

DETERMINATION OF THE COLLOCATED IERS SITES COORDINATES WITH COMBINATION OF GPS AND SLR DATA

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ABSTRACT. The year data series of GPS and SLR observations from European collocated IERS sites were processed. The analyses were performed with the *GAMIT/GLOBK ver. 10.2* and *Kiev-Geodynamics-5.2* respectively. The coordinate time series were obtained. Combination of results obtained from two techniques are carried out at normal equations level. The comparison of sites positions derived from single technique and from combined solution are discussed.

1. OBSERVATIONS PROCESSING

The Lageos-1 and Lageos-2 observations from 36 SLR stations over the period of 2000.12.18 – 2002.01.26 were used. The apriori coordinates and velocities were taken from the solution SSC(GAOUA)01L01. The data processing has been carried out according to the models and methods recommended by IERS Conventions (1996) (McCarthy, 1996). The frame of GPS_SLR were transformed to ITRF2000.

The GPS data have been processed with *GAMIT 10.2* software package (King, 2003) for GAO_GPS solution. The data from 13 GPS weeks (every fifth week from GPS week 1095 to 1147) obtained at 7 permanent GPS stations (GLSV, WTZR, CRAO, ZIMM, BOR1, MATE, METS) were used for obtaining GAO_SLR solution. Apriori coordinates are taken from ITRF2000. The processing has been carried out according to EPN standards using IGS products (Beutler, 1990) (precise satellite orbits, antennas phase center variations, etc.).

2. OBTAINING THE COMBINED SOLUTION

The combined solution GPS_COMB was obtained with *GLOBK ver 10.2* software. The combination has been carried out using the stored VCV matrices and apriori values for estimated parameters from GAO_GPS and GAO_SLR solutions. The good positions agreement from GPS and SLR data were obtained for 3 stations – Zimmerwald, Wettzel, Borowiec. For this reason only this sites were treated as sites with collocated techniques.

Table 1 gives the transformation parameters between the solutions and ITRF2000.

Parameters	ITRF-GAO_SLR	ITRF-GAO_GPS	ITRF-GAO_COMB
T1, m	1.376	0.079	0.080
T2, m	3.654	-0.307	-0.306
T3, m	-2.003	0.399	0.400
D, mm/km	0.0128	-0.0094	-0.007
R1, mas	0.098	-0.010	0.007
R2, mas	-0.076	0.006	-0.006
R3, mas	-0.069	0.005	0.015

Table 1: Transformation parameters between the frames

3. CONCLUSIONS

- Selected SLR and GPS stations are irregularly distributed around the globe.
- The number of SLR observations in a two order smaller than number of GPS observations.
- SLR observations has been carried out irregularly.
- The solutions are distorted by errors of processing software.

For these reasons there are big differences in reference points positions for 2 sites with collocated techniques.

- The year data span is not enough to obtain reliable SLR stations positions.
- Combining the data from different techniques we have to provide weight function which account for not only precision of observations but also their number and regularity.
- If there are a small number of SLR data it is possible to strengthen solution adding a GPS data.

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