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Federal Office of Meteorology and Climatology **MeteoSwiss**

Swiss status report

E-GVAP meeting 2008/01/17

- Operational activities at MeteoSwiss : going on
- Progress report of MeteoSwiss and ETH Zürich on the tomography project
- Progress report of swisstopo
- Research activities at the University of Bern: going on
- D. Leuenberger and E. Brockmann took part to the working groups meetings in Autumn 2007

Pierre Jeannet, MeteoSwiss



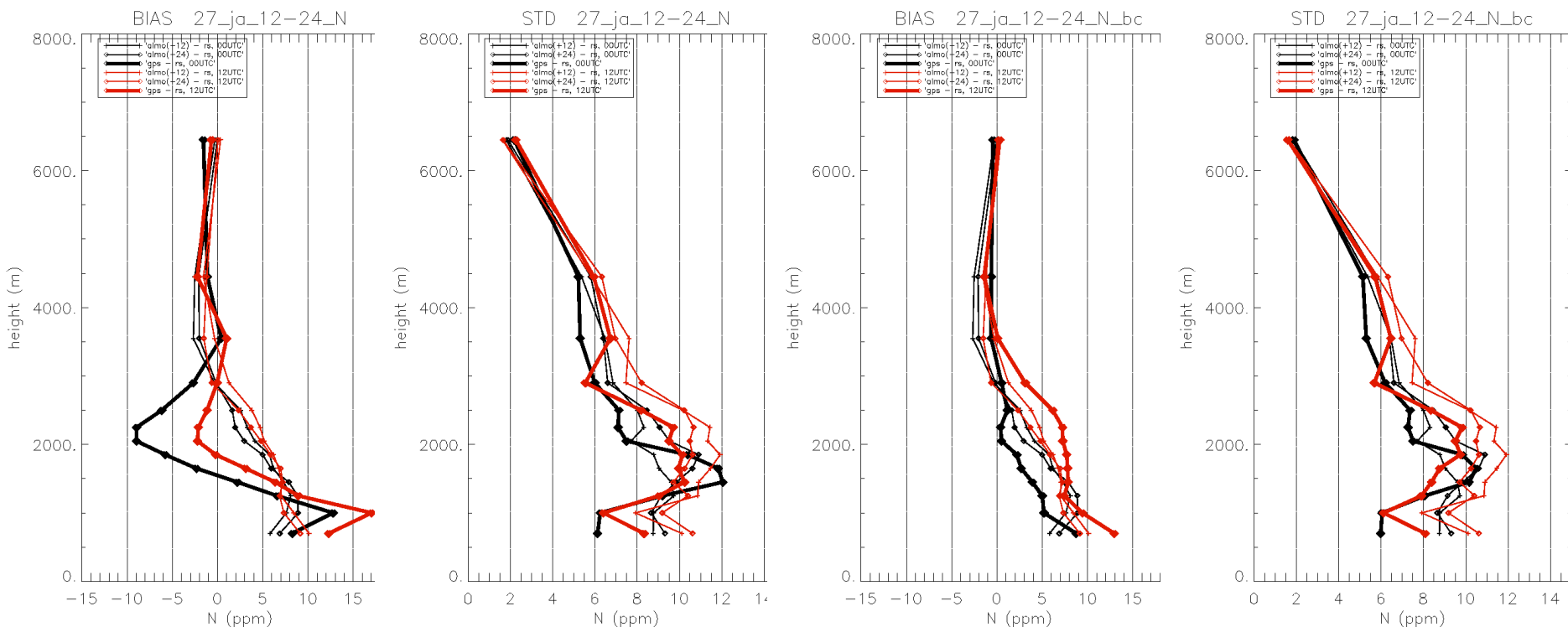
GPS tomography project (MeteoSwiss+ETH)

- More than one year of humidity profiles from GPS tomography compared with Payerne soundings and COSMO NWP.
- General humidity distribution during the year is reasonably well captured by GPS tomography. However fairly large biases compared to radiosonde humidity, dependent on height and season.
- Simple bias correction against NWP model analyses is able to reduce the large bias, but it is questionable, if the bias is small enough for an assimilation.
- For an operational assimilation, the accuracy of tomography humidity profiles needs to be improved. The high spatial and temporal availability is positive, but bias and std dev should be smaller than that of the model first guess.

Results from the bias correction. Bias and standard deviation (STD) of GPS tomography and NWP forecasts against radiosonde humidity.

Without correction

With correction





Outlook 2008: GPS tomography project (3)

- The overall goal of the joint project between ETH and MeteoSwiss is the assimilation of the humidity profiles from GPS tomography into the COSMO model. The assimilation scheme of COSMO (nudging) is currently being extended to include such profiles. When the quality of the humidity profiles is improved, assimilation experiments will be undertaken.
- At ETH Zurich, the tomography algorithm is currently being improved using new ideas (e.g. using linear functions in wet refractivity instead of constant functions inside the voxels).

References: GPS tomography project (4)

- Troller, M., A. Geiger, E. Brockmann, J.-M. Bettems, B. Bürki and H.-G. Kahle (2006), Tomographic Determination of the Spatial Distribution of Water Vapor Using GPS observations, *Adv. Space Res.*, **37(12)**, 2211–2217, doi:10.1016/j.asr.2005.07.002.
- Troller, M., D. Leuenberger, E. Brockmann, A. Geiger and H.-G. Kahle, 2007a: Use of CGPS Networks to determine Tropospheric Water Vapor for NWP Models: Results of a One Year Investigation with Radiosondes. *Submitted to Journal of Geophysical Research*.



Status report swisstopo

- E. Brockmann took part to the 2nd E-GVAP Processing working group meeting (Matera, 11.09.2007) and acts in the liaison between geodesy and meteorology.
- swisstopo upgraded 90% of the national GPS network AGNES to GPS+GLONASS combined receivers.
- <http://www.swisstopo.admin.ch/internet/swisstopo/de/home/topics/survey/permanent/pnac/series.html>
- swisstopo sends on an hourly basis data of PAYE to the metoffice data server since the 19th of June 2007 according to the requirements for supersites. 9 solution types from 8 Analysis centres already exist:
- <http://www.knmi.nl/samenw/egvap/validation/plot.cgi?PAYE>
- swisstopo is presently the only analysis centre considering also GLONASS satellite data. The results are promising but for ZTD troposphere estimation the influence is quite small (status at present). Tomography is presently not discussed too heavily within E-GVAP; here we expect a bigger positive influence from GLONASS.