IVS Pilot Project – Tropospheric Parameters

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Introduction

Based on the very promising results of the 2nd IVS Analysis Pilot Project (Boehm et al., 2002) the IVS Directing Board decided in April 2002 to set up the 'Pilot Project – Tropospheric Parameters'. The Institute of Geodesy and Geophysics (IGG) of the Vienna University of Technology was appointed as coordination center of the new Pilot Project (PP). After the Call for Participation six IVS Analysis Centers (ACs) (see Table 1) agreed to contribute to the PP by regular submissions. They have been submitting results of tropospheric estimates of all IVS-R1 and IVS-R4 24h-sessions since January 1st, 2002.

Table 1 IVS ACs contributing to the Pilot Project

BKG	Federal Agency for Cartography and Geodesy, Leipzig	Germany
CGS	Centro di Geodesia Spaziale, Matera	Italy
CNR	Istituto di Radioastronomia, Bologna	Italy
IAA	Institute of Applied Astronomy, St. Petersburg	Russia
IGG	Institute of Geodesy and Geophysics, Vienna	Austria
GSF	NASA – Goddard Space Flight Center, Greenbelt	U.S.A.

Main features of the submissions

All ACs use cutoff elevation angles at or below 5°, and all but one (IGG) apply the Niell (1996) mapping functions. IGG uses the IMFh mapping function (Niell, 2001) for the hydrostatic part of the neutral atmosphere. Horizontal gradients (MacMillan, 1995) are estimated by all ACs; GSF and IGG introduce a-priori gradients from NWP (Numerical Weather Prediction) models. Three ACs fix the ITRF2000. Most of the ACs apply the CALC/SOLVE software package except IAA using the QUASAR software and IGG using OCCAM.

Combination strategy for the zenith path delays

The combination consists of a two-step procedure which is carried out site by site, week by week and parameter by parameter. So far, only total and wet zenith path delays have been combined by IGG. The comparison of gradients remains to be done.

In the first step combined zenith path delays are determined as unweighted means. This solution is used to derive mean standard deviations for each AC which are used for the weighting of the individual AC series in the the second step. There, the biases between the time series are removed and the VLBI values of the zenith path delays at each epoch are calculated as weighted means (Figure 1).

Finally, the combined wet and total delays are checked against each other by calculating the hydrostatic delays using the pressure values recorded at the stations.

Conclusion

Statistics show that the accuracies of the weekly offsets and the hourly values are at the level of 2 – 3 mm. More details can be found at the IGG homepage.

Thus, the combined VLBI time series can be compared with zenith path delays derived by other techniques such as GPS or WVR.

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References

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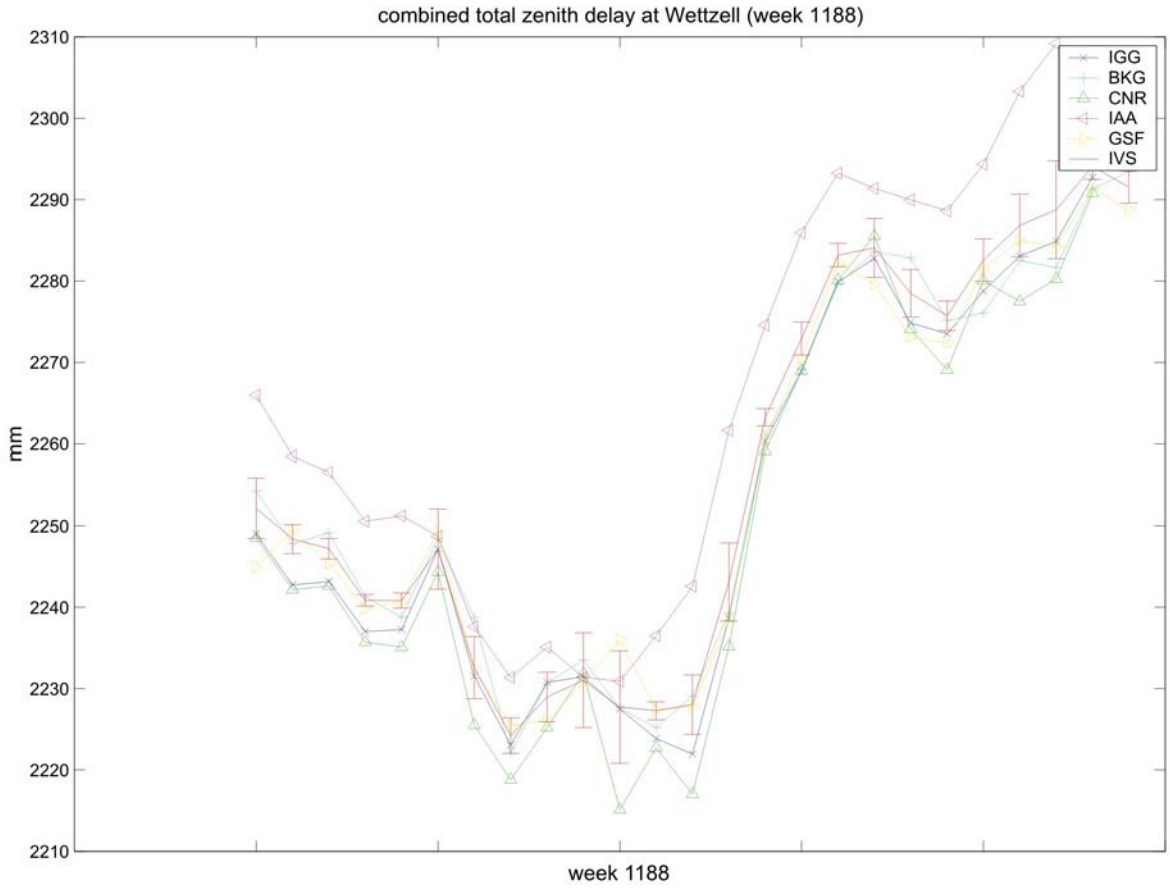

Fig. 1 Total zenith path delays at hourly epochs as submitted by the ACs and the combined VLBI solution with error bars for Wettzell, Germany (Oct. 14, 2002)