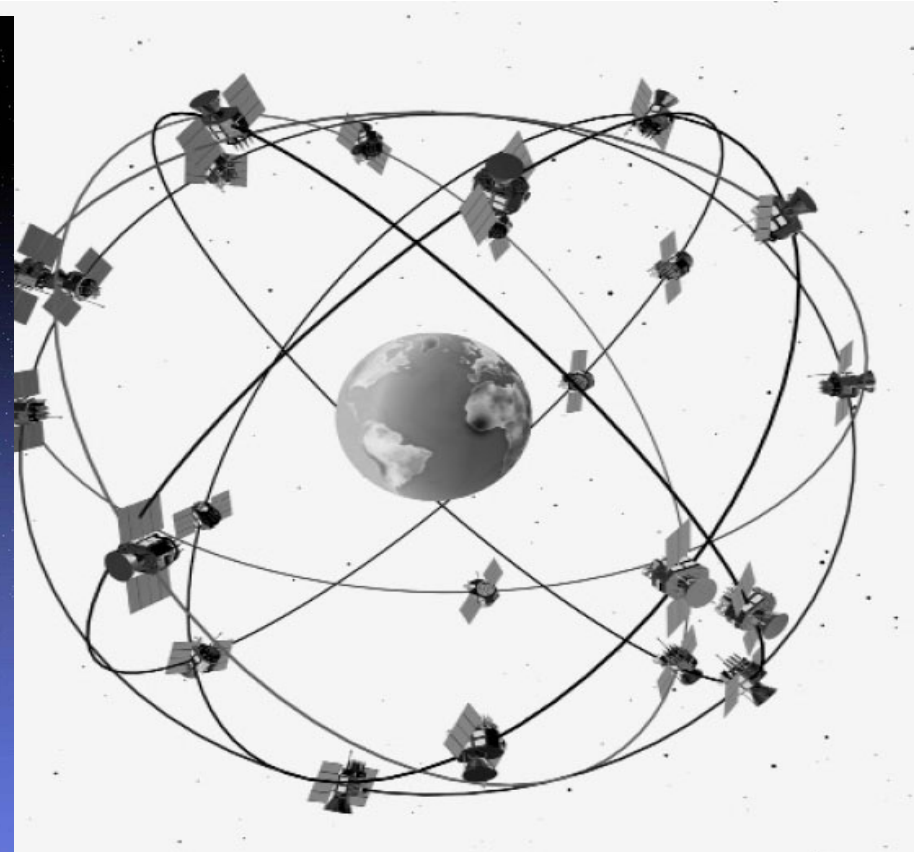
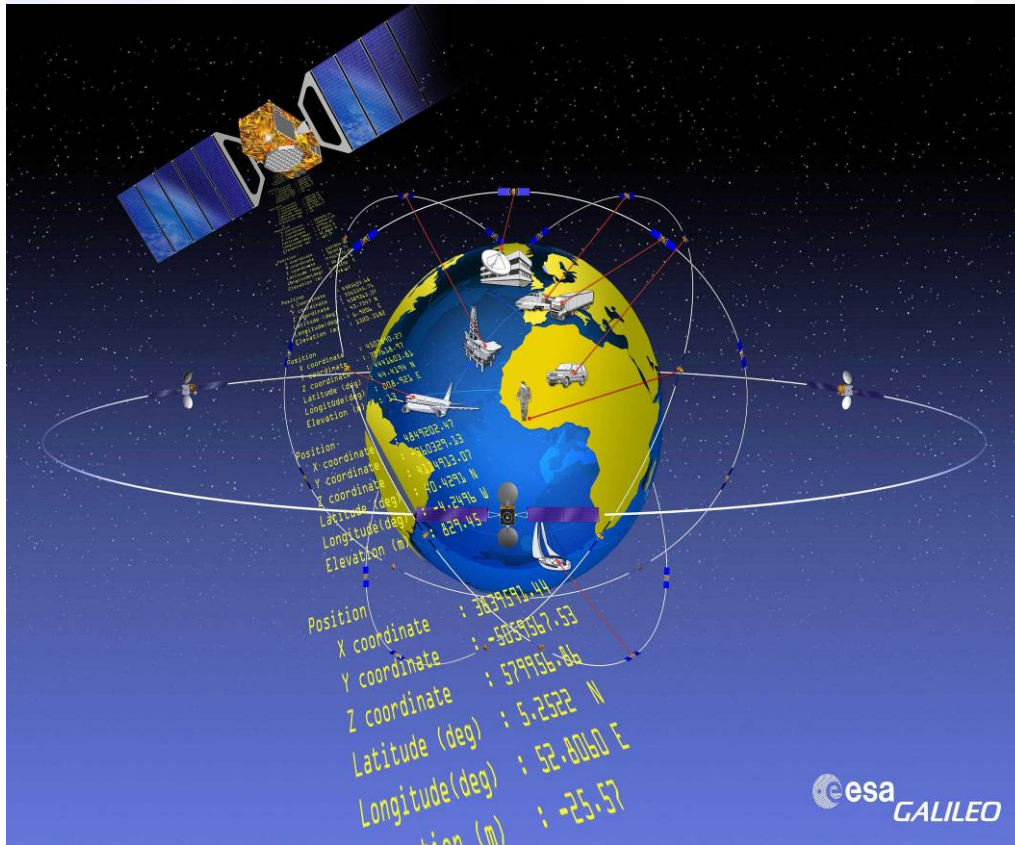


- GNSS station - Yanqing





GNSS Meteorological Application

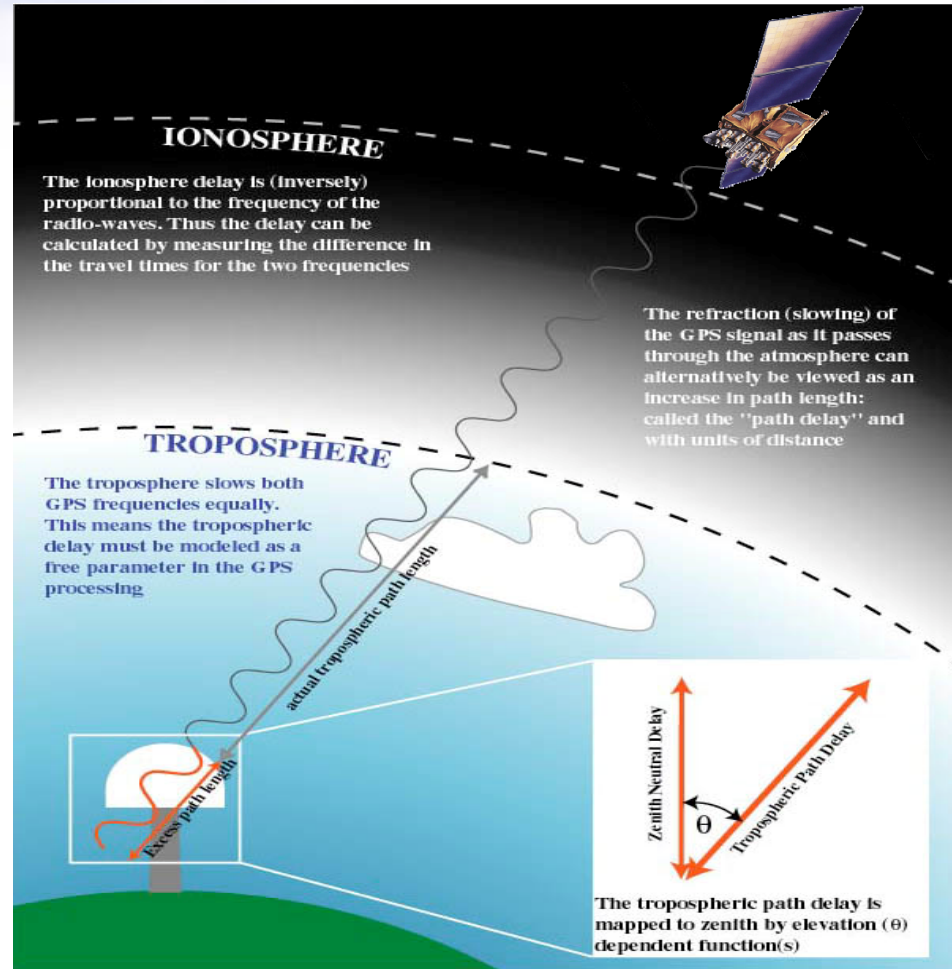


- GPS and Galileo





GNSS Meteorological Application





GNSS Meteorological Application

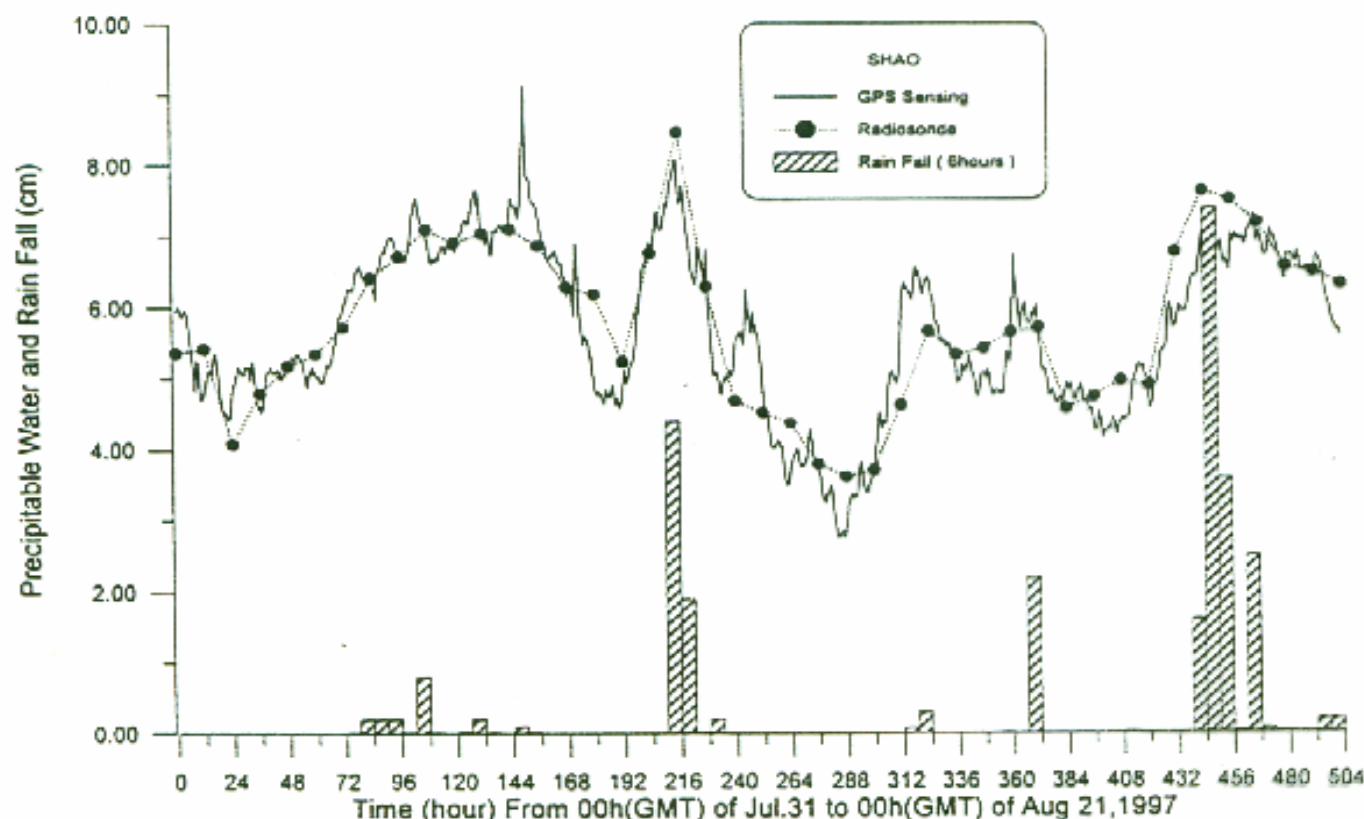


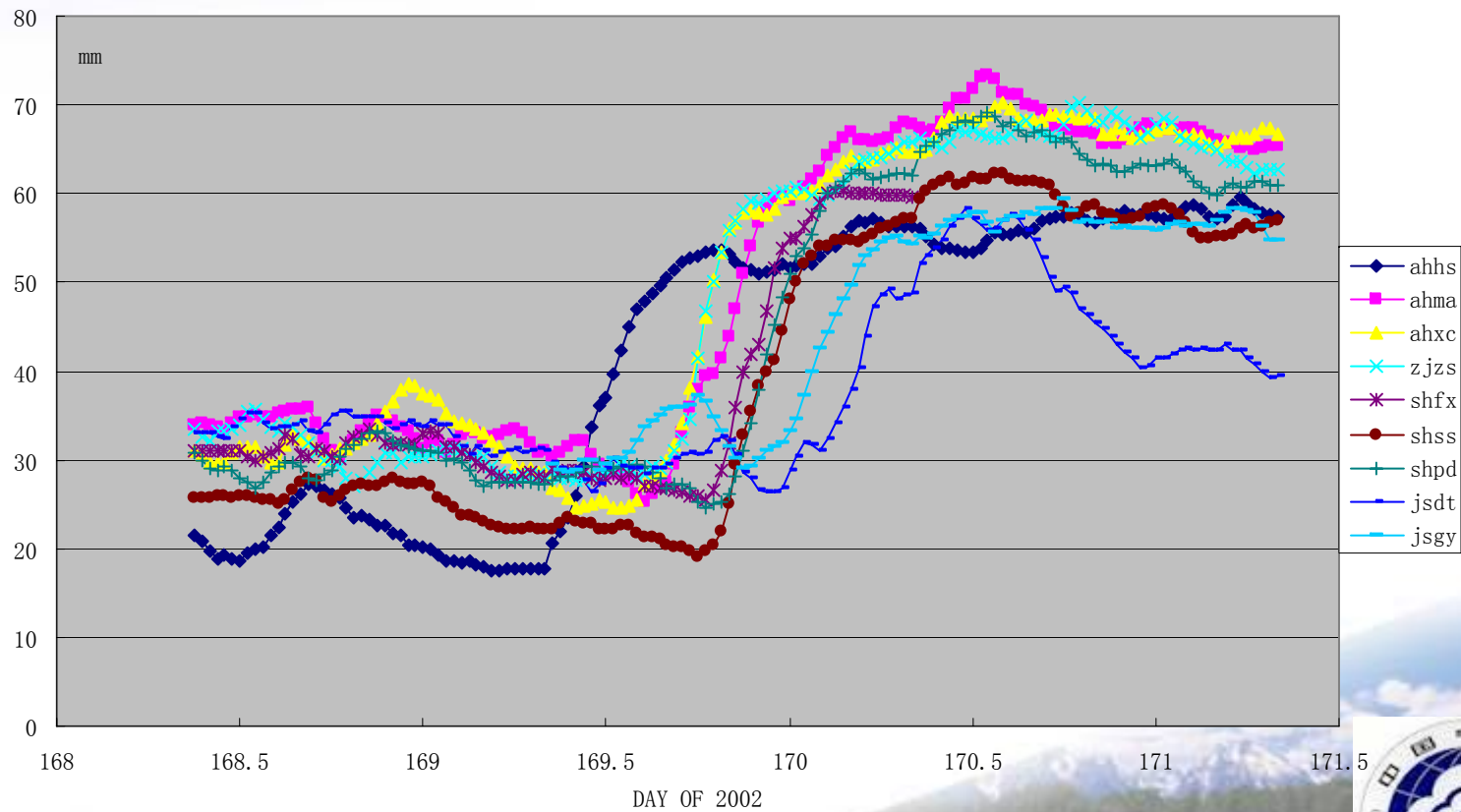
图 10 上海站 GPS 遥感水汽与探空水汽对照 (直方图为地面 6 小时降水)

Relationship between PWV and the rainfall





GNSS Meteorological Application

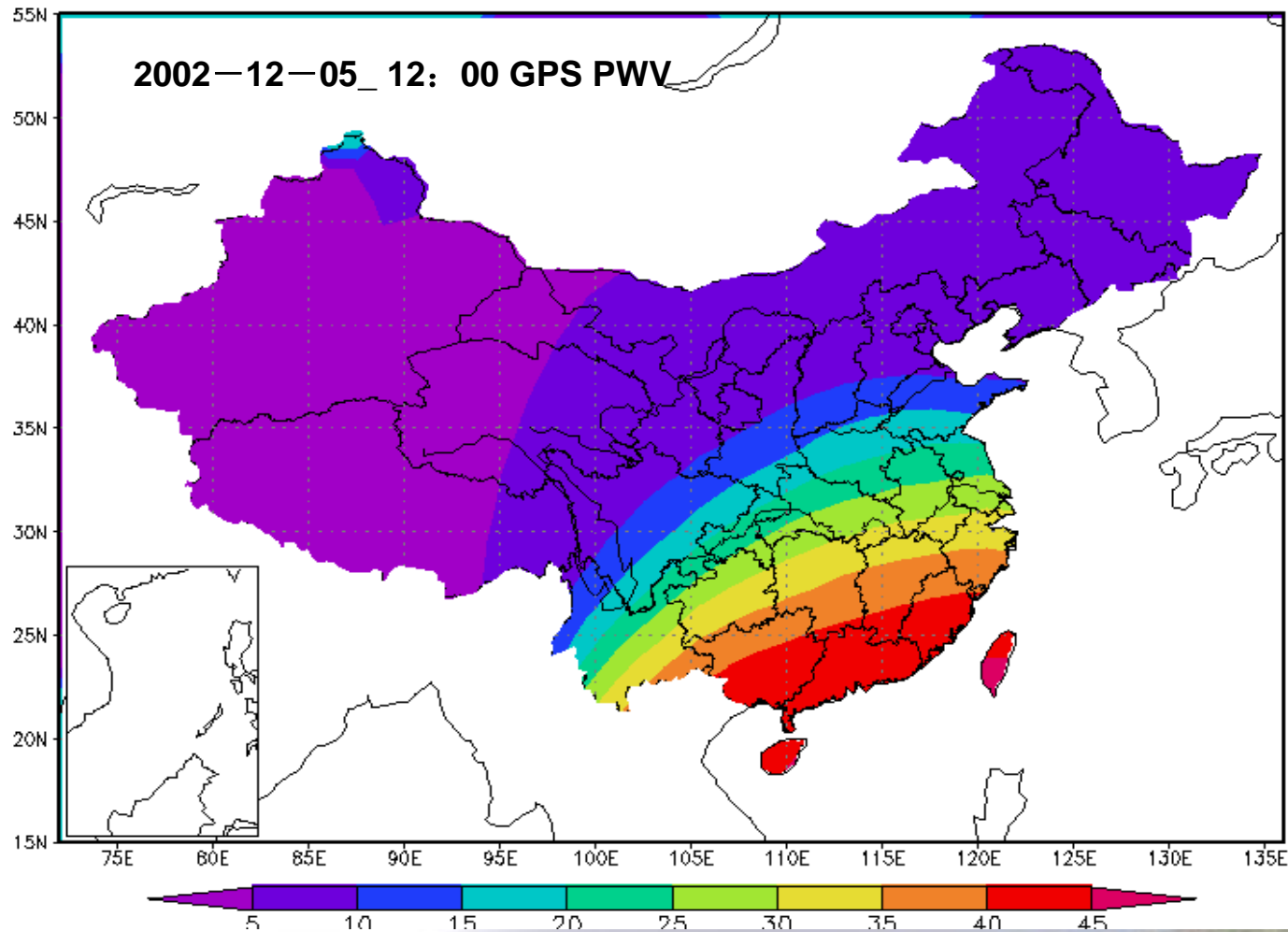


PWV changes during the Meiyu season





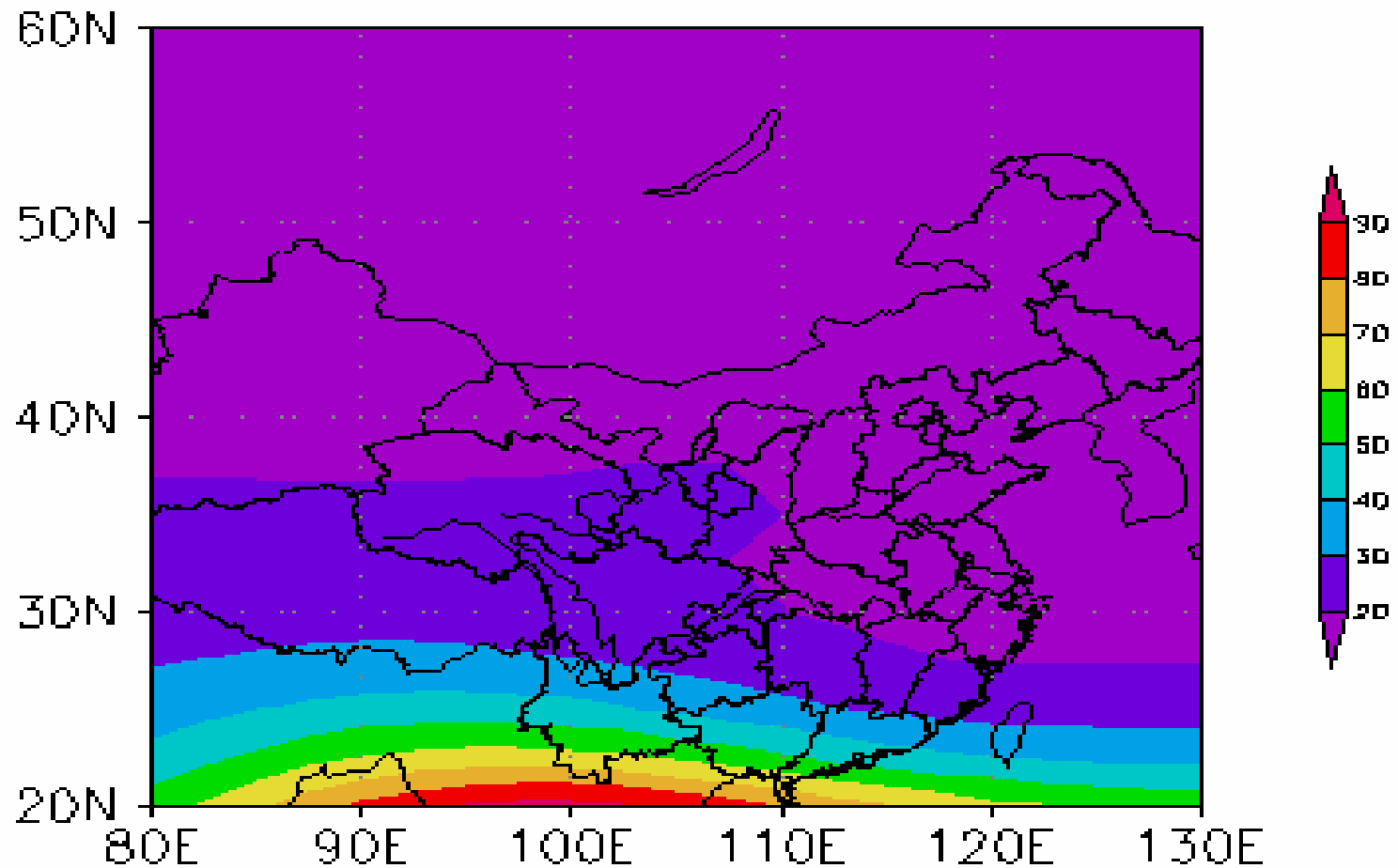
GNSS Meteorological Application



PWV distribution over China



GNSS Meteorological Application

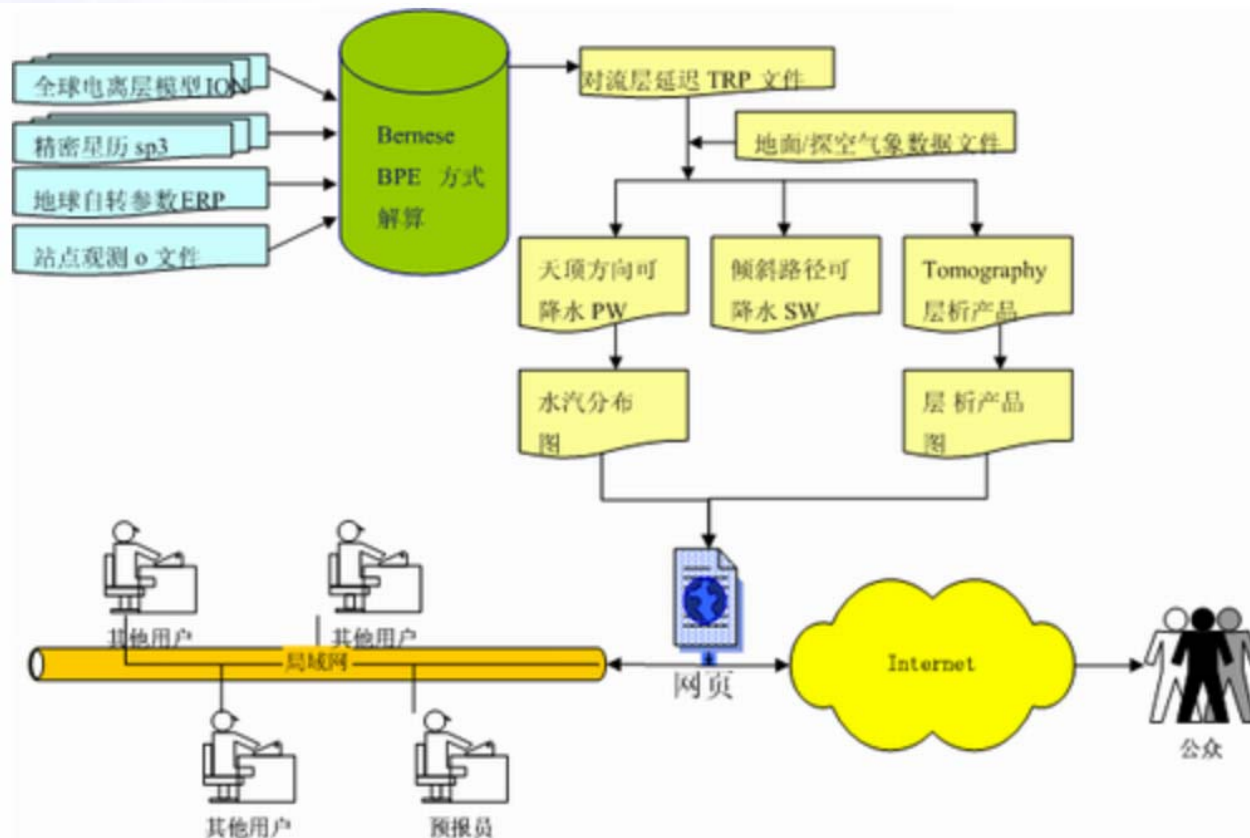


TEC distribution on 12UTC, April 27, 2004





GMA in 2006's Rehearsal



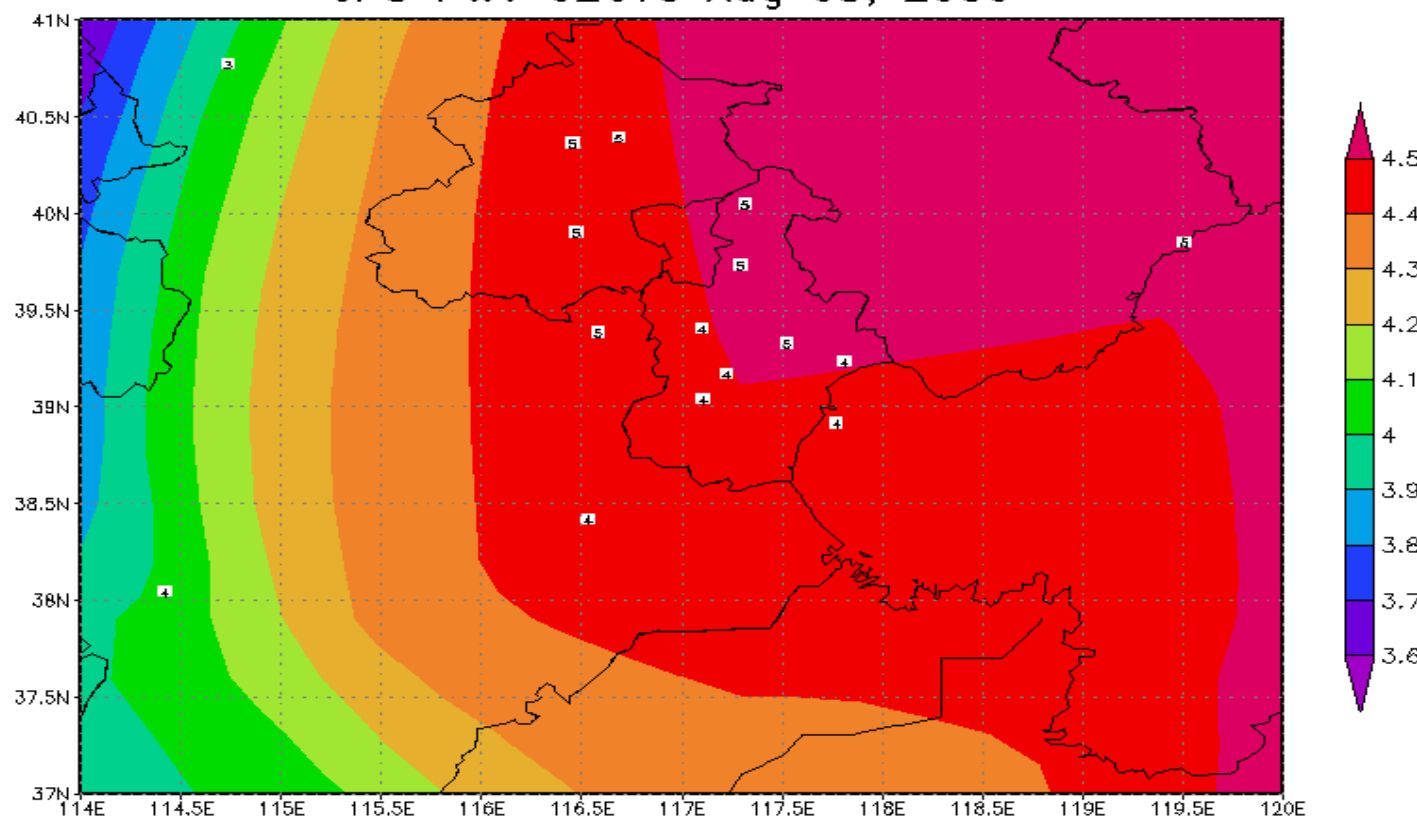
GMA data processing system





GMA in 2006's Rehearsal

GPS PWV 02UTC Aug 05, 2006



Horizontal distribution of PWV in Beijing





GMA in 2006's Rehearsal



北京气象

- 业务化项目
 - 自动气象站
 - 雨量
 - 雷达(S波段)
 - 雷达(C波段)
 - 静止卫星云图
 - 卫星遥感图像
 - 闪电定位
 - 风廓线
 - GPS水汽
 - 酸雨
 - 负离子
 - 紫外线
 - 大气成分监测
 - 沙尘暴
 - 道面监测
 - 花粉(4-9月)
- 试运行项目
 - 微波辐射计
- 移动观测项目
 - 移动边界层探测
 - 移动环境气象探测
- 系统功能
 - 在线帮助
 - 留言本

地基GPS/MET

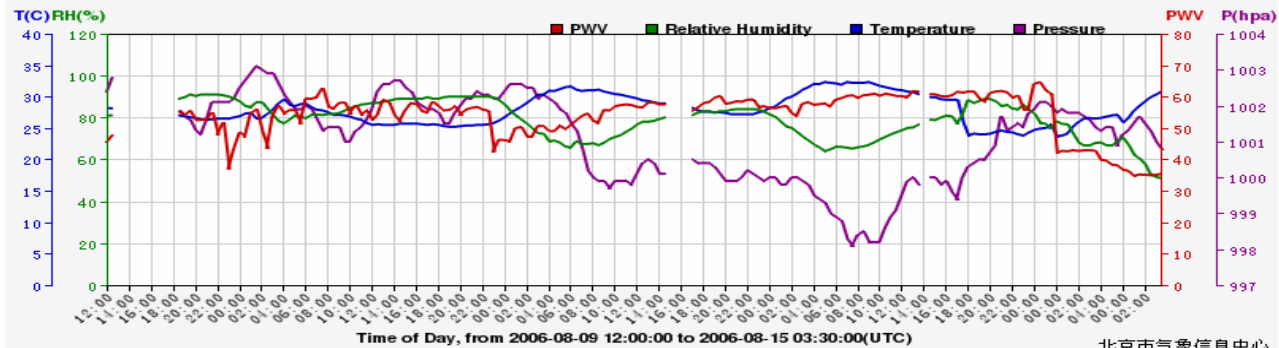
项目简介 | 气象要素信息 | 水汽总量信息 | 总水汽图 | 科研论文

(解算程序业务试运行, 站点将逐步增加, 显示仅供参考)

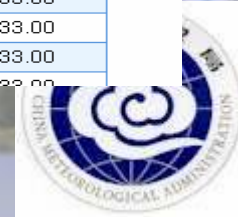
按站点: 大兴区 观象台
 怀柔区 九渡河 桥梓镇 怀北镇 杨宋镇 怀柔镇 渤海镇
 房山区 韩村河 霞上 青龙湖 长阳 官道 闫村 窦店 琉璃河

按时间: 2006-08-15 03:30:00 (UTC)

观象台水汽总量信息



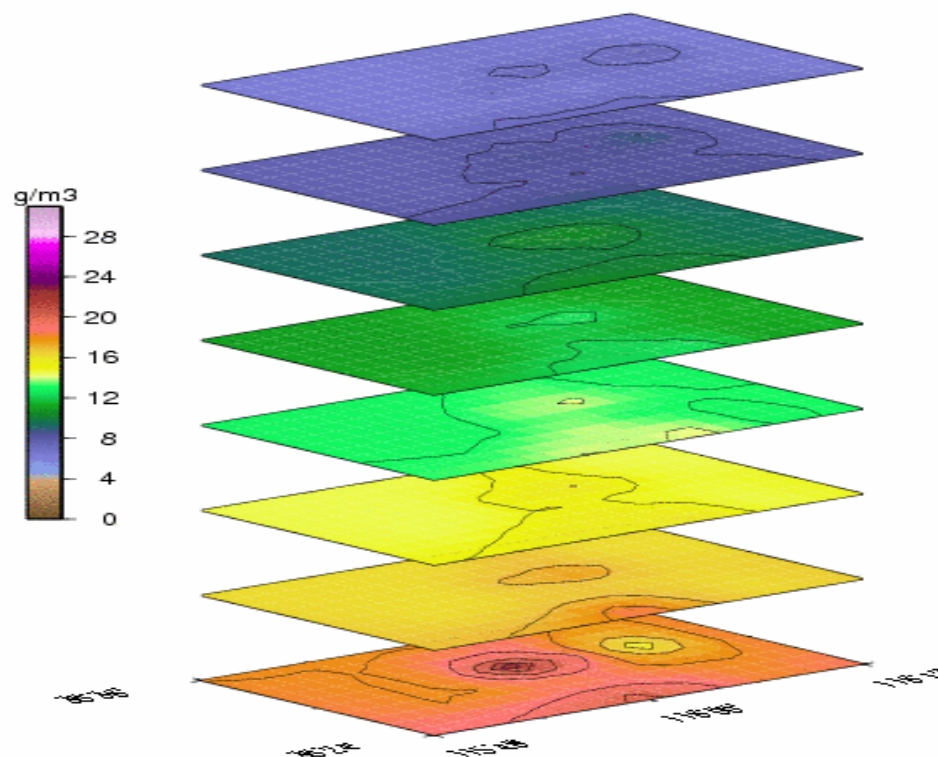
站名	观测时间	水汽总量	气温(℃)	气压(hpa)	相对湿度(%)	经度(E)	纬度(N)	海拔高度(m)
观象台	2006-08-15 03:30:00	35.40	30.80	1000.80	51.00	116.4700	39.8000	33.00
观象台	2006-08-15 03:00:00	35.10	30.30	1001.00	51.70	116.4700	39.8000	33.00
观象台	2006-08-15 02:30:00	35.00	29.90	1001.30	52.80	116.4700	39.8000	33.00
观象台	2006-08-15 02:00:00	35.10	29.20	1001.50	57.80	116.4700	39.8000	33.00
观象台	2006-08-15 01:30:00	35.20	28.50	1001.70	60.60	116.4700	39.8000	33.00
观象台	2006-08-15 01:00:00	34.80	27.70	1001.50	62.30	116.4700	39.8000	33.00
观象台	2006-08-15 00:30:00	35.40	26.50	1001.30	67.00	116.4700	39.8000	33.00



Web service of GMA for Beijing



GMA in 2006's Rehearsal



3D water vapor distribution over Beijing
using a tomographic method

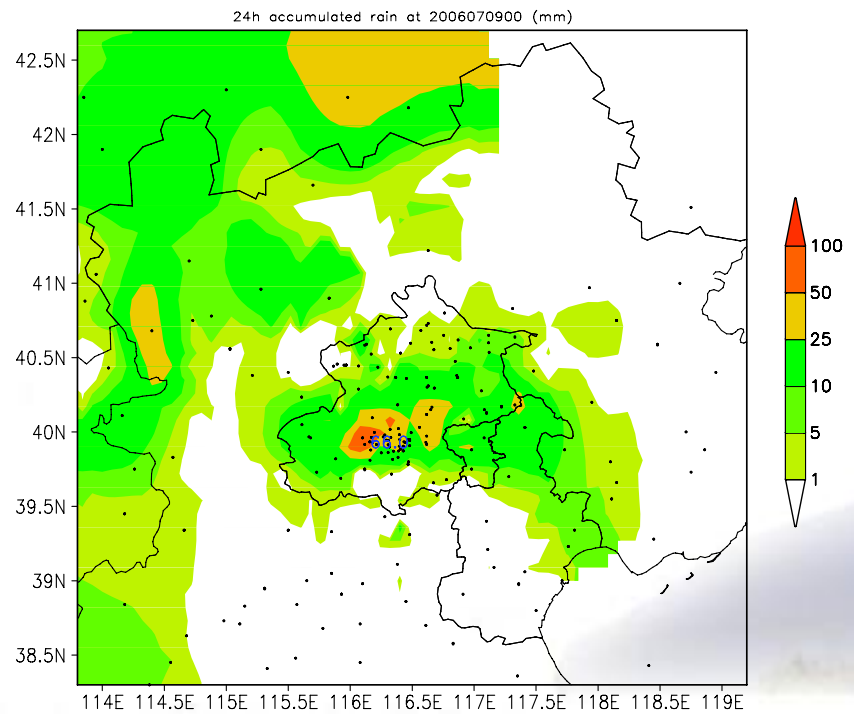
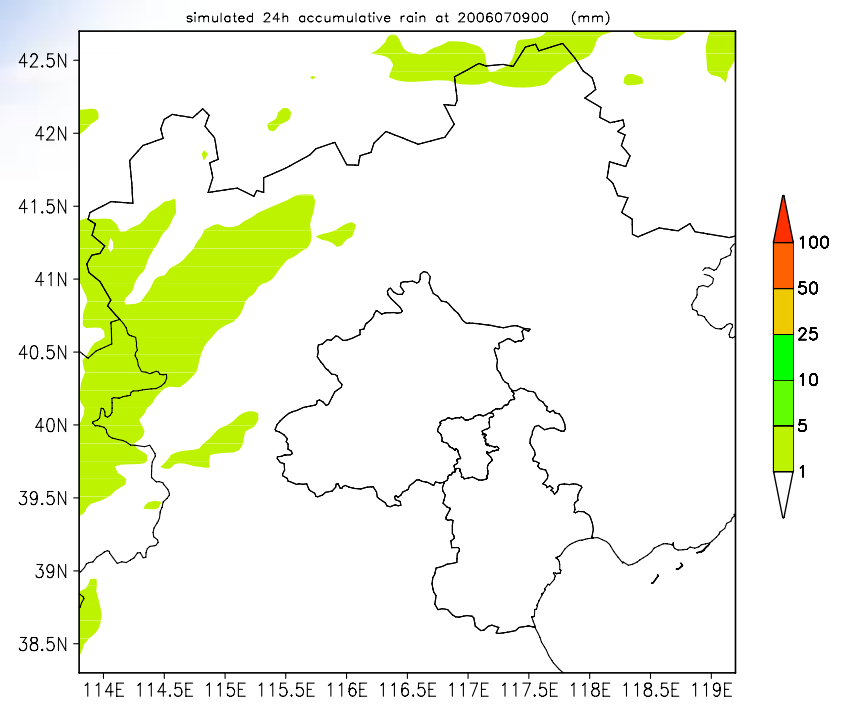
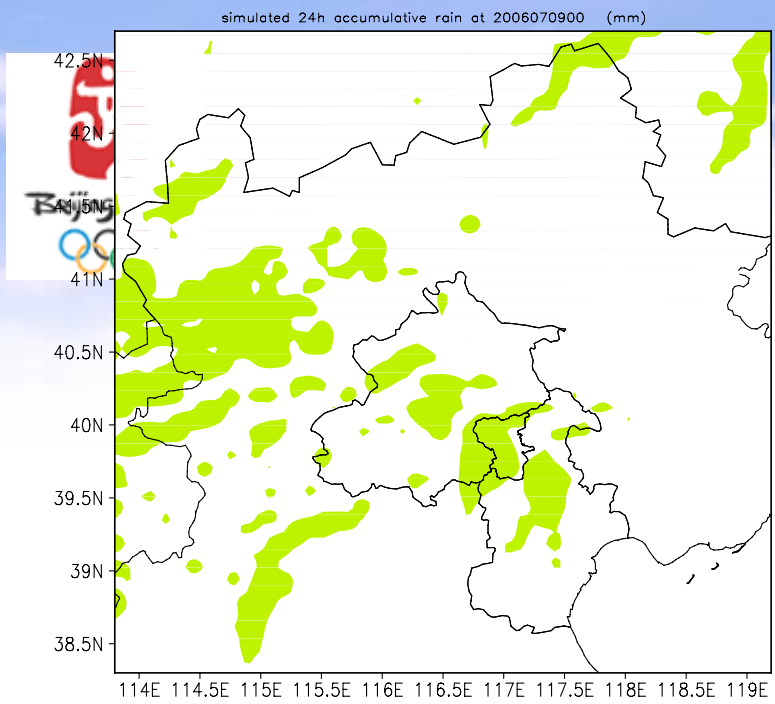




GMA in 2006's Rehearsal

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





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





Thank you for your attention

