3.7.2 Working Group on Combination

Status and Future of the IERS Combination Pilot Project

The IERS Combination Pilot Project (CPP) is a major step towards more consistent IERS products that are generated routinely.

Starting with GPS week 1260 (i.e., February 29, 2004) the technique services IGS, ILRS, IVS and IDS are asked to provide a weekly combined SINEX solution of the respective technique, including station coordinates, Earth Orientation Parameters (EOP), and, in the case of VLBI, possibly quasar coordinates. Eight weeks after the respective week of observations, the combined intra-technique solutions should be available for the second step, i.e., the inter-technique combination. Six institutions proposed to participate in the inter-technique combination and will deliver a weekly combined solution after another four weeks, i.e., 12 weeks after the observations. The last step consists of comparisons and quality checks of the inter-technique solutions. Besides the combination centres doing internal quality checks of their inter-technique solutions themselves, two independent institutions proposed to participate in this third step of the pilot project. The deadline for the validation report is 16 weeks after the observations, thus allowing four weeks of time for the validation process.

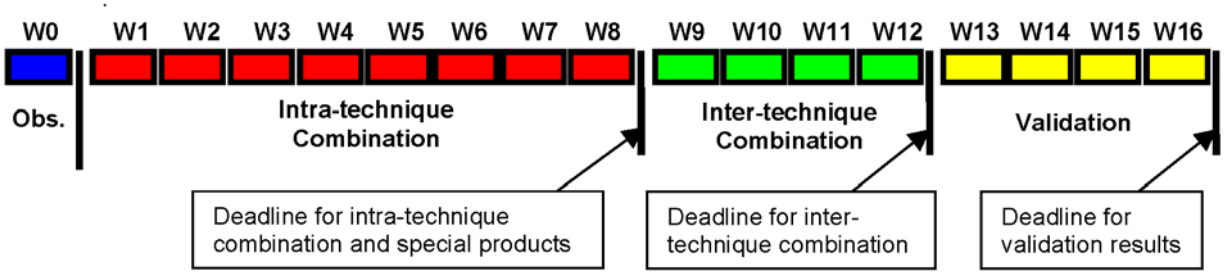

Fig. 1: Schedule of the Combination Pilot Project

Additionally, several institutions answered the call and proposed to deliver some special products, e.g., sub-daily Earth Rotation Parameters, a solution combined on the observation level, etc.

The status at the end of 2004 is, that the combined intra-technique solutions are routinely available in time (all combinations except DORIS). The files / solutions are accessible via the web site <http://iers1.bkg.bund.de/info/listCPP.php>.

However, the inter-technique combination results are still missing and therefore also the validation part. To support the IERS CPP with more weekly solutions (but mainly to generate a new ITRF2004 solution) a Call for long time series was issued.

More information may be found at the IERS web site (<http://www.iers.org/>).

Status and Future of the IERS Long Time Series

As already mentioned in chapter 3.3 (Analysis Coordination) of this volume, the availability of long time series is essential for a weekly rigorous combination of space geodetic solutions.

The derivation of weighting schemes and the application of local ties is only possible reasonably if a longer series of weekly solutions or a long time solution is available.

Due to the call for IERS Long Time Series, combined intra-technique solutions from all techniques are available for long time spans. It must be emphasized that this is the first time that all the technique services IGS, IVS and ILRS place a combined solution of the respective technique including station coordinates and EOPs at the disposal. Additionally, all the solutions were reprocessed, except for IGS, so that they form a homogeneous time series.

The available files / solutions are accessible via the website maintained by the IERS Central Bureau: <http://iers1.bkg.bund.de/info/listFileITRF2004.php>

Furthermore, for future products 'ITRF + EOP', the long time series build the basis for the generation of these products. The next main step for this topic is the generation of the ITRF2004 (station coordinates, velocities and EOP) by the ITRF Combination Centres IGN, DGFI and NRCan. The envisaged date for presenting the final solution is August 2005 at the IAG Scientific Assembly at Cairns / Australia.

Meetings and Workshops

Several meetings during 2004 had a session dedicated to combination of space geodetic techniques. A detailed overview is given in section 3.3 of this volume (IERS Analysis Coordinator).

Future Activities

Regarding the weekly combinations, it should be envisaged for the future to include other parameters as well: To complete the group of reference frame related parameters, the quasar coordinates representing the celestial reference frame and the nutation parameters (offsets and rates according to IAU2000) are of special interest. But also the troposphere parameters (zenith delays and horizontal gradients) should not be forgotten as they are common to all microwave techniques and they are influencing the terrestrial reference frame due to their correlation with station coordinates. Other parameters that are common to more space techniques like orbits or clocks could be included in the combination as well.

Furthermore, it is worth to think about a sub-daily resolution for Earth rotation parameters as an additional product.

Concerning the latency of the combined IERS products, it is the question whether it would be possible to reduce the latency from now 2 months for the weekly inter-technique combination in the CPP to a date closer to the observations. Additionally, to go even a step further, it would be an option to generate so-called rapid IERS

products which are then based on daily combinations and not on weekly solutions.

And finally, groups that can do a combination on observation level are encouraged to contribute to the IERS combination activities, and probably additional groups will work towards a combination on observation level.

As the IVS has decided to initiate a two-week continuous VLBI campaign in 2005 (as already done in 1996 and 2002), named CONT05, there will be additional observation material that can be used for special and very detailed combination studies.

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