

3.7.2 Working Group on Combination

IERS Combination Pilot Project

The main project of the Working Group on Combination is the IERS Combination Pilot Project (CPP) that started in 2004 (see IERS Annual Report 2004 for more details). However, many developments within the IERS during the last year were, with due reason, pursued with much higher priority than the CPP: the generation of the long-time series of reprocessed intra-technique combined solutions and the computation of the new ITRF. Therefore, the original intention of the CPP, i.e., the routine generation of weekly combined inter-technique solutions has not been achieved yet. Nevertheless, the developments concerning the weekly combined intra-technique solutions provided by each of the technique services were making considerable progress during 2005. Thanks to these efforts, official weekly routine solutions are available now in SINEX format for all space geodetic techniques. These solutions are the basis for the planned IERS product: a weekly combined inter-technique solution. The future IERS products are described in more detail in Section 3.3 “Analysis Coordinator” (this volume).

Standards and Conventions for Reprocessing Activities

The definition of standards and conventions, be it for modelling of the observations or for the parameterization of unknown quantities, is always a tightrope walk between

- (1) consistency (limiting the degrees of freedom of each individual group, but giving a well-defined product with a well-defined interpretation when combining the solutions) and
- (2) diversity in solutions (leading to interesting comparisons, progress, but also to a combined solution, that is a mixture of apples and pies).

In each individual case a balance has to be found between these two extremes, based on a consensus among the member of the Working Group on Combination or even better, among all the groups in the geodetic/geophysical community, which are “affected” in one way or the other by such a standard or convention. The point of view depends, to a large extent, on the products one has in mind: if the products of the individual analysis centers are considered, one may want to have a large variety of approaches for comparisons and information, called “bio-diversity” in a totally different field of science; if the combined product and its optimum use by the community concerning consistency and its interpretation is crucial, one may want to combine solutions with modelling standards (and a parameterization) as consistent as possible and not a mixture of different sets. A combination may not even make sense or be possible in the latter case.

The agreement on standards is especially important in view of new realizations of the ITRS, i.e. ITRF200x solutions and for the upcoming IGS reprocessing effort. Since a reprocessing within the IGS is not yet a routine effort, the standards have to be carefully considered and agreed upon. This is of special importance for modelling issues that are common to more than one observing technique (e.g. oceanic and atmospheric loading or tropospheric mapping functions), and that should, therefore, be consensus among all technique services.

A considerable effort was put in the development of common standards within the project GGOS-D, funded as part of the German "Geotechnologien-Programm 'Observation of the Earth from Space'". The standards for modelling and parameterization adopted within this project have been presented at one of the meetings of the IERS WG on Combination and are available (e-mail to Peter Steigenberger: steigenberger@gfz-potsdam.de).

CONT02 and CONT05 Combination Work

Quite a few groups were investigating combination strategies during the last year based on the data of the continuous VLBI campaigns of 2002 and 2005, i.e., CONT02 and CONT05. Because of the continuous observations from VLBI over at least 14 days, these datasets are especially suited for such studies. In addition, a considerable effort was put into the collection of auxiliary data, e.g., the data of water vapour radiometers, giving additional independent information to validate the results obtained by the space geodetic techniques.

All participants in the combination work are very much encouraged to use the data of the CONT02, the CONT05, but also the data of previous CONT-campaigns for combination studies. A considerable amount of results already exist for these periods (e.g., by Manuela Krügel, DGFI, and Daniela Thaller, GFZ) and can be made available for comparisons.

Combination of VLBI Intensive Session Solutions with IGS Rapid Solutions

The VLBI Intensive Sessions are mainly used to determine UT1 with low latency. Due to the fact that only two VLBI stations are involved in each of these sessions (Wettzell/Hawaii or Wettzell/Tsukuba), most of the parameters cannot be estimated simultaneously. Polar motion values are, typically, not estimated but taken from the most recent IGS determination. Thinking of a very low-latency Earth rotation parameter product, it makes a lot of sense to consider the combination of the VLBI Intensive Sessions with IGS rapid solutions. VLBI will mainly contribute to the estimation of UT1 and GPS to polar motion. Initial tests to combine SINEX files from VLBI Intensive Sessions (computed by DGFI) and from GPS rapid solutions (computed by GFZ) have been performed and the results are very encouraging.

Meetings and Workshops

- IERS Working Group on Combination and CPP Meeting during 2nd EGU General Assembly, Nice / France, April 2005
- IERS Workshop on Combination, GFZ Potsdam / Germany, October 2005. Papers are available in the IERS TN 35.
- Meetings with a session dedicated to combination of space geodetic techniques: EGU General Assembly, Nice / France, April 2005

Markus Rothacher, Daniela Thaller