

3.7.2 Working Group on Combination

IERS Combination Pilot Project (CPP)

One major project of the working group still is the IERS Combination Pilot Project (CPP) that started already in 2004 (see IERS Annual Report 2004 for more details). However, many developments within the IERS during the last years were running in parallel (new ITRF computations, Call for long-time series, CPP), so that the original intention of the CPP, i.e., a routine generation of weekly combined inter-technique solutions could not be achieved yet. Nevertheless, the first step is already successfully completed: Each of the technique services provides routinely an official weekly / daily intra-technique combined solution.

GGOS-D Project

The project “GGOS-D” is one of the major projects concerning the combination of space geodetic techniques and, therefore, should be mentioned here, too. GGOS-D is funded by the German Ministry of Education and Research (BMBF) within the Geotechnologien programme, with four institutions involved: GeoForschungsZentrum Potsdam (GFZ), Deutsches Geodätisches Forschungsinstitut (DGFI) in Munich, Institute of Geodesy and Geoinformation of the University of Bonn (IGG-B), and Bundesamt für Kartographie und Geodäsie (BKG) in Frankfurt/Main. Within this group, a broad variety of expertise concerning the analysis of GPS, VLBI, SLR, altimetry and Low Earth Orbiter (LEO) data is available so that high-quality solutions for all of these techniques could be generated. All partners agreed on detailed standards for their analysis strategy concerning a priori models and parameterization so that the resulting normal equation systems are as homogeneous as possible and allow for a rigorous combination. The level of agreement and the remaining analysis noise can be assessed as two different contributions for each of the techniques are available, at least for GPS, VLBI and SLR. An overview about the software packages used and the time span of data that is analyzed is given in Table 1. Similar to the analysis of the data, the inter-technique combination is performed with two different software packages as well.

Table 1: Generation of consistent time series within the GGOS-D project.

Technique	Software	Institution	Resolution	Period
SLR	DOGS	DGFI	1 week	11/1992 – 12/2006
SLR	EPOS	GFZ	1 week	10/1992 – 12/2006
VLBI	OCCAM	DGFI	1 day	01/1984 – 12/2006
VLBI	Calc/SOLVE	IGG-B / BKG	1 day	01/1984 – 12/2006
GPS	EPOS	GFZ	1 week	Several months
GPS	Bernese	GFZ	1 day	01/1994 – 12/2006
LEOs	EPOS	GFZ	3 days	01/2004 – 12/2004
Altimetry	DGFI software	DGFI		01/1993 – 12/2005
Combination	DOGS-CS	DGFI	1 day / 1 week	01/1984 – 12/2006
Combination	Bernese	GFZ	1 day / 1 week	01/1984 – 12/2006

Besides the agreement on common standards and a homogeneous reprocessing of the whole time span of data, the parameter space used within GGOS-D marks an important extension compared to standard solutions provided by the technique-specific analysis centers:

- station coordinates,
- Earth orientation parameters (all five angles including their time-derivatives),
- station-specific troposphere parameters for GPS and VLBI (zenith delay and horizontal gradients),
- spherical harmonic coefficients of the Earth's gravity field of degrees zero to two for SLR and LEO solutions.

Due to the extended parameter space, the individual techniques can be linked by more parameters than solely the station coordinates and EOPs. Furthermore, the correlations and interactions between all the estimated parameters can be studied, and the impact of combining the individual contributions can be assessed.

More information about the project GGOS-D is available at <http://www.ggos-d.de>.

Meetings and Workshops

See Section 3.3 “Analysis Coordinator” (this volume) for a detailed list.

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