

3.6.2.3 Deutsches Geodätisches Forschungsinstitut (DGFI)

The activities of the IERS Combination Research Centre at DGFI can be divided into the following major topics:

- Refinements of the SLR intra-technique combination (ILRS-B)
- DGFI contributions to the project “GGOS-D”
- DGFI contributions to the second realization of the ICRF (ICRF2)
- Analysis of systematic effects in CRF solutions
- DGFI contributions to the IERS Combination Pilot Project

SLR intra-technique combination (ILRS-B)

Since June 2004, DGFI serves as the official ILRS Backup Combination Center (ILRS-B). It computes on a weekly basis 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. During 2006, DGFI has refined the intra-technique combination methodology and software for an automated combination of the individual SLR solutions. The variance component estimation, which was mainly implemented for an automatic weighting, turned out to be a useful tool also for outlier analysis of the input solutions.

DGFI contributions to the project “GGOS-D”

The project “Integration of Space Geodetic Techniques as a Basis for a Global Geodetic-Geophysical Observing System (GGOS-D)” is a joint project of the “GeoForschungsZentrum Potsdam (GFZ)”, the “Bundesamt für Kartographie und Geodäsie (BKG)”, the “Institut für Geodäsie und Geoinformation, Universität Bonn (IGGB)” and DGFI funded by the German Ministry for Research and Education in the frame of the programme GEOTECHNOLOGIEN. Although GGOS-D is not an IERS project, the work is very closely related to the DGFI research performed as IERS Combination Research Centre. The DGFI activities within GGOS-D include the following items:

- Contributions to the definition of unified GGOS-D processing standards, models and parameterizations and implementation in the software packages DOGS-OC (for SLR) and OCCAM (for VLBI);
- Generation of fully consistent observation time series of SLR and VLBI observations;
- Computation of a GGOS-D reference frame based on the consistent VLBI, SLR and GPS observation time series;
- Development of combination procedures to generate consistent time series of geodetic-geophysical parameters, such as station and Quasar coordinates, EOPs, troposphere parameters, and low-degree spherical harmonics of the Earth gravity field.

DGFI contributions to the ICRF2

The IVS has established a Working Group (WG) for the second realization of the ICRF (ICRF2) during the IAU General Assembly in Prague 2006, which will deal with all efforts related to the observational data. DGFI actively takes part in this WG by submitting catalogues, source position time series and other type of results. A first goal of the WG is to identify sources with time-variant positions by examining time series of estimated source positions. Tests are currently done at DGFI to estimate such time series from single session solutions using an NNR datum over all sources w.r.t. a CRF solution computed at DGFI.

Analysis of systematic effects in CRF solutions

In 2006, the effect of various analysis options on VLBI-determined CRF was investigated at DGFI:

- different tropospheric mapping functions and gradient models;
- choice of data set (neglecting sessions before 1990 and 21 astronomic sessions);
- handling of sources that may not be assumed to have time-invariant positions;
- handling of the station network (estimate the station positions per session, as positions and velocities over 20 years, or fix them to a priori values).

The biggest, clearly systematic effects in the estimated source positions up to 0.5 mas were found to be due to the different gradient models. The choice of the data set does generally not have a significant influence. This holds also (with several exceptions) for different options how to treat the sources which are assumed to have time-invariant positions. Furthermore it turned out that fixing station positions to values not consistent to the solution itself can noticeably affect CRF solutions.

DGFI contributions to the IERS Combination Pilot Project

Within the IERS Combination Pilot Project (CPP), DGFI provides individual SLR and VLBI solutions and combined SLR solutions (ILRS-B) to the ILRS and IVS, respectively. DGFI has been accepted by the IERS as a Combination Centre for the inter-technique combination of the weekly/daily SINEX files provided by the Technique Services. The SINEX files were analysed regarding the suitability for a rigorous combination. We investigated different strategies for the weekly inter-technique combination and performed test computations. We implemented variance component estimation to estimate weighting factors for the different space technique. The handling of local ties within the weekly combination is subject of further investigations.

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