

3.3 Analysis Coordinator

Introduction This annual report of the IERS Analysis Coordinator (AC) will concentrate on the following topics:

- List of IERS products on the Web pages
- IERS Analysis Campaign to align EOPs to ITRF2000 / ICRF
- IERS SINEX Combination Campaign
- SINEX Format Version 2.00

Besides these major topics considerable effort was put into the scientific preparation of the IERS Workshop 2002 in Munich with the themes “combination” and “global geophysical fluids”.

List of IERS Products on the Web Pages

A complete list of the IERS products was compiled by Daniela Thaller during the end of 2001 and finalized in the first few months of 2002. In mid 2002 the detailed information for all products was added in a uniform way to the IERS Web pages at the IERS Central Bureau by Wolfgang Schwegmann (see <<http://www.iers.org/iers/products/>>). This list will serve as the “status quo”, i.e., as the starting point for improving the IERS product consistency and accuracy. In view of the fact, that only a rigorous combination of station coordinates, EOP and quasar coordinates can guarantee a consistent IERS product palette, the emphasis of the IERS AC work was put on stimulating the combination efforts and the development of appropriate software algorithms. On the long run this strategy will be more efficient than trying to improve individual products (e.g., improving EOP series independent of the reference frame).

IERS Analysis Campaign to Align EOPs to ITRF2000 / ICRF

The intention of this EOP Alignment Campaign is to achieve an overall accuracy of 0.1 mas for Earth Orientation Parameters and to create EOP series with highest possible consistency with ICRF and ITRF2000. Therefore, this EOP Alignment Campaign deals with the analysis and understanding of the origin of systematic errors resulting from the reference frame or its realisation.

At the end of September 2001 the IERS Alignment Campaign was started by the IERS AC with an initial Call for Participation (CfP). The Campaign has been subdivided into two parts. In a first step the Analysis Centres of the various space geodetic techniques were asked to produce EOP series with the reference frame fixed to the ITRF2000 / ICRF coordinates and velocities. In addition, they were asked to produce solutions with different levels of constraining to ITRF2000 (ICRF). The second step consisted of the analysis of the submitted EOP series by comparing individual series with the official IERS solutions (C04, Bulletin A) and by studying the consistency between the series. The final results should be a set of recommendations on how the ITRF2000 reference frame should be

realised in the routine solutions generating EOP series.

Until May 2002, 21 proposals were received (see also the Web pages <<http://alpha.fesg.tu-muenchen.de/iers/eop/campaign.html>>). 12 of them contributed to the first step and produced more than 40 different EOP series from all four techniques (VLBI, SLR, GPS, DORIS) with various constraints (fixed site coordinates, significant or minimum constraints on the site coordinates) to realise the ITRF2000 reference frame. The series are publicly available at the ftp archive <<ftp://alpha.fesg.tu-muenchen.de/iers/eop/>>. In addition to the EOP series themselves, a detailed description file about the constraints, the reference frame, the reference sites and the combination approach used is available for each individual series. A first overview was given by Robert Dill at the EGS General Assembly 2002 in Nice.

As a second step of the campaign, 12 groups are now analysing the submitted EOP series.

These groups have to deal with many special problems coming from the pooling of EOP series from different techniques. In order to be able to compare the series, these need to be reformatted and re-sampled into one common format. Problems occur with data gaps, different interpolation schemes and different or wrong signs. In a first comparison of the EOP series against each other, the three EOP parameters x-pole, y-pole, and UT1-UTC were studied by a simultaneous estimation of an offset, a drift and a scale factor. Additionally, possible time lags (shifts in time) were detected. In polar motion (x-pole, y-pole) most series show offsets that agree within about ± 0.5 mas and almost no drifts, except IGN 01 (Doris) and ASI 01 (about 1.5 mas/a). Drifts result mainly between the long VLBI series (IAA, GAUS, GSFC), where the ITRF2000 velocities are used over long time intervals. The VLBI series show a good agreement in UT1-UTC. The comparison of UT1-UTC estimates from satellite techniques (GPS, SLR, DORIS) with those from VLBI is known to be a problem because of systematic effects coming from the orbit modelling. Until now there is no significant indication that fixed constraints are better than loose or minimum constraints. Only the ASI 01 series differs very much from the other series, probably due to the extremely loose constraints used. The poster from the EGS 2002 in Nice and the total set of most recent results are available on the Web pages <<http://alpha.fesg.tu-muenchen.de/iers/eop/results.html>>. More results were presented at the IERS Combination Workshop 2002 in Munich by

- Dill, R.: Comparison of EOP series from the IERS analysis campaign to align EOPs to the ITRF2000/ICRF.
- Carlucci, T., Gambis, D., Bizouard, C., Francou, G.: Comparative Study of EOP Series Derived for the IERS Alignment Campaign.

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- Messerer, E., Boehm, J., Schuh, H.: Comparison and combination of the EOP submitted to the IERS Alignment Campaign 2002.

The IERS Combination Workshop in Munich adopted the following recommendations concerning the EOP Alignment Campaign:

- Solve problems that occur from reformatting, resampling and interpolation
- Create a new database with comparable EOP series until the end of the year 2002
- Analysis of offsets and drifts in x-pole, y-pole; find relations to the type of ITRF realisation
- Develop strategies to combine / compare UT1 and LOD of satellite techniques and VLBI
- Call to the analysis groups, to finish their studies until February 2003
- Conclusion and presentation of final results until EGS General Assembly, April 2003

After removing all obvious error sources like interpolation and sample errors further investigations by the FESG group in Munich are concentrating on the smaller differences between subsets of the submitted EOP series, like, e.g., the 13 GPS series from IGS. Now the influences of the choice of stations realizing the ITRF2000 reference frame or the constraints used can be seen. The analysis of the remaining residuals shows systematic errors like biases and/or periodic signals. The interpretation of these results will be finished in the beginning of 2003. The presentation of final results is expected at the EGS 2003 in Nice.

IERS SINEX Combination Campaign

After some preparations the IERS SINEX Combination Campaign was started with a Call for Participation (CfP) in May 2002 and eleven groups sent back a proposal. The campaign has been divided into two parts:

- as a first step, solution series of the space geodetic techniques were to be produced by several analysis centres for the whole year of 1999, including at least station coordinates and EOPs as parameter types in the SINEX files;
- as a second step, these solution series in SINEX format were then to be combined by several groups with the goal to develop appropriate combination software and to assess systematic biases between the individual space geodetic techniques.

The first step could be finished by the end of the year 2002 and all solution series were added to the SINEX data pool, which was already prepared in 2001. The combination step is still ongoing and

first results, presented at the IERS Workshop in November 2002 in Munich, look very promising. Further results are expected for the EGS General Assembly 2003 in Nice in April 2003.

All necessary information concerning the campaign can be found on the Web site of the IERS Analysis Coordination, which is updated whenever new information becomes available:

<http://alpha.fesg.tu-muenchen.de/iers/sinex/sinex_campaign.html>.

Concerning the SINEX files, you can retrieve all solutions for the combination tests from the Web page on the SINEX data pool:

<<http://alpha.fesg.tu-muenchen.de/iers/sinex/datapool.html>>.

SINEX files containing local tie information are also available in the data pool.

As one result of the IERS Workshop 2002 in Munich, all analysis centres that were contributing solution series were asked to fill in a form about the modelling and parameterisation characteristics of their solutions. These forms will be archived together with the solution series in the SINEX data pool, but this step has not yet been completed.

SINEX Format Version 2.00

The new version of the SINEX format description, called SINEX 2.00, could be finished after intensive discussions with the groups that are doing the analysis of the space geodetic techniques. Since May 2002, the final description is available on the Web site of the IERS Analysis Coordination (including an example and a set of formulas):

<http://alpha.fesg.tu-muenchen.de/iers/sinex/sinex_v2.pdf>.

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