

# **Fifth E-GVAP plenary meeting, 2008/01/17, Toulouse**

## **A) E-GVAP Status Report Jan. 2008, from MeteoSwiss**

### **A.1 General information**

D. Leuenberger and E. Brockmann took part to the working groups organized in Autumn 2007.

### **A.2 Research activities at MeteoSwiss and ETH Zürich**

Daniel Leuenberger, MeteoSwiss, and M. Troller, ETH Zurich, 14.01.2008

#### **Summary and conclusions of the work done in 2007**

More than one year of humidity profiles from GPS tomography have been analyzed and compared against humidity observations from the radiosonde in Payerne, as well as humidity analyses and forecasts from the COSMO NWP model.

The general humidity distribution during the year is reasonably well captured by the GPS tomography. However, a closer look reveals fairly large biases as compared to radiosonde humidity, dependent on height and season. The bias against radiosonde is generally larger than that of the 12h model forecast and the standard deviation of the GPS profiles has a similar magnitude as that of the 12h model forecasts.

A simple bias correction against NWP model analyses has been applied to the GPS tomography humidity, based on a linear regression of hourly data from two months. It turns out that the bias is dependent on the height of the profile and on the geographical location of the tomography voxel. The correction 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 the tomographic humidity profiles needs to be improved. Clearly, the high spatial and temporal availability is positive, but the overall bias needs to be reduced and the standard deviations should be smaller than that of the model first guess if the approach should contribute to a significant improvement to initial field data assimilation in the COSMO model. Work in this direction is under way in a separate project at ETH Zürich (PhD started September 2006).

The work described in this report is partly contained in the publication Troller et al., 2007a.

#### **Outlook 2008**

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**

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*.

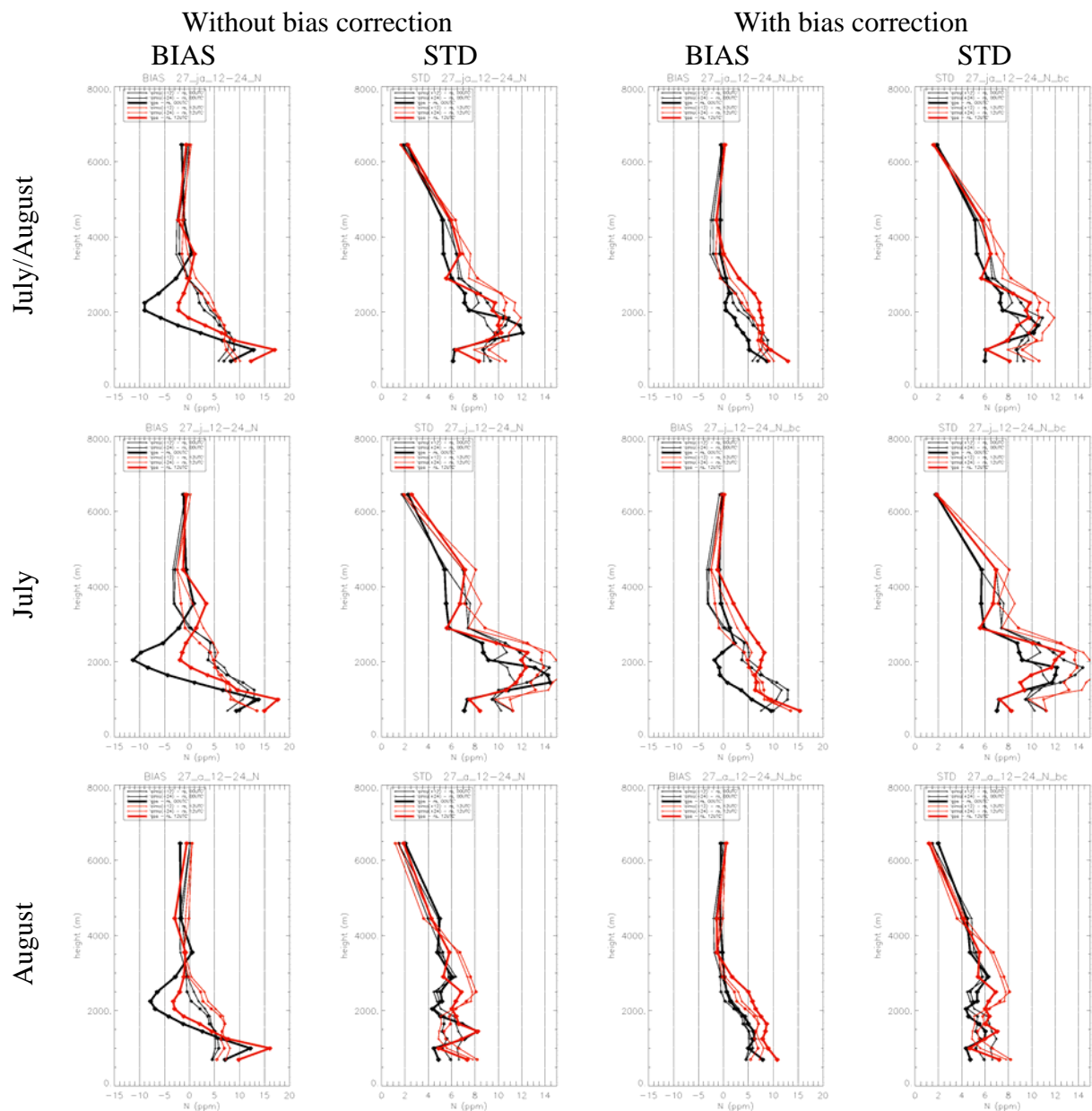


Figure 5) Results from the bias correction. Bias and standard deviation (STD) of GPS tomography and NWP forecasts against radiosonde humidity as in Fig. 3. First row shows statistics for the months July/August, second row only for July and third row only for August. The two rightmost columns show GPS tomography without bias correction, the two left columns with bias correction using coefficients calculated for the months July/August.

### Contribution to EGVAP working group

D. Leuenberger took part to the workshop of the Expert team mid-Nov. 2007.

### A.3 Operational activities at MeteoSwiss

The operational comparison between GPS and Payerne sounding is going on.

## **B) E-GVAP related activities at swisstopo**

E. Brockmann, 14.01.2008

E. Brockmann took part to the 2<sup>nd</sup> 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/permnet/pnac/series.html>

swisstopo sends on an hourly basis data of PAYE to the metoffice data server since the 19<sup>th</sup> 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.

## **C) E-GVAP related activities at the IAP-University of Bern**

New activities will be presented at the next plenary meeting