

IAA combined EUREF weekly coordinate time series

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Abstract

The aim of this investigation is the computation of independent combined weekly solution for coordinates of EPN stations using weekly solutions of individual Analysis Centers. The discussion of possible processing strategies is presented. Weekly solutions computed using one of these strategies are compared with the official EPN solutions and with the solutions obtained in our previous investigation.

Introduction

The European Permanent GPS Network has been operating for several years and coordinate time series of its stations are widely used for different investigations of crustal deformations and relative site motions. But the official EPN weekly solutions distributed in SINEX files reveal some jumps and systematic seasonal errors and because of these reasons we try to obtain independent coordinate time series suitable for geodynamical researches. On the first stage of this project original GPS observations of selected subnetwork were reprocessed using fiducial-free approach (MALKIN, VOINOV, 1999). But such a way of reprocessing appears to be too cumbersome, so at the next stage of the project we tried to obtain homogeneous coordinate time series based on reprocessing of existing (official) EPN solutions.

We used strategy of removing of a priori constraints on coordinates with further transformation w.r.t. ITRF2000. The strategy of removing constraints can be found in (BROCKMANN, 1996). It was shown that obtained coordinate time series are more stable than official ones and most likely are mostly free of seasonal errors.

In the present paper an attempt to compute independent combined weekly solution using weekly solutions of individual Analysis Centers is made. We present preliminary results for only one possible strategy of combining solutions. Several different approaches are under investigation and are discussed here.

Processing strategy

To obtain new weekly combined coordinate time series first all individual weekly solutions of different Analysis Centers were reprocessed in order to remove all stated constraints on the coordinates. For combining these individual weekly solutions several approaches can be used. The first one consists of making a system of normal equations and solving it in one step without any allowing for possible different orientation of individual solutions with respect to each other.

Then this combined solution should be transformed to the ITRF2000.

This procedure was applied for data covering the period of about one year (from GPS week 1010 to 1065). For determination of the transformation parameters all stations presented both in the ITRF2000 and in the combined solution were used. In figures we present comparison between official coordinate time series, one obtained by removing constraints from the official one, and our combined time series for sites Wettzell and Svetloe.

Another approach to combination of weekly solutions is under investigation. It differs from the previous method by taking into account parameters of transformation of each individual solution with respect to combined one. Combination in this way can be done by using strategy similar to that used by IERS.

The third possible way is to select first two solutions with as many common stations as possible for a given week, to transform one of them to another and then combine them into one solution. Each next individual solution should be transformed to the existing combined one and then a new combined solution should be computed. This method is similar to "free chain method" used for compilation of star catalogues.

Finally a new combined solution should be transformed to the ITRF2000.

References

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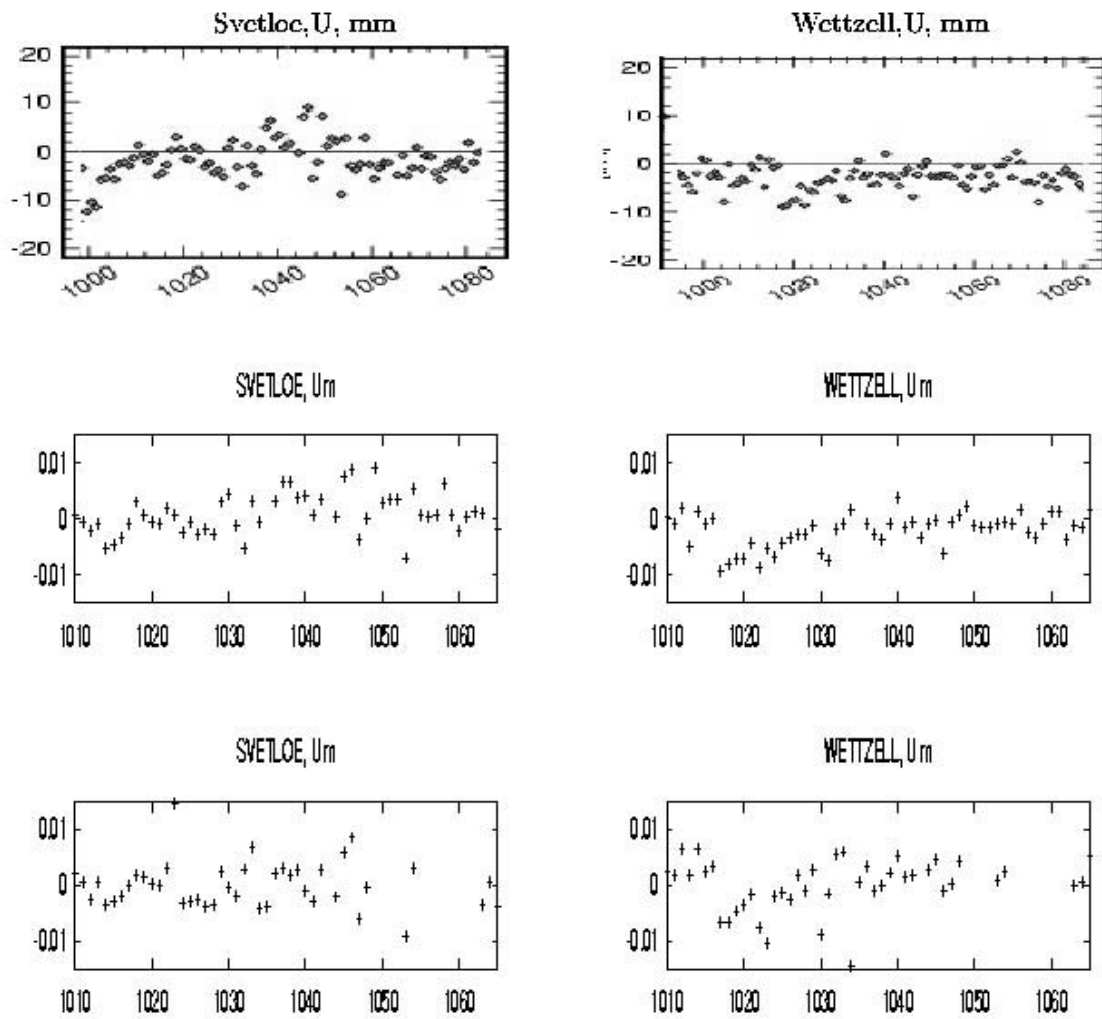


Fig. 1. Coordinate time series for stations SVTL (on the left) and WTZR (on the right) for EPN/ROB, dc-constrained EUREF and new solutions, vertical component.