WEEKLY COMBINED SOLUTIONS DETERMINATION

Local Analysis Centres process their subnetworks using the strategy specified in the *Guidelines for the Analysis Centres* and submit coordinate and troposphere solutions in resp. the SINEX and Troposphere SINEX formats (*IERS, 2006*). The SINEX files contain complete information about the solution (mainly estimated coordinates and normal equations or covariance matrix) and they are used as a basis to compute the weekly combined EPN solution.

The combinations are generated using the ADDNEQ2 program of the Bernese GNSS Software v.5.2 (*Dach et al., 2007*). First, the individual SINEX solutions from the LAC are transformed using SNX2NEQ into the Bernese internal format containing normal equations (it is recommended to submit solutions in SINEX format using normal equations, but it is not mandatory) and minimal constraints are eliminated from each solution. During this step it is checked if all stations that should be excluded (*ftp://epncb.oma.be/pub/station/general/excluded/*) are not present in the solutions. In case such station was not omitted by some LAC it is eliminated here. After that, all normal equations are combined using ADDNEQ2 (1st iteration). The alignment to the IGb08 is made by adding minimal constraint conditions (translations only) on the set of 71 reference stations (IGb08 and/or EPN Class A stations). The results are analysed by comparing all stations coordinates specific for different LACs with their mean values calculated on the basis of all contributions. In case the differences are higher than 8 millimetres horizontally or 16 millimetres vertically (these values were chosen based on long-term analysis of solutions) the affected station is eliminated from the specific solution and the combination is done again. The eliminated stations are listed in the combined SINEX (part: Type 3 – Handling of stations problem). The adjustment is repeated (2nd iteration) and the same criteria are checked again. If necessary, the 3rd iteration is also being made.

At the end, Helmert transformation parameters between the weekly combined and the network of reference station is performed after which the coordinates of the estimated reference stations are compared with their original coordinates. Reference stations for which the difference exceeds 8 millimetres horizontally or 15 millimetres vertically are removed from the list of reference stations reference and the combination is repeated. The results are submitted to the BKG data centre (*ftp://igs.bkg.bund.de/EUREF/products/*) and to the IGS as the European densification of the IGS. The full version of the weekly reports is available from the EPN CB (*ftp://epncb.oma.be/pub/product/reports/*), while their short version is sent with the EPN LAC mail service.

Dach, R., U. Hugentobler, P. Fridez, M. Meindl (Eds) (2007): **Bernese GPS Software Version 5.0. User manual**, Astronomical Institute, University of Bern, 2007.

EPN Coordination Group and the EPN Central Bureau (2013): **Guidelines for the EPN Analysis Centres** (available at *http://www.epncb.oma.be/_documentation/guidelines/*).

IERS (2006): **SINEX (Solution Independent Exchange Format) description** v. 2.02 (*http://www.iers.org/IERS/EN/Organization/AnalysisCoordinator/SinexFormat/sinex__cont.html).*