3.6.2.3 Deutsches Geodätisches Forschungsinstitut (DGFI)

The DGFI activities as IERS Combination Research Centre during the year 2005 can be divided into the following major topics:

- Refinements of the SLR intra-technique combination (ILRS-B)
- Simultaneous estimation of a TRF, the EOPs and a CRF
- Combination of homogeneously processed VLBI and GPS data
- DGFI contributions to the IERS Combination Pilot Project

SLR intra-technique combination

Since June 2004, DGFI serves as the official ILRS Backup Combination Centre (ILRS-B). It computes weekly a combined SLR solution as an official product (SINEX files with station positions and EOPs) for the ILRS and as input for the weekly combination of SLR data with other techniques within the IERS Combination Pilot Project (CPP). During this period, DGFI has refined the intra-technique combination methodology and software for an automated processing to guarantee an operational combination of the individual SLR solutions on a weekly basis.

Simultaneous estimation of a TRF, the EOP and a CRF

DGFI has computed a VLBI solution with simultaneous estimation of station positions and velocities (TRF), celestial coordinates of the radio sources (CRF), and the full set of Earth orientation parameters (EOP) using the VLBI software OCCAM (Tesmer et al., 2004, Titov et al., 2004). The results of this completely undistorted VLBI solution were compared with the official IERS products, namely the IERS C04 series for the EOP, the ITRF2000, and the ICRF-Ext1. Assuming that the VLBI solution is free of (systematic) errors the results indicate inconsistencies between the IERS C04, ICRF-Ext1, and the VLBI part of ITRF2000 (Angermann et al., 2006). The observed discrepancies demonstrate the need for the development of rigorous combination methods for the generation of consistent IERS products, as for example envisaged within the IERS CPP.

Combination of homogeneously processed VLBI and GPS data

In close cooperation between DGFI, the Forschungseinrichtung Satellitengeodäsie TU München (FESG), and the GeoForschungs-Zentrum Potsdam, homogeneous normal equations were generated by a careful adoption of the models and parameterisations of the VLBI software OCCAM and the Bernese GPS software. The results based on the data of the continuous IVS campaign CONT02 have delivered very promising results for all parameters common to both techniques such as station positions, troposphere parameters, and sub-daily EOP (Thaller et al., 2006). Furthermore long time series solutions of VLBI and GPS of homogeneously re-processed VLBI and GPS data were generated and analysed. The results demonstrate that the estimated parameter series of both techniques are in a good agreement. It turned also out, that the differences

compared to the results of the 14-days CONT02 campaign – especially for the estimated troposphere parameters – are very small.

IERS Combination Pilot Project

The IERS Combination Pilot Project (CPP) aims at more consistent, routinely generated IERS products. „Weekly" SINEX solutions, which are available from the different technique services containing station positions, EOPs, and, possibly, quasar coordinates. These solutions shall be rigorously and routinely combined into consistent IERS products. In the frame of the CPP, DGFI provides individual SLR and VLBI solutions and combined SLR solutions (ILRS-B) to the ILRS and IVS, respectively. DGFI has been nominated by the IERS as a combination centre for the inter-technique combination. The presently available SINEX files were analysed regarding the suitability for a rigorous combination. The methodology for the weekly inter-technique combination of station positions and EOPs has been developed and implemented in the DGFI software DOGS-CS. During the CPP and within the IERS Working Group on Combination it was recognized that the weekly SINEX solutions now routinely generated by the Technique Centres are not sufficient to generate combined inter-technique solutions over longer time periods. It was found, that a refined TRF realization is an essential prerequisite for the weekly inter-technique combination. The computation of a new ITRF2005 solution is currently in progress by the ITRS Combination Centres.

Acknowledgement

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