

# Analysis Coordinator Report

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## Abstract

IVS 2010 analysis coordination issues that may also cause noticeable impacts for the future are reported here. Routine Earth orientation parameter combinations on the basis of datum-free normal equations were transferred to the IVS Combination Center at BKG, Frankfurt a.M., Germany.

## 1. General Issues

The “Eleventh IVS Analysis Workshop” was hosted by the University of Tasmania, School of Mathematics and Physics, Hobart, Australia, on February 11, 2010, in connection with the Sixth IVS General Meeting. The coordination of IVS routine data analysis was discussed as well as developments for improving geodetic and astrometric data analysis in general.

The timeliness of the submission of the SINEX files from the operational IVS Analysis Centers to the IVS Data Centers has remained an issue of constant annoyance. The reason is that the combination process has to wait until at least four centers have submitted their results. The irregular composition of contributions generates an additional component of noise to the combined products. At the same time, the IERS Earth Orientation Product Center and the IERS Rapid Service and Prediction Center are delayed in including the VLBI results in their combinations as well. This leads to a constant downweighting of the IVS products in the IERS combinations.

During the Analysis Workshop, it was shown that the treatment of the subdaily tidal Earth rotation parameter variations and the introduction of harmonic site position variations may generate alias effects in the daily EOP time series. Especially the pole rates and the nutation components are affected by model differences by up to 100  $\mu\text{as/d}$  and 50  $\mu\text{as}$ , respectively. The Analysis Coordinator emphasized that the Analysis Centers should strictly follow the IERS Conventions including Tab. 5.1 in their routine EOP determinations.

A number of tests have been carried out to support endeavors to achieve suitability of analysis packages and their results for the combination. Furthermore, the implementations of the Vienna Mapping Function 1 (VMF1) in Calc/Solve by GSFC and BKG have been tested and compared.

## 2. IVS Operational Data Analysis and Combination

From October 1, 2009, the operational combination has been taken over by the IVS Combination Center at the German Bundesamt für Kartographie und Geodäsie (BKG) in Frankfurt a.M. (see separate report by BKG/DGFI). The input to these combinations are datum-free (constraint-free) normal equation systems in SINEX format (Solution Independent Exchange format). The transition from the nutation representation in the ecliptic system through nutation in longitude  $d\psi$  and obliquity  $d\epsilon$  to the nutation representation in the IAU2000 paradigm,  $dX$  and  $dY$ , has been realized successfully in most of the analysis software packages. Therefore, the combination is now solely based on this new representation. For users of the old system, a separate table is generated through a transformation.

The next steps of combination, in particular with respect to future computations of the International Terrestrial Reference Frame (ITRF), are planned to also include the elements for the

radio source positions in the normal equation systems. All software developers have been informed by the Analysis Coordinator that this step is imminent.

### 3. UT1 Intensive Sessions

At present, the results of the 1h UT1-UTC Intensive sessions are reported by the analysis centers in the IVS EOP exchange format (for more details see IVS Analysis Coordinator’s Web page). Due to a lack of resources, a combination of the Intensive results is not foreseen in the near future. However, the individual results are still very valuable since they have been used by various agencies for further processing. In order to make optimal use of these results, it is necessary to also report the polar motion a prioris in the result files (eopi files). All analysts dealing with the analysis of Intensive sessions are kindly asked to also report their polar motion a prioris in the respective files.

In the not too distant future, all of the Intensive observing sessions will be operated in an e-VLBI mode for the transmission of the raw data. This is already the case for the INT2 and INT3 sessions. With this in place, the latency between observations and data analysis will be as short as a few hours only. At this time, some of the necessary auxiliary data like polar motion or mapping functions from numerical weather models, like VMF1, will not yet be available and will have to be replaced by predictions. Therefore, the initial results can only be considered as being preliminary, and a mechanism of UT1 products with staggered latencies and accuracies will have to be introduced. For the purpose of developing a plan for a properly organized setup, a ‘Task Force on Intensives’ was established under the lead of Rüdiger Haas.

### 4. Thermal Expansion of Radio Telescopes

Further details of radio telescopes have been collected in the antenna-info file under the url <http://vlbi.geod.uni-bonn.de/IVS-AC/Conventions>. The background of the thermal expansion models is described in [1].

### 5. Personnel

Table 1. Personnel at the IVS Analysis Coordinator’s office

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### References

- [1] Nothnagel A. (2009) Conventions on thermal expansion modelling of radio telescopes for geodetic and astrometric VLBI. *J. Geod* 83(8):787–792, doi:10.1007/s00190-008-0284-z