4 IERS Workshop on Combination

A workshop devoted to combination issues of geodetic space techniques has been organized by the International Earth Rotation and Reference Systems Service (IERS) in Potsdam, Germany, on October 10 – 11, 2005.

During the last one and a half years the IERS Working Group on Combination has been coordinating the steps towards a set of IERS combined products. The solutions are based on a rigorous combination of "weekly" SINEX files produced by intra-technique combinations within the Technique Centres. The new products resulting from these combination procedures are expected eventually to replace a considerable part of the current IERS products.

The workshop brought together nearly 60 experts from the fields of Terrestrial Reference Frame (TRF), Celestial Reference Frame (CRF) and Earth Orientation Parameters (EOP) to discuss the combination and validation strategies, the present status of combined intra- and inter-technique products, their development and adoption in the future.

During the first day two sessions took place – Session 1: Multi year solutions: ITRF200x/local ties, chaired by Z. Altamimi and D. Angermann, and Session 2: Weekly solutions: station coordinates, non-linear station behaviours, systematic effects, etc., chaired by E. Pavlis and R. Biancale.

Session 1 was devoted to the review of the status of the ITRF2004 being under development, the analysis of the submitted time series and the discussion on future plans for the ITRF solutions. The recommendations of the past IERS workshop on combination held in Munich in 2002 were also reviewed in this session, and in particular those relevant to the ITRF solutions. As far as the ITRF2004 is concerned, the call for participation issued in December 2004 descripts the background, the requested time series solutions, the analysis strategy as well as the expected main results of the ITRF2004.

Session 2 of the IERS Workshop focused on the problems and issues faced by all techniques in striving to deliver timely weekly products of high and consistent quality. The status of the process within each space technique, the way each of them has attempted to address and solve the requirements were presented together with comparisons of homogeneously reprocessed GPS and VLBI long time series and investigations about the stability of origin, scale and orientation of space-geodetic terrestrial reference frames.

The next day three sessions completed the workshop – Session 3: EOPs: Multi-year solutions, current analysis, weekly solutions, rapid products, chaired by D. Gambis, J. Vóndrak, and W. Wooden, Session 4: Comparison / validation with other time series, chaired

by R. Gross and T. van Dam, and Session 5: Status of projects, future products and structure of the IERS, chaired by C. Ma and M. Rothacher.

The first session on October 11 addressed the different Earth Orientation Parameter (EOP) products that are currently computed and made available for various applications. These products include long-term and current analysis series as well as rapid series and predictions. Since the 1970s, these time series have been derived from the combination of individual astro-geodetic techniques, Very Long Baseline Interferometry (VLBI), Lunar Laser Ranging (LLR), Global Positioning System (GPS), Satellite Laser Ranging (SLR), and Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS). Previously, the time series were based on astrometric observations for many decades. The ultimate objective of combination is to derive EOP time series taking advantage of the qualities of the various techniques after removing the instabilities and systematic behaviour of each individual technique. The resulting series must have the following characteristics: continuous, given at equidistant intervals without any gaps, homogeneous, stable at the various time scales with negligible systematic errors. Six presentations and two posters addressed the issues in detail.

In Session 4 the focus was on the comparison and validation of time series originated from different space techniques versus other time series or models. The problems were addressed by using different epochs, constraint and unconstraint solutions and by comparing which models give sufficient information for independent investigations.

The last session summarized the topics of the previous ones and pointed towards a generation of a new set of rigorously combined IERS products. This would also necessitate, to a certain extent, modifications in the structure of the IERS and its components. To achieve the highest accuracy and consistency for future IERS products, it is crucial to proceed towards a rigorous combination of all the parameters common to more than one space geodetic technique. Such a combination of techniques should eventually be performed for all the major products of the IERS, from multi-year solutions for reference frame realizations generated on, e.g., a yearly basis, to near real-time products such as EOP estimates produced on a daily basis. More details were given by contributions of the heads of the IERS Earth Orientation Centre and of the ITRS Centre, as well as by the IERS chair and the analysis coordinator.

The detailed programme of the workshop, summaries and presentations are available at

<http://www.iers.org/MainDisp.csl?pid=66-25725>.

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