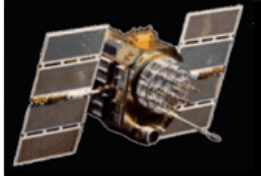
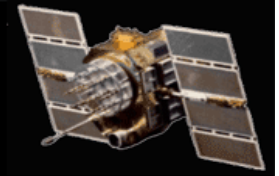




GPS Network: GFZ Contribution to COPS/GOP/IOP

Galina Dick

GeoForschungsZentrum Potsdam, Germany

4th COPS Workshop

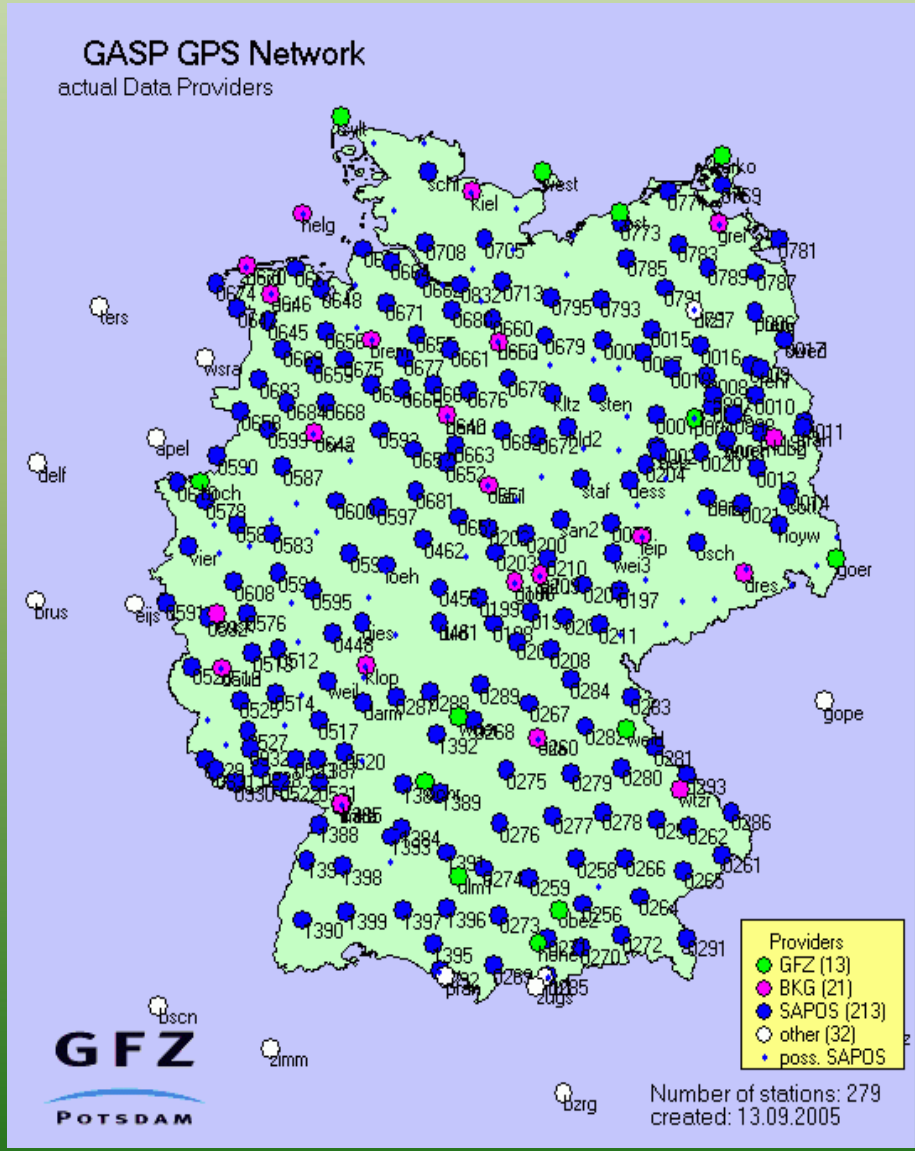
25 - 26 September 2006

University of Hohenheim, Stuttgart

Water Vapor Monitoring with GPS at GFZ (1)

GPS Analysis Center at GFZ: NRT IWV monitoring since 2000

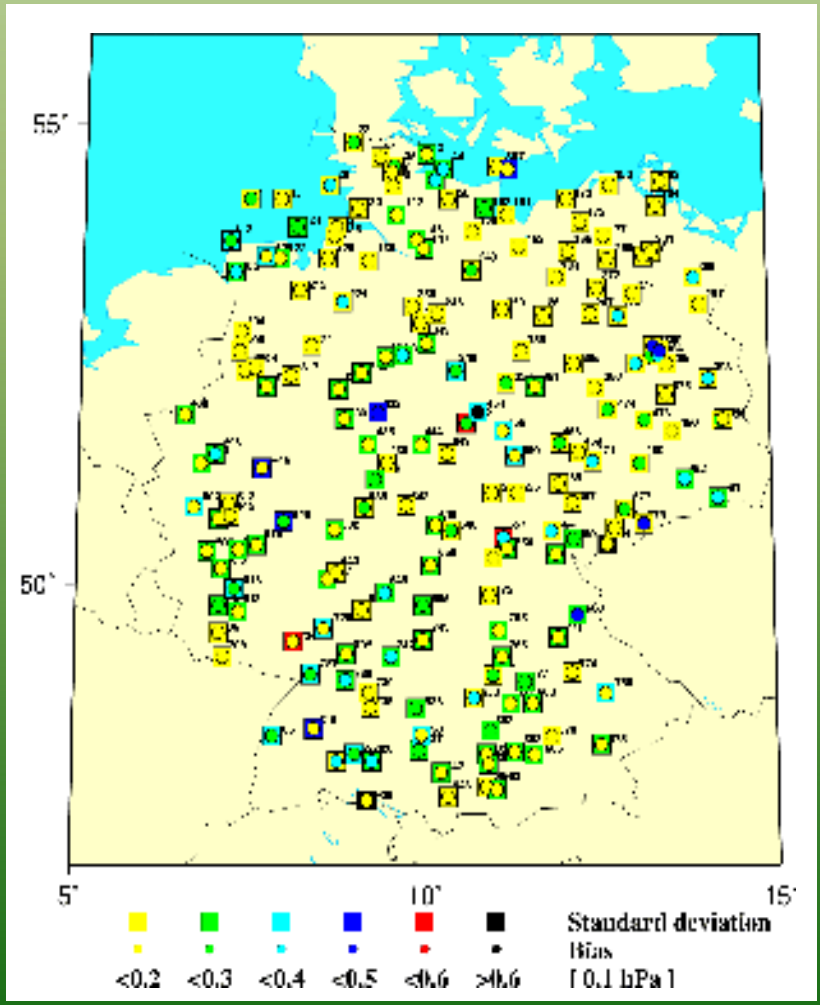
- **Automatic operation of >200 stations with processing time of about 10 min on a single PC**
- **Delay < 1.45 min**
- **Quality: < 1-2 mm IWV**



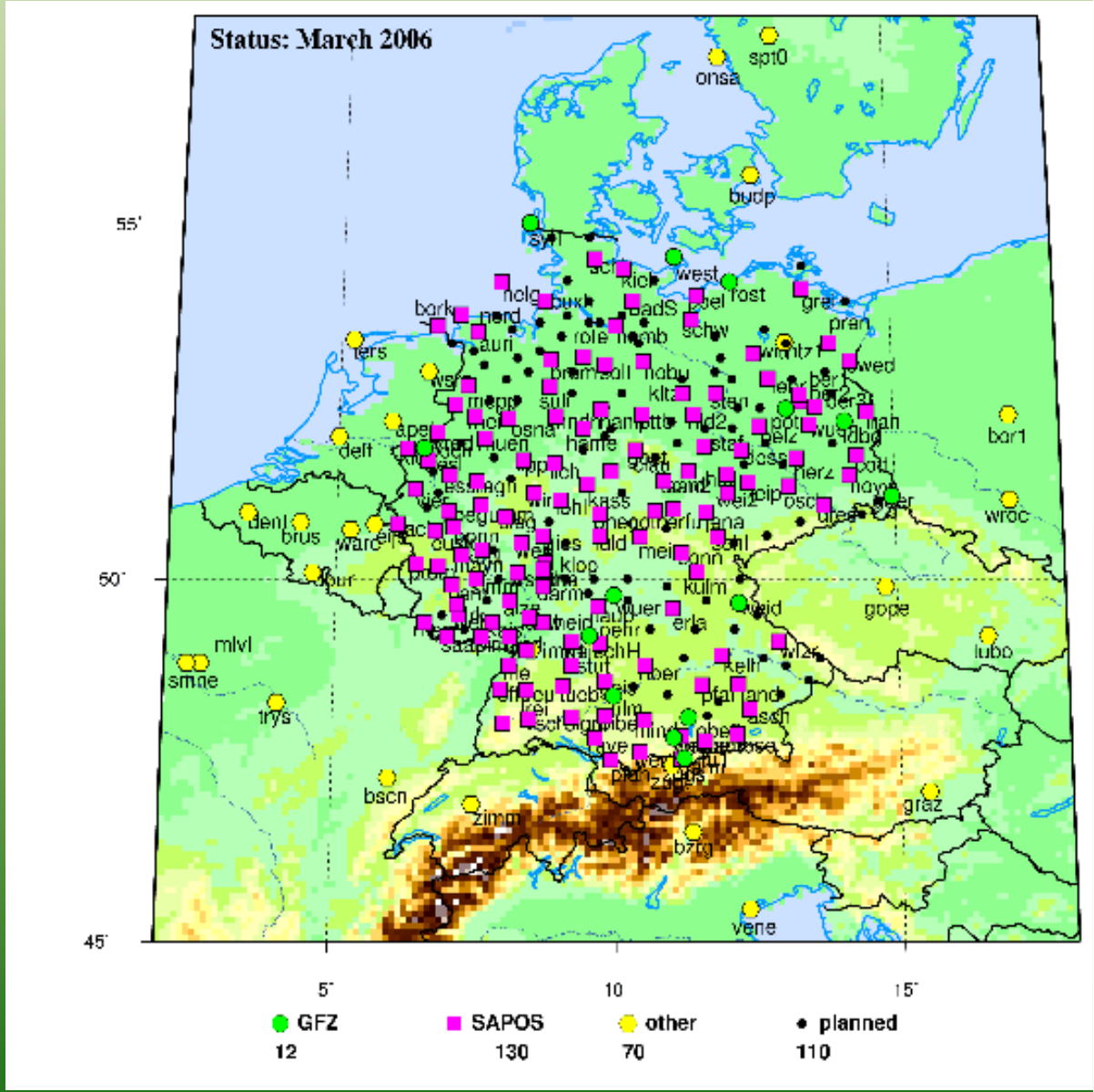
Water Vapor Monitoring with GPS at GFZ (2)

Data for analysis

- Hourly GPS- and Met-data
- Interpolation of missing Met-data (210 synoptic stations)



German NRT network

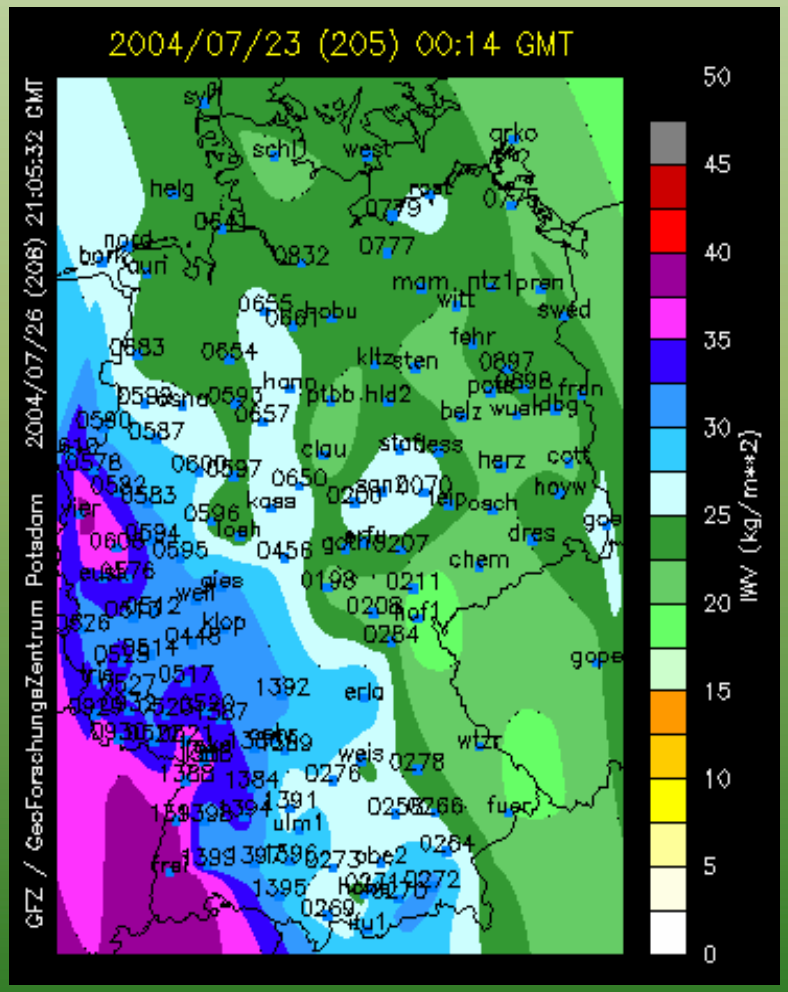


Whole: 220

Water Vapor Monitoring (Web Page GFZ)

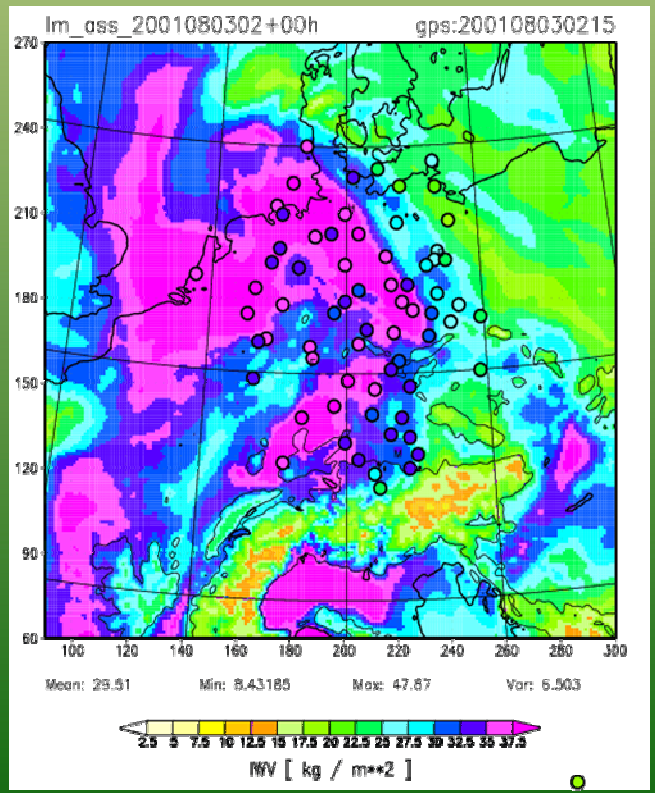
- **Time series (last 2 or 7 days)**

- **Animation (selected time interval)**



- **Comparison to 'Local Model' of DWD**

  (continued after GASP)



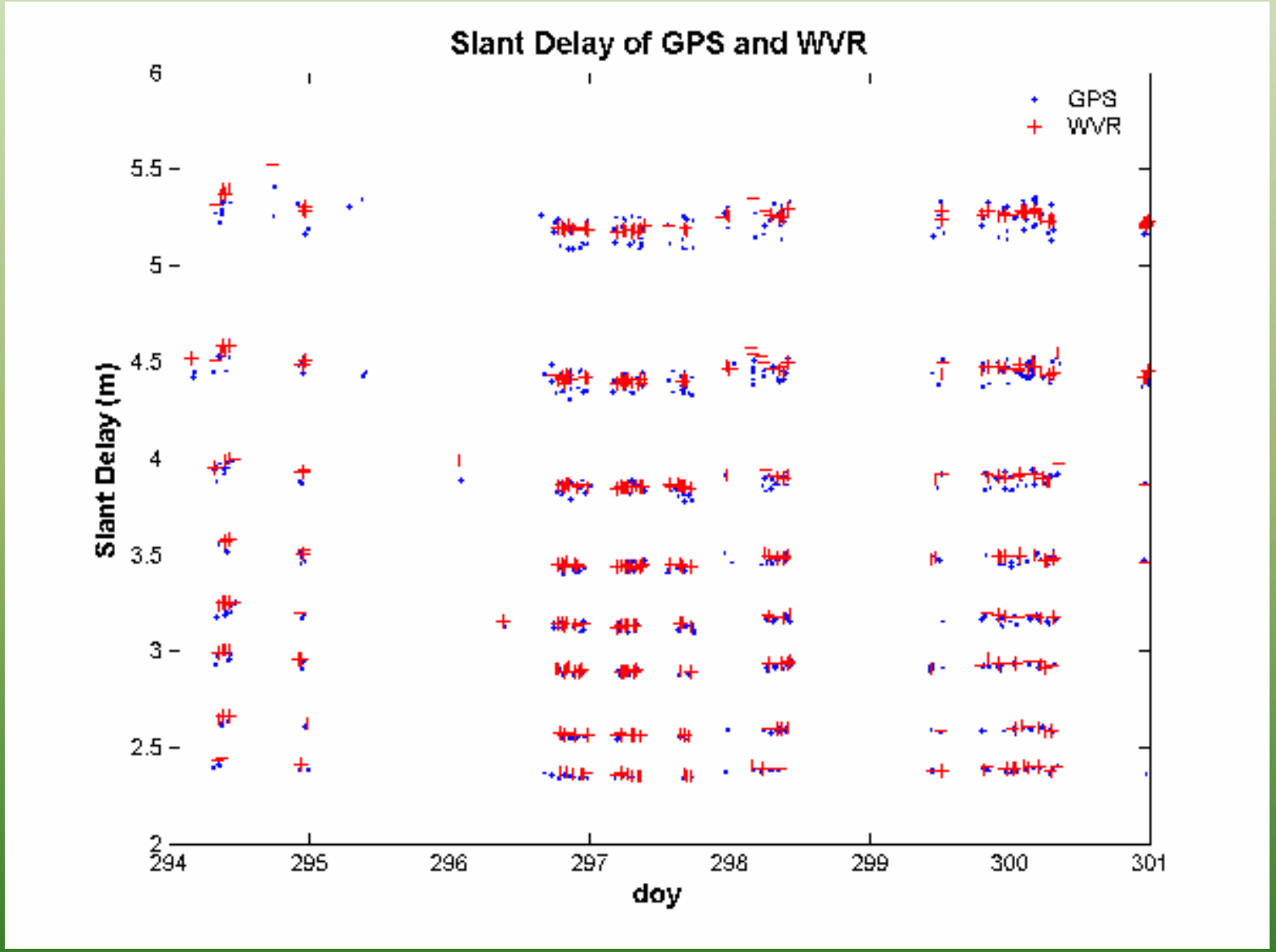
GFZ POTSDAM

Main GPS derived products

- **NRT products (delay < 1.45h, COST-Format):**
  - **ZTD/IWV with 30 minutes resolution**
  - **trop. gradients in North/East direction**
- **Pots-Processed:**
  - **‘slant delays’ with sampling rate of 2.5 minutes**

GFZ POTSDAM

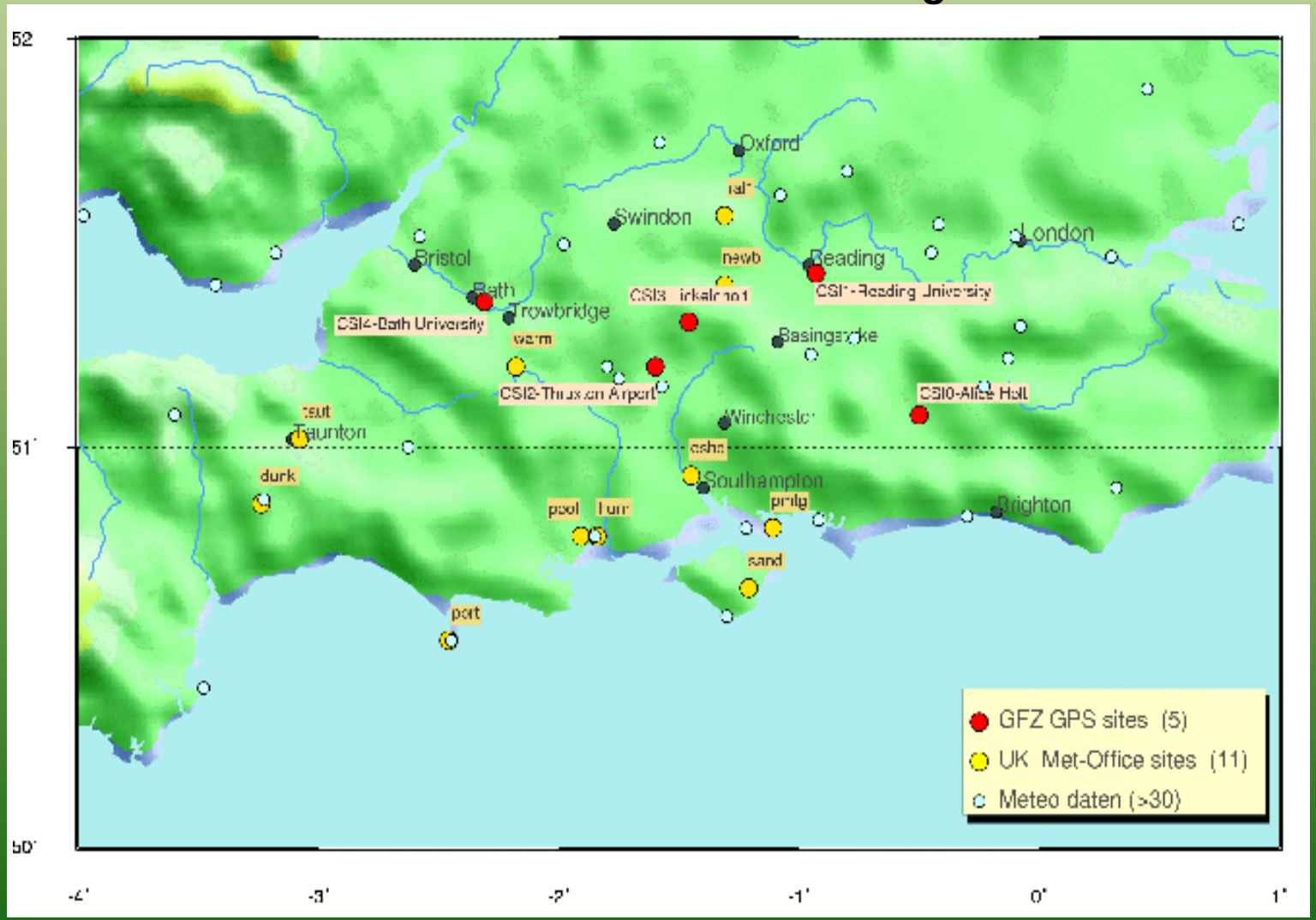
Comparison of ‘slant delay’ from GPS with WVR



Slant delay for one week of data in Oktober 2002, station Wettzell

CSIP - Convective Storm Initiation Project

- proposed by the Meteorological Community of the UK
- conducted in southern England in June-August 2005
- *Goal:* to understand the mechanisms of initiation of precipitating convection in the environment of southern England



GFZ Network
Observation period:
7 June to 24 Aug. 2005

CSIP: Examples of GFZ GPS sites

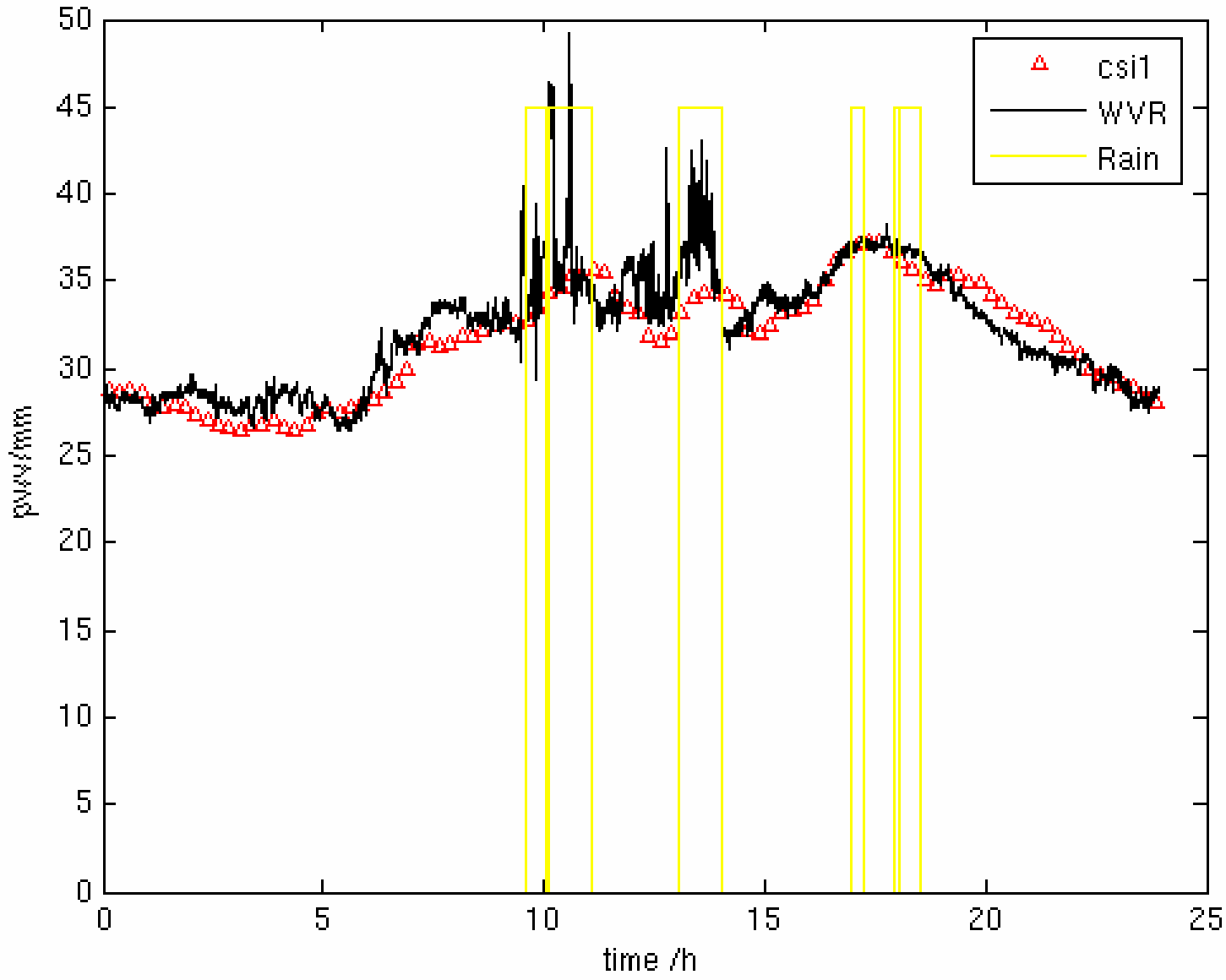
GPS receiver at Alice Holt:

„bad“ location,
not sufficient data quality

GPS sites at Bath University and Thruxton Airport:

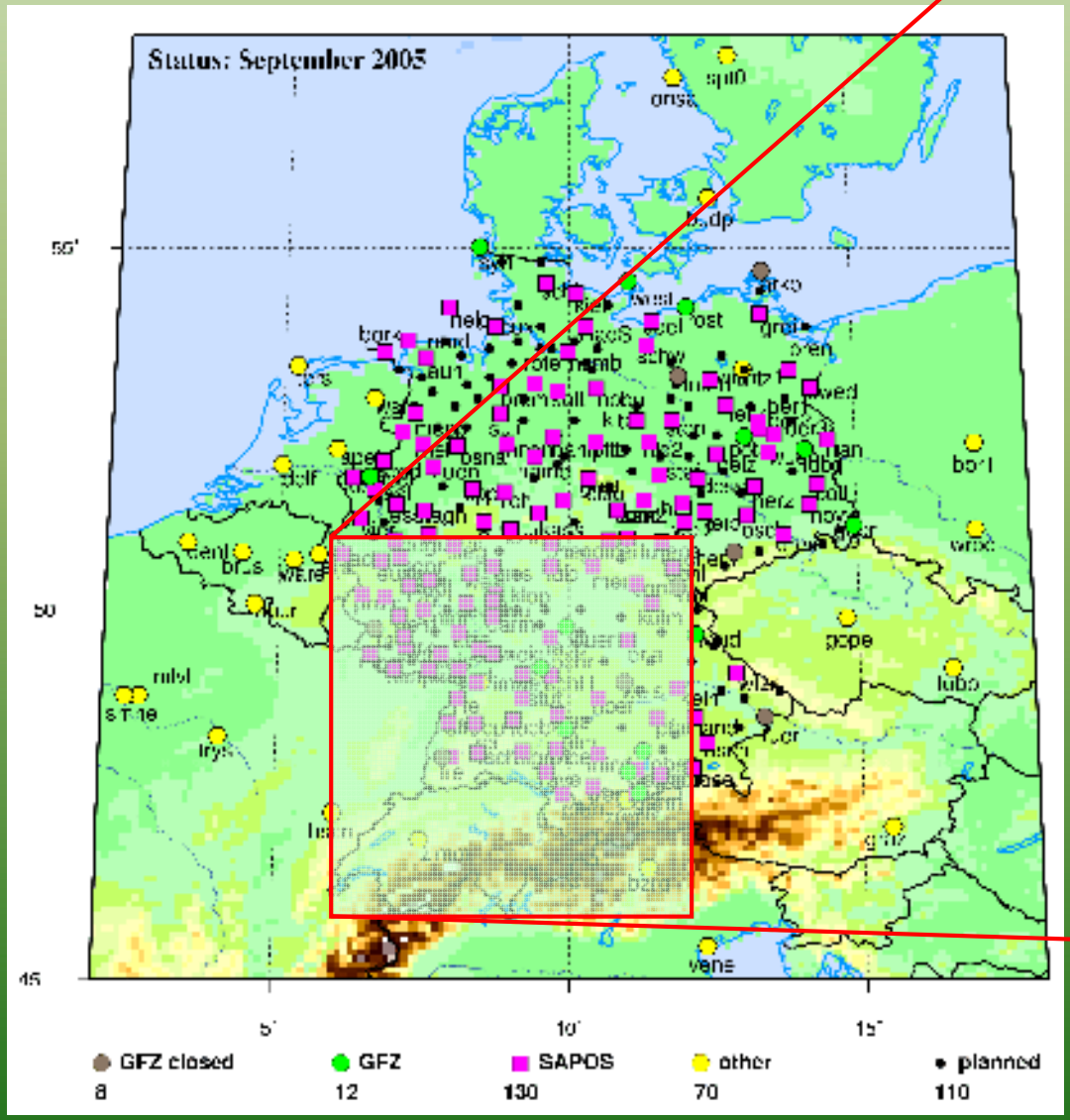
„good“ location,
high data quality

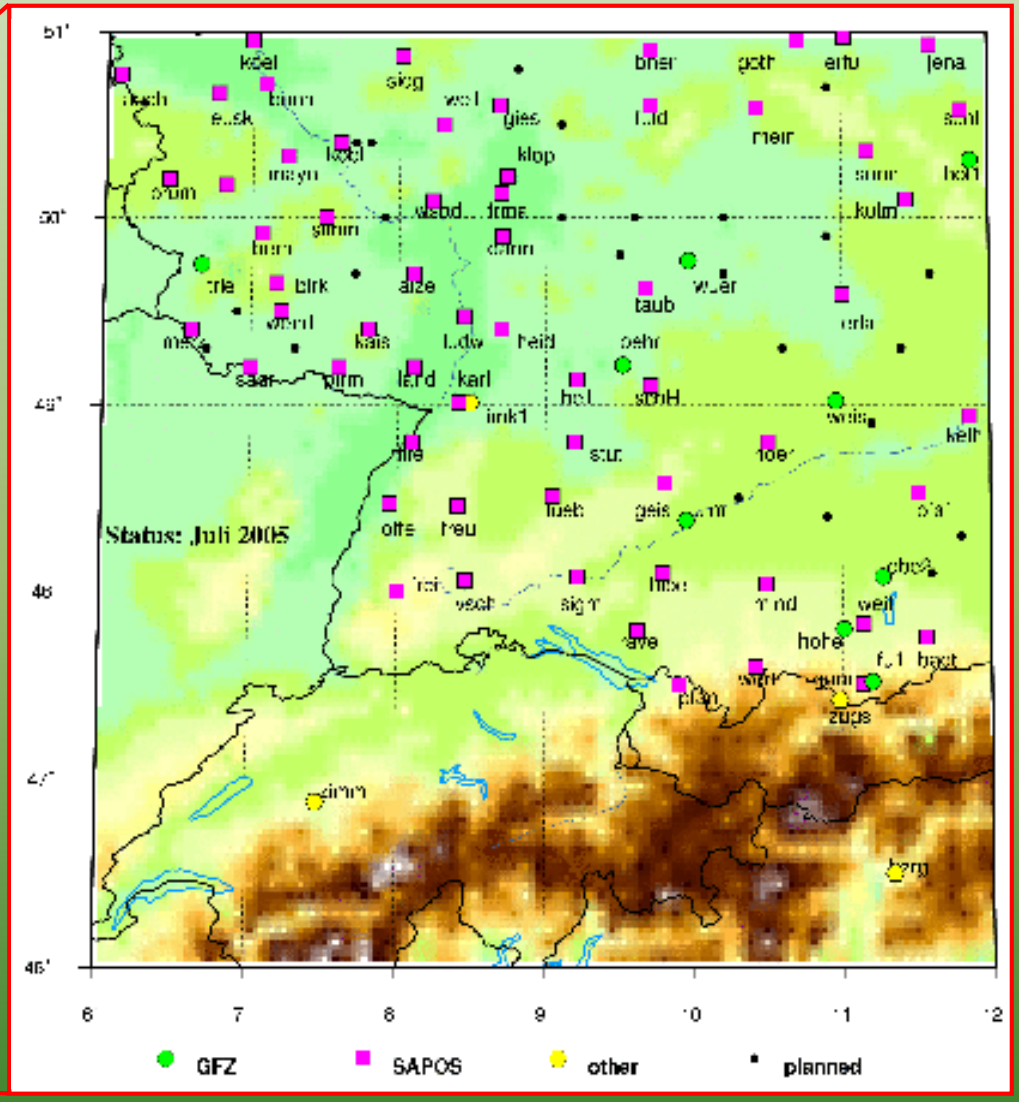
CSIP Results: Validation with WVR



PWV from GPS (Reading University) and WVR (Linkelholt) for 24 June 2005

GFZ Participation in GOP/IOP





GOP: 2007
> 70 SAPOS NRT sites

IOP: 3 months in 2007
5 GFZ sites

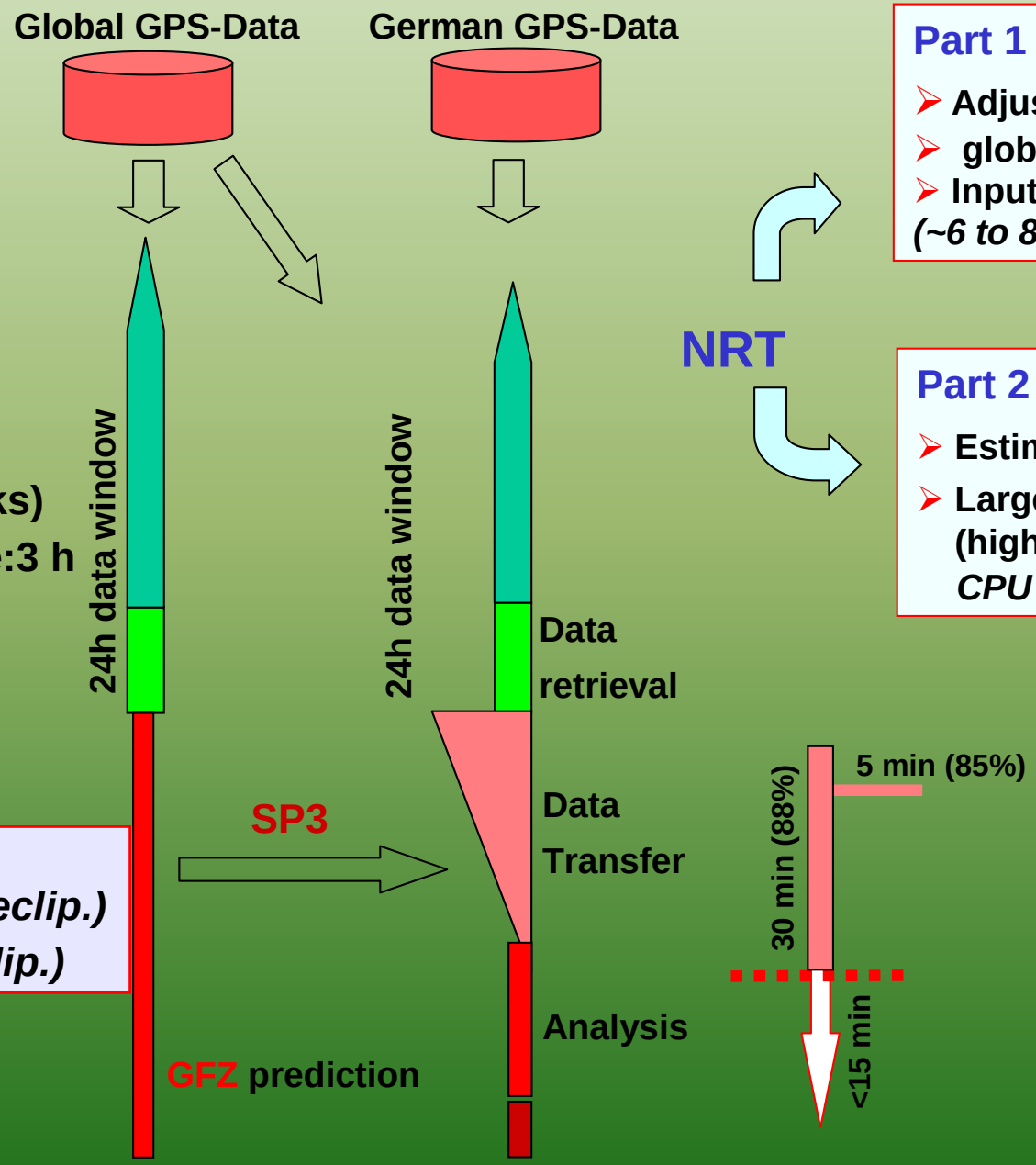
GFZ POTSDAM

Outlook

Plans:

- **GFZ analysis network extension to more than 250 sites**
- **Participation in GOP/IOP with 5 additional sites**
- **GPS data processing for all available sites during GOP/IOP**
- **Estimation of „slant delays“, tomography**

GFZ NRT Processing Scheme



Part 1 - Network orbit improvement:

- Adjustment of precise orbits & clocks
- global network : ~20 IGS + 5 German sites
- Input orbits: GFZ (Ultra Rapid pred.)

(~6 to 8 minutes CPU, Linux PC)

Part 2 - PPP Analysis:

- Estimation of trop. parameters
- Large set of parameters possible (high sampling rate, trop. gradients)

CPU (Linux PC): <5 min for 220 sites

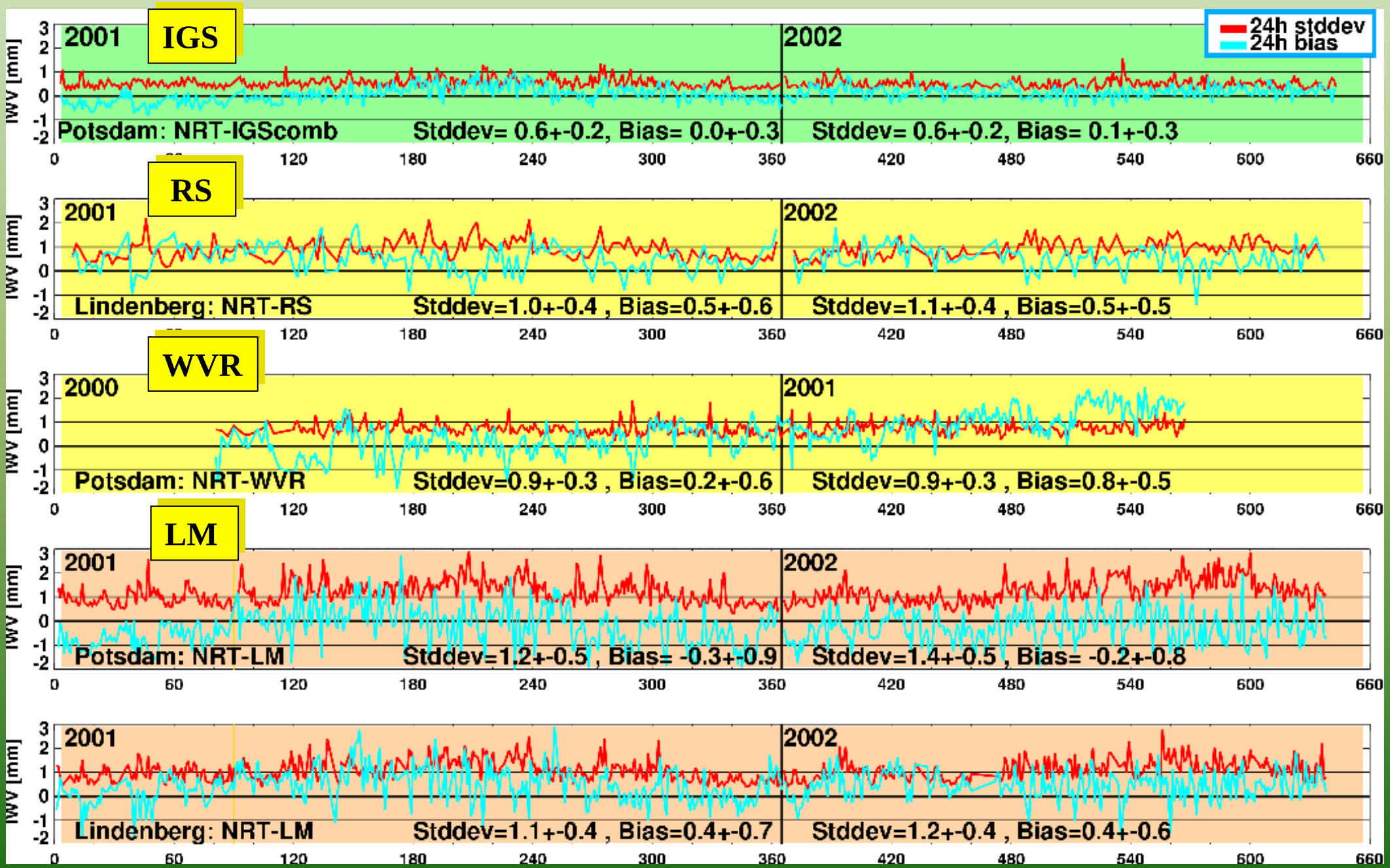
Quality GFZ:
~5 cm (non- eclip.)
10-15 cm (eclip.)

Hardware

- **1 PC: Data handling**
- **1 PC: Analysis**
  - **20 min Ultra Rapid**
  - **10 min NRT IWV**

GFZ POTSDAM

Quality: Comparisons with other time series



GFZ POTSDAM

COPS – GOP/IOP

- **Global Observation Period (GOP)**

  Location: Southern Germany & Eastern France

  Period: 2007

- **Intensive Observation Period (IOP)**

  Location: Southern Germany & Eastern France

  Period: June - August 2007

Goal of GOP/IOP:

- **combine the most powerful remote sensing instruments with proven ground-based and airborne measurement techniques**
- **to serve as a backbone for the Priority Program SPP 1167 by producing the demanded data sets of unachieved accuracy and resolution**