

BKG/DGFI Combination Center Annual Report 2012

Sabine Bachmann, Michael Lösler, Robert Heinkelmann, Michael Gerstl

Abstract

This report summarizes the activities of the BKG/DGFI Combination Center in 2012 and outlines the planned activities for the year 2013. The main focus was the stabilization of outlier detection and the update of the Web presentation of the combined products.

1. General Information

The BKG/DGFI Combination Center was established in October 2008 as a joint effort of the Federal Agency for Cartography and Geodesy (Bundesamt für Kartographie und Geodäsie, BKG) and the German Geodetic Research Institute (Deutsches Geodätisches Forschungsinstitut, DGFI). The participating institutions, as well as the tasks and the structure of the IVS Combination Center, have been described in [5]. The tasks comprise quality control and a timely combination of the session-based intermediate results of the IVS Analysis Centers into a final combination product (e.g., Earth Orientation Parameters (EOP)). In coordination with the IVS Analysis Coordinator, the combination results are released as official IVS products. The Combination Center is also expected to contribute to the generation of the official IVS input to any ITRF activities. These tasks are performed on an operational basis.

2. Component Description

The BKG/DGFI Combination Center performs a combination of session-based results of the IVS Analysis Centers on an operational basis. The strategy for the combination is based on the combination of normal equations and has been adopted from the combination process developed and performed by the IVS Analysis Coordinator (cf. [3], [4]).

At BKG the following tasks are performed:

- Ensuring quality control of the Analysis Center results: checking the format of the results and their suitability for combination, performing identification and reduction of outliers, comparing the Analysis Centers' results with each other, and comparing the results w.r.t. external time series, e.g. from IERS or IGS.
- Providing feedback to the Analysis Centers: quality control results are available at the BKG IVS Combination Center Web page [7].
- Creating high quality combination products and performing timely archiving and distribution: combination products will be created by using the combination part DOGS-CS of DGFI's software package DOGS [6].
- Submitting official IVS combination products to the IERS: the products are submitted to the responsible IERS components to be used for IERS product generation (e.g., EOP rapid products and the EOP series IERS C04). Additionally, IVS product series are provided for ITRF computation (see next item). This work is also supported by the staff of the IERS Central Bureau hosted by BKG.

- Generating official IVS input to the ITRF: the time series of the combined session products (from 1984 to present) is submitted for ITRF computation in the form of normal equations in SINEX format.
- Archiving Results: Final results are archived in the BKG Data Center and mirrored to the IVS Data Centers at OPAR and CDDIS. This work is assisted by the staff of the BKG Data Center in Leipzig.

DGFI is in charge of the following Combination Center functions:

- DGFI is developing state-of-the-art combination procedures. This work, as well as the following item, is also related to the ITRS Combination Center at DGFI and DGFI's efforts within the IERS WG on the Combination on Observation Level (COL).
- The software DOGS-CS is updated by implementing and documenting the developed state-of-the-art combination procedures.
- The DGFI DOGS software package is continuously updated to be in accordance with the IERS Conventions.
- DGFI generates the operational IVS troposphere combination products, analyzes the individual AC contributions and gives feedback to the IVS AC, and publishes the results on the Web page <http://www.dgfi.badw.de/index.php?id=395>. DGFI provides rapid as well as long-term series of combined tropospheric products.

3. Staff

The list of the staff members of the BKG/DGFI Combination Center in 2012 is given in Table 1.

Table 1. Staff members of the BKG/DGFI Combination Center.

Name	Affiliation	Function	E-Mail
Michael Gerstl	DGFI	Software maintenance	gerstl@dgfi.badw.de
Robert Heinkelmann*	DGFI	Combination strategies	heinkelmann@dgfi.badw.de
Sabine Bachmann	BKG	Combination	sabine.bachmann@bkg.bund.de
Michael Lösler	BKG	Hardware/Web site maintenance	michael.loesler@bkg.bund.de

* Robert Heinkelmann left DGFI at the end of October 2012 and moved to GFZ Potsdam, Germany.

4. Current Status and Activities

The combination of the IVS Rapid EOP series (R1 and R4 sessions), which started in 2009 at BKG, has been continued routinely in 2012. In 2012, six IVS Analysis Centers (BKG, DGFI, GSFC, IAA, OPA, and USNO) contributed to the IVS combined product (see [4]). Potential new

ACs are AUS, CGS, NMA, and TUW (see also Section 5). The rapid solutions contain only R1 and R4 sessions, and new data points are added twice a week as soon as the SINEX files of at least four IVS Analysis Centers are available. Long-term series are generated quarterly and include every 24-hour session since 1984. The quarterly series include long-term EOP series, station positions, and velocities. Furthermore, a VLBI TRF is generated and published. The preprocessing to read and write source positions has been implemented, and the software has been extended to process source parameters. The results of the combination process are archived by the BKG Data Center in Leipzig. The combined rapid EOP series, as well as the results of the quality control of the Analysis Center results, are also available directly at the BKG/DGFI Combination Center Web page [7] or via the IVS Analysis Coordinator Web site. The inclusion of new Analysis Centers has continued, a newly designed Web page has been brought on line and the Web-based analysis tools have been enhanced.

5. Plans for 2013

In 2013 the work of the BKG/DGFI Combination Center will focus on the following:

- Including new Analysis Center solutions: one based on the GEOSAT software and provided by Halfdan Pascal Kierulf from the Geodetic Institute, Norwegian Mapping Authority (NMA), Hønefoss, Norway; another one based on the OCCAM software and provided by Oleg Titov from Geoscience Australia (AUS), Canberra, Australia; and a third one based on VieVS (Vienna VLBI Software) provided by the Vienna VLBI Group from the Vienna University of Technology, Austria (TUW).
- Investigation into combination of source coordinates and set up of extended analysis and combination routines (e.g., the generation of the necessary datum conditions).
- Extending the Web-based data analysis feature on the IVS Combination Center Web pages ([7]).
- Providing more products and information resulting from the combination process.

References

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- [3] Nothnagel, A., Böckmann, S., Artz, T., Analysis Coordinator Report, in: International VLBI Service for Geodesy and Astrometry 2007 Annual Report, NASA/TP-2008-214162, D. Behrend and K. D. Baver (eds.), 16–17, 2008.
- [4] Nothnagel, A., Böckmann, S., Artz, T., Analysis Coordinator Report, in: International VLBI Service for Geodesy and Astrometry Annual Report 2009, NASA/TP-2010-215860, D. Behrend and K. D. Baver (eds.), 45–47, 2010.

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- [5] Schwegmann, W., Gerstl, M., Heinkelmann, R., BKG/DGFI Combination Center Annual Report 2008, in: International VLBI Service for Geodesy and Astrometry Annual Report 2008, NASA/TP-2009-214183, D. Behrend and K. D. Baver (eds.), 250–252, 2009. BKG/DGFI Combination Center results at Analysis Coordinator’s Web page.
- [6] http://ilrs.dgfi.badw.de/fileadmin/dogs/cs_manual.ps
DOGS_CS software manual (German version only).
- [7] <http://ccivs.bkg.bund.de/>
BKG Combination Center Web page.