

3.6.2.7 Groupe de Recherches de Géodésie Spatiale (GRGS)

In the framework of the IERS Combination Research Centres, the “Groupe de Recherches de Géodésie Spatiale” (GRGS) has proposed from year 2000 to study the combination of five techniques (SLR, LLR, VLBI, GPS and DORIS) in order to obtain a global and homogeneous solution of the Earth Orientation Parameters (EOPs): universal time UT1, polar motion, nutation corrections in longitude and obliquity, as well as station coordinates.

The adopted strategy consisted in combining with the GRGS's DYNAMO software the normal equations resulting from processing the GRGS's GINS orbitography software for individual techniques. The optimal relative weights between each technique were obtained by using the Helmert's optimal variance-covariance method.

From a three-months period (July to September 2000), results not only emphasise the interest of combining satellites for the same technique (DORIS or SLR), but also use the advantages of each technique in a global combination. Precision for SLR, inertial system for VLBI, data redundancy for GPS are the main benefits of the combination process. Resolutions of one day as well as of six hours in order to better fit the VLBI intensive campaigns were attempted. Compared to the EOPC04 series, our final solution shows discrepancies in the order of 0.25 mas for the pole motion and 0.015 ms for UT1.

However some problems remain on the processing of individual techniques like GPS which is not yet on the level of the international service. Moreover the chosen period is too short for drawing a definitive conclusion.

This is why a next step is already planned. It will consist in a one-year (probably year 2002) global estimation including the EOPs, as well as station coordinates and using upgraded models and improved processing for each technique. It should demonstrate the merits of such a global and homogeneous processing.

This work was leaded at GRGS in the framework of the doctorate of Philippe Yaya.

Reference

Ph. Yaya: Apport des combinaisons de techniques astrométriques et géodésiques à l'estimation des paramètres d'orientation de la Terre, Thèse de Doctorat, Observatoire de Paris, July 2002.

Richard Biancale