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Long-time series of reprocessed GPS and VLBI troposphere zenith delays

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Co-located sites of the space-geodetic techniques GPS and VLBI allow for a comparison of the troposphere parameters determined by these two independent techniques. Long-time series of homogeneously reprocessed GPS and VLBI troposphere zenith delays computed by TU Munich/TU Dresden (GPS) and DGFI (VLBI) covering the time interval from 1994 till 2005 provide the basis for our comparison and combination studies. In order to minimize systematic effects due to differences in modeling and parameterization, all important models as well as the parameterization of the software packages Bernese and OCCAM used for the GPS and VLBI processing have been harmonized. Thus, a maximum level of consistency is guaranteed.

As the tropospheric mapping functions have a significant influence on the estimated troposphere parameters, we computed three GPS and VLBI solutions, respectively, that only differ in the mapping functions and the a priori hydrostatic delay: (1) Niell mapping function (NMF), (2) Isobaric mapping function (IMF), and (3) the Vienna mapping function (VMF1). A constant a priori delay computed with the Saastamoinen model and a standard atmosphere is applied for the solutions with NMF and IMF, whereas a priori delays computed from numerical weather model data are used for the solution with VMF1.

This contribution will compare the influence of the three analysis strategies on the differences between GPS and VLBI troposphere parameters. These comparisons might allow an assessment, whether more sophisticated mapping functions like VMF1 are able to reduce the small but significant differences between GPS and VLBI troposphere parameters. Furthermore, long-term trends in the tropospheric delays are ana-

lyzed. As earlier comparisons already showed a very high level of similarity between the parameters obtained independently by GPS and VLBI, a combination on the normal equation level has been performed for a limited data set. First combination results will demonstrate the impact of a common reference frame (i.e., consistently combined station coordinates and velocities as well as Earth orientation parameters) on the troposphere zenith delays.