

Swedish Contributions to COST ES1206: Ongoing and planned

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Structure

- NGAA GNSS processing centre
- Data assimilation impact study with GNSS data
- GNSS in Climate Applications

NGAA GNSS processing centre

Status

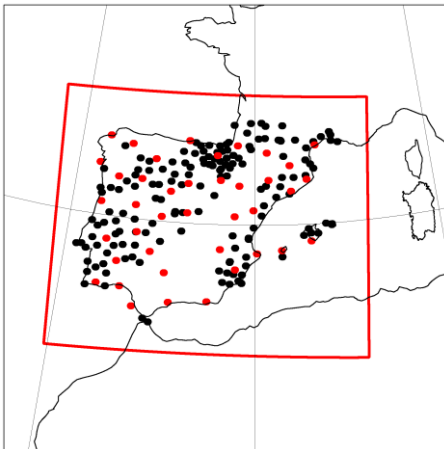
- SMHI is the processing centre for the Nordic countries (NGAA) using the GIPSY PPP software
- Currently processing ~200 Swedish stations, ~90 Norwegian, ~100 (87 + 13) Finnish
- About 16 Danish stations in a test version
- Still problems with the quality of the ZTD estimates
- No full time person to work with the processing

Plans

- The processing will be run at the Swedish National Land Survey, also responsible for SWEPOS, the national GNSS station network
- They are familiar with the software (both Bernese and GIPSY) and have 24/7 on duty
- This will increase the quality and faster implementation of new stations
- SMHI will still be the contact point for E-GVAP and ES1260

Design of Parallel Experiment

- One month parallel experiment (September, 2012) investigating the impact of GNSS data on HARMONIE NWP forecasts.
- Model domain over Iberia and with 2.5 km horizontal resolution and 65 vertical levels.
- One control run assimilating only conventional types of observations and one additional run with assimilation also of GNSS data in addition.
- The GNSS run has been optimized with respect to bias correction, error statistics and thinning distances.
- Experiments carried out in close collaboration between SMHI, IMO and AEMET.
- Further evaluation and optimization planned, both over IBERIA and other domains



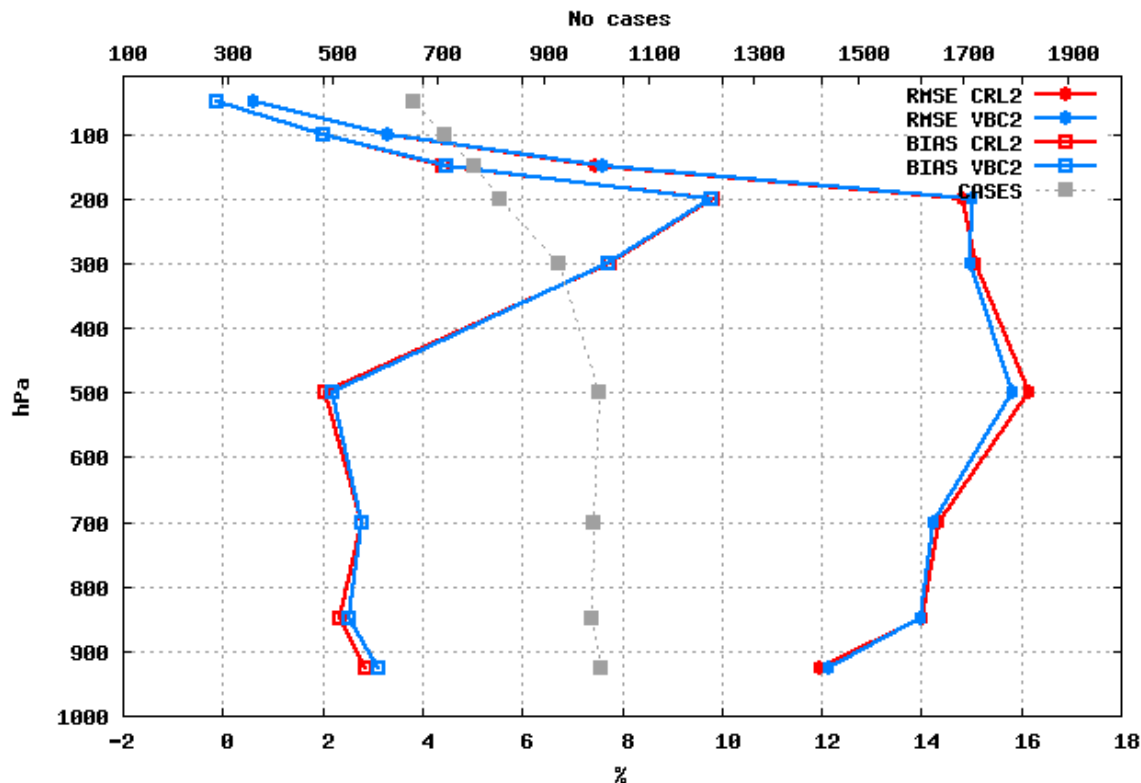
Model domain (**red frame**) and GNSS observations before (black dots) and after (**red dots**) thinning of data.

Scores for verification against observations

BIAS and RMSE of +6,+12 and +18 h

Relative Humidity forecasts

Period: September 2012 Valid Time: 12UTC



CRL2- Only conv. obs.

**VBC2-Conv. obs. and
GNSS obs.**

GNSS in Climate applications

Status

- An evaluation was carried out of the IWV in the regional climate model RCA using GPS data from 99 European sites used 14 years of data (1997 – 2010). Data from this network for three additional years has been processed. A homogeneous ZTD time series 1997–2013 is now available.

Plans

SMHI is interested in GNSS ZTD / IWV from additional and larger areas:

- Evaluate global model climate EC-Earth (prescribed SST and sea-ice, horizontal resolution 100–50 km) using GPS IWV globally and for special regions where the GPS data is available. Arctic, Antarctic, Europe, West and East Africa, South America (La Plata), India
- Evaluate diurnal cycle of IWV in high resolution regional climate models RCA (50–10 km), HARMONIE-CLIM (horizontal resolution 12 & 6 km) driven by ERA-Interim data at the lateral boundaries for Europe and Africa

An example of assessment of the diurnal I WV cycle

RCA and GPS I WV diurnal cycle similar, but RCA wetter during night and peaks later in the afternoon. Possibly due to coarse resolution (50 km) or problems in the convective and surface schemes

Plan: Investigate the I WV patterns and coupling to the precipitation in a new study with a higher resolution model (2–3 km) over Europe and Africa. For longer GPS time series and data from more stations.

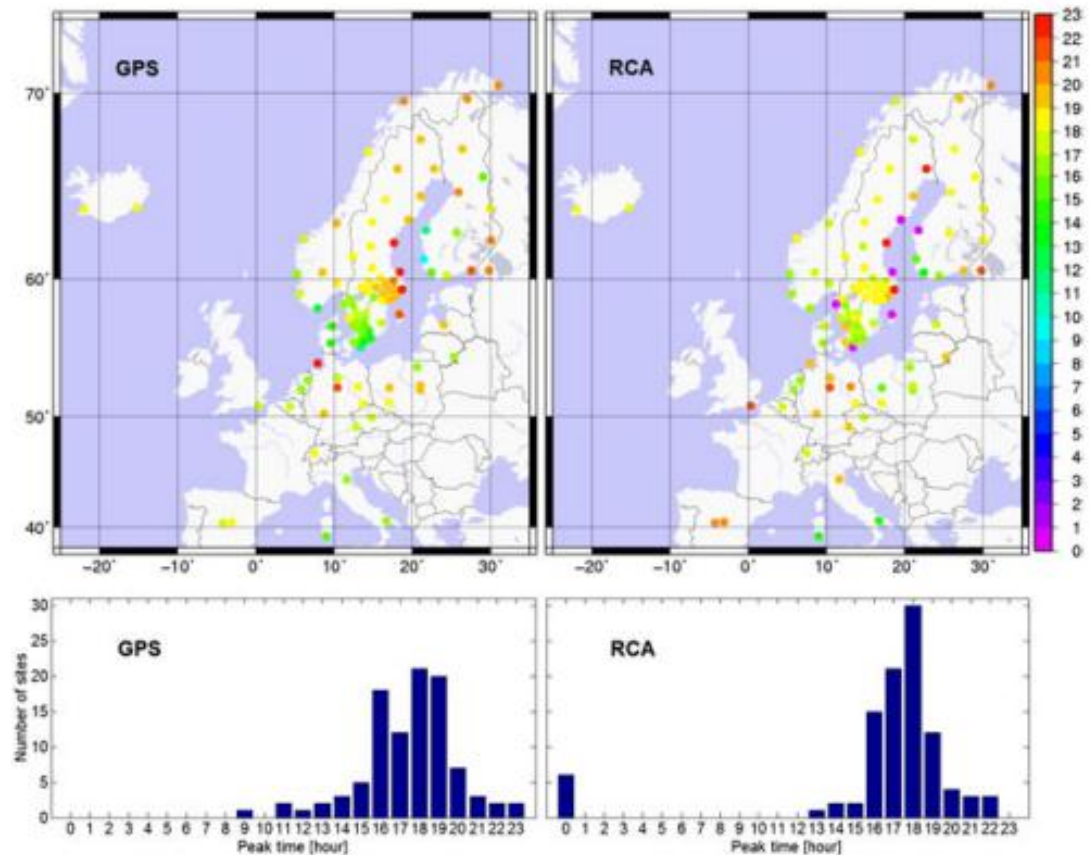


Figure 10. Peak time of the diurnal cycle of the I WV, for the summer months (JJA), obtained from the GPS data and the RCA simulation for each GPS site (upper panels) and histograms of the peak time (lower panels). The hour is in local solar time. Ning, Elgered, Willén and Johansson 2013 JGR