

Current GNSS-Met and GNSS-Clim Activities in Belgium



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Weather and Climate Applications @ RMI

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Weather Office :

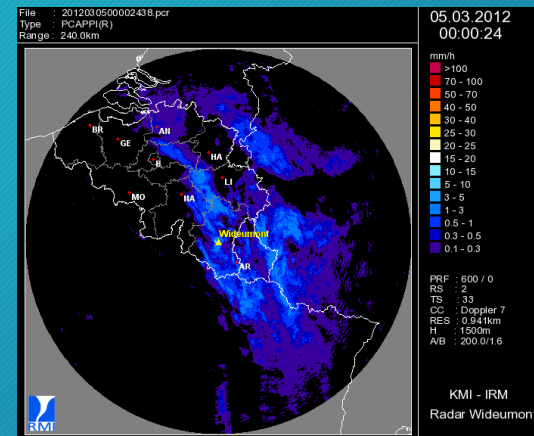
- Recent interest in getting GNSS-based nowcasting products (e.g. IWV maps for Belgium)

High-Resolution NWP ALARO Model :

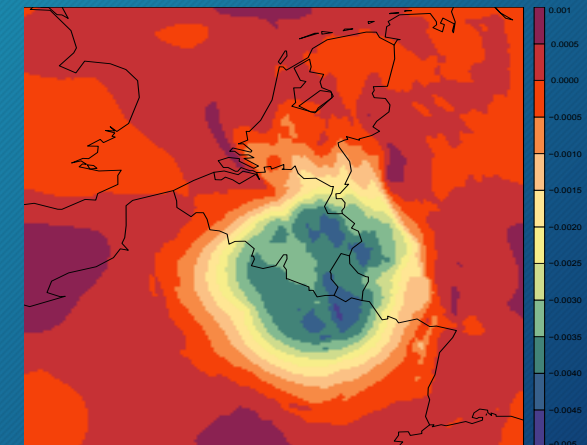
- Started recently data assimilation activities (surface observations, assimilation of radar data with 3DVar implemented)
- Test case study radar of Wideumont, March 2012
- Next step : Assimilation of GNSS-based ZTD to improve relative humidity

Climate Research :

- Validation ALARO climate model output with GNSS products (e.g. using IWV time series)



The radar precipitation image



The RH2m increments due to Wideumont radar data

A Multi-site/Multi-Technique IWV intercomparison

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Van Malderen, Brenot, Pottiaux et al., “a multi-site intercomparison of integrated water vapour observations for climate change analysis” Atmos. Meas. Tech., 7, 2487-2512, 2014

Instruments:

- GNSS, CIMEL sun photometer, radiosondes, satellite (AIRS, GOME/SCIAMACHY/GOME-2)

Location(s):

- First focus on Brussels, Belgium, then extended to 28 IGS sites

Focus/Questions:

- Impact of clouds (“weather observation bias”) on IWV comparisons?
- Geographical dependency of the comparisons?



IWV trends at IGS stations (1995/1996-Now)

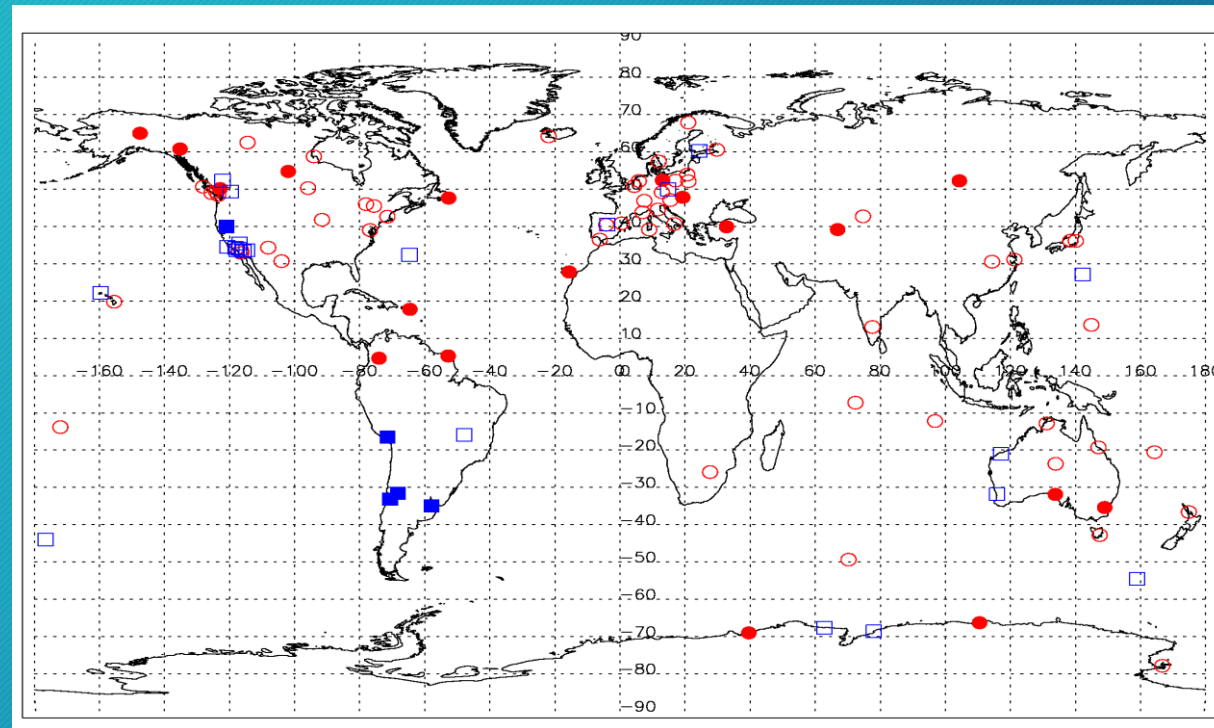
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Location(s):

- All IGS Stations starting in 1995/1996

Focus/Questions:

- Geographical inconsistencies
- Weather observation biases → trends (e.g. cloud cover)
- Are these related with the chosen database for meteorological parameters (NCEP/DOE)? (sensitivity analysis/impact on trends and biases)
- What are the ERA-interim and GOME (2)/SCIAMACHY trends at these stations?



- IWV ↗
- IWV ↗ significantly
- IWV ↘
- IWV ↘ significantly

GNSS-Met Analysis Centre @ ROB

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GNSS-Meteorology:

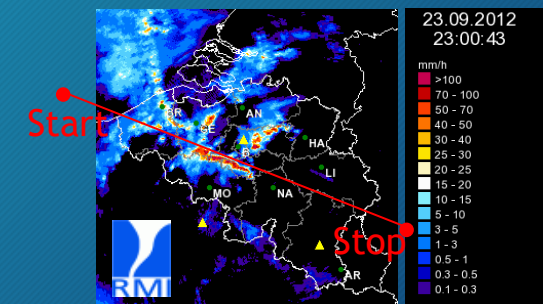
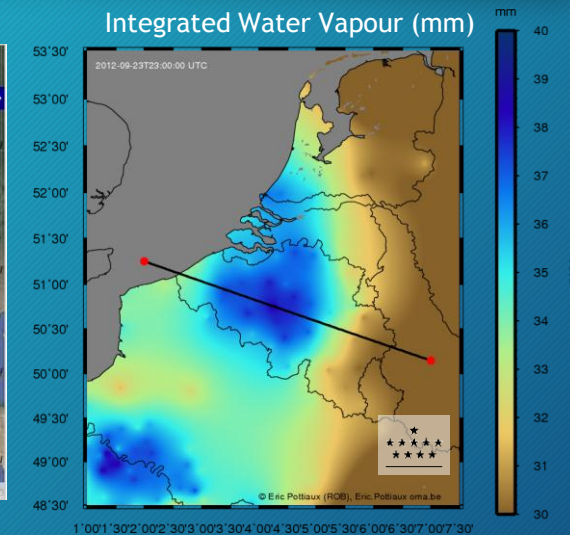
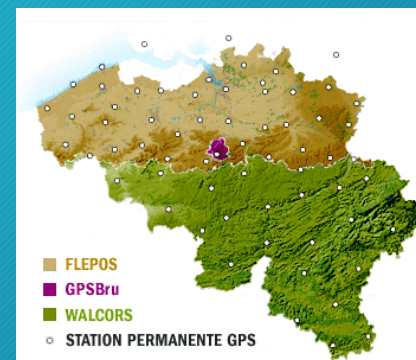
For many years: ROB develops and maintains a **GNSS-Met analysis centre for E-GVAP/RMI** (focus on European level - NWP/D.A.) → upgrade ongoing

GNSS-Nowcasting:

More recently: ROB investigated the development of a **toolbox/products** for nowcasting applications (see Munich's presentation) - ROB cooperates with GOP to investigate **RT processing capabilities & benchmark** on the Belgian dense network

GNSS-Climate:

Future: ROB envisages some reprocessing activities w.r.t. GNSS-climate (depending on funding - focus on Belgium / ALARO domain)



Retrievals of 3D water vapour density from GNSS tomography @ BIRA

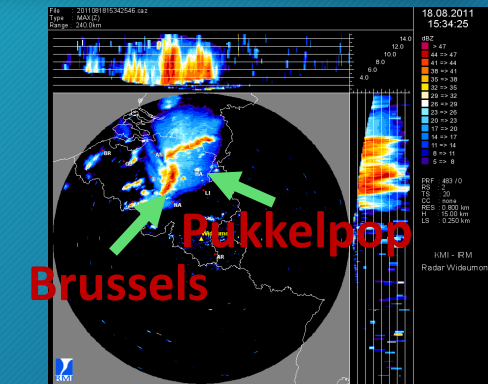
(from post-processed case studies to operational use)

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Storm of the 18th August 2011

→ Flood event in Brussels

→ Storm at Belgium's Pukkelpop music festival kills five after stage collapses



Interest for nowcasting

→ Use of the best a priori condition to obtain relevant perturbations of forecasts in nowcasting

