

3.6.2.3 Deutsches Geodätisches Forschungsinstitut (DGFI)

During the year 2003 the activities of the IERS Combination Research Centre at DGFI were mainly concentrated on the following topics:

- Investigations related to TRF datum realisation
- Analysis of time series of datum parameters and station positions
- Improvement of automated SLR intra-technique combination
- Contributions to the IERS SINEX Combination Campaign
- Quasi-rigorous combination of VLBI and GPS using CONT02 data

TRF datum realisation

The space geodetic observation techniques contribute in different ways to the realisation of the TRF datum. We used solutions and normal equations of the different techniques to study the covariance information of the datum parameters (e.g. origin, scale). In addition, time series analysis of datum parameters contribute to identify strengths and weaknesses of the space techniques. For the definition of the kinematic datum we propose to use kinematic models based on geodetic observations (e.g. APKIM) instead of geophysical models (e.g. NNR NUVEL-1A) to ensure that the no net rotation condition is more accurately fulfilled (Drewes and Meisel, 2003).

Analysis of time series

The time series of station positions and datum parameters, obtained from VLBI, SLR, GPS and DORIS solutions, were analysed w.r.t. non-linear signals (e.g. seasonal) and jumps, and were compared at co-location sites to investigate systematic biases between techniques. The observed non-linear effects in site positions and datum parameters are in conflict with the assumption of constant station velocities (Angermann et al., in press).

Automated SLR intra-technique combination

DGFI participates as analysis and combination centre in the ILRS. The products (station positions and earth orientation parameters) are generated on a weekly basis. The objective of the combination centre is to compute a combined solution in an automated process using individual SLR solutions. For this purpose software and scripts were developed for quality control and combination (Kelm, 2003).

IERS SINEX Combination Campaign

In the framework of this IERS project, DGFI has provided SLR, VLBI and GPS solutions and has combined weekly (or session-wise) solutions of different techniques containing station positions and EOPs. Important tasks were the handling of local ties, the weighting of the solutions, and the realisation of the datum for the individual and weekly combined solutions (Krügel and Meisel, 2003).

CONT02 combination

A joint project of FESG (Forschungseinrichtung Satellitengeodäsie, TU München) and DGFI aims towards a rigorous combination using

the CONT02 VLBI data and global GPS data. The computations of daily unconstrained GPS normal equations were done at the FESG with the Bernese software; the VLBI normal equations were generated at DGFI with the OCCAM software. Much care was taken to adapt common models and parameterisations for the data analysis. First results show the advantages of such a rigorous combination, though some details need to be further studied (Thaller et al., in press).

Acknowledgement

The IERS Combination Research Centre at DGFI is supported by the programme GEOTECHNOLOGIEN of BMBF and DFG, Grant 03F0336C; the document no. is GEOTECH-47.

References

- Angermann, D., B. Meisel, M. Krügel, H. Müller, V. Tesmer: Time evolution of the terrestrial reference frame, submitted to IAG Proceedings, IUGG 2003 (in press).
- Angermann, D., D. Thaller, M. Rothacher: IERS SINEX combination campaign. Proceedings of the IERS Workshop on Combination Research and Global Geophysical Fluids, IERS Technical Note 30, 2003, 94-101.
- Drewes, H., B. Meisel: An actual plate motion and deformation model as a kinematic terrestrial reference system. In: Geotechnologien Science Report No. 3, 40-43, Koordinierungsbüro Geotechnologien, Potsdam, 2003.
- Gerstl, M.: Numerical aspects on combination at the observation equation and normal equation level. Proceedings of the IERS Workshop on Combination Research and Global Geophysical Fluids, IERS Technical Note 30, 2003, 89-93.
- Kelm, R.: Automated combination of SLR solutions within the ILRS. In: Geotechnologien Science Report No. 3, 89-91, Koordinierungsbüro Geotechnologien, Potsdam, 2003.
- Kelm, R.: Rank defect analysis and variance component estimation for inter-technique combination. Proceedings of the IERS Workshop on Combination Research and Global Geophysical Fluids, IERS Technical Note 30, 2003, 112-114.
- Krügel, M., B. Meisel: DGFI results of the IERS SINEX combination campaign. In: Geotechnologien Science Report No. 3, 96-100, Koordinierungsbüro Geotechnologien, Potsdam, 2003.
- Thaller, D., R. Schmid, M. Rothacher, V. Tesmer, D. Angermann: Towards a rigorous combination of VLBI and GPS using the CONT02 campaign, submitted to IAG Proceedings, IUGG 2003 (in press).

*Detlef Angermann, Hermann Drewes, Rainer Kelm,
Manuela Krügel, Barbara Meisel, Volker Tesmer*