

3.3 Analysis Coordinator

Activities towards Future IERS Products

The analysis campaigns and pilot projects (IERS SINEX Combination Campaign, IERS Alignment Campaign, IERS Combination Pilot Project, IERS Long Time Series) during the last few years revealed that the IERS, as a service for data and products concerning Earth orientation/rotation and reference systems, cannot fully satisfy the demanding users in geodesy and geodynamics with the products presently available. The main goal for all the IERS products must be to reach as much consistency as possible between the products, especially between Earth orientation parameters and terrestrial and celestial reference frames. In order to achieve this goal, it is not adequate any longer to derive the official IERS products ITRF, ICRF and EOP independently from each other.

A first step towards more consistency is the IERS Combination Pilot Project (CPP) that started already in 2004 (see the IERS Annual Report 2004 for more details). The intention of the CPP is to derive combined inter-technique solutions on a weekly basis including at least station coordinates and Earth rotation parameters. The major achievement of the CPP up to now is that each of the technique services (except IDS) provides a combined solution based on the weekly SINEX files of the individual analysis centres on a routine basis. Unfortunately, the next step, i.e., a weekly inter-technique solution generated routinely is not yet realized.

Another step to make available consistent reference frames and EOP is the generation of the ITRF2005. ITRF2005 will contain station coordinates, velocities and daily pole coordinates altogether for the first time of an ITRF solution.

Both of the new developments within the IERS mentioned above match perfectly into the four different types of future IERS products that are thought to be fully or partly realized within the next years:

- Multi-year solutions for consistent ITRF, EOP and ICRF
- Weekly final solutions to generate combined EOP series on a routine basis
- Daily rapid combined solutions for EOP
- Predicted EOP for real-time users based on combined products

The ITRF2005 belongs to the first type of new products listed above, although it is restricted to a combined solution with only a subset of the five EOP. Nevertheless, a yearly or 2-yearly update of such long-time series is very important in order to:

- Include the data from the most recent year (especially for improving the coordinates and velocities of more recent sites and for generating highly consistent and accurate EOP series including the latest year)

- Take into account the improvements in the data analysis concerning the modelling
- Allow for improvements in the parameterization
- Combine additional common parameters, e.g. troposphere zenith delays

In order to bridge the time span between the latest and the forthcoming multi-year solution, the weekly final solutions should be generated as a second new product type. They coincide in principle with the inter-technique combination in the CPP. Their main purpose is providing accurate combined EOP estimates that can be used as a consistent continuation of the latest multi-year solution.

A further reduction of the time delay of IERS combined products can be achieved by providing daily rapid combined solutions. It became obvious that there is a need for monitoring the EOP, the terrestrial reference frame and especially the individual station coordinates in near real-time (Earthquakes, tsunamis, ...). At the moment, the IGS is the only service generating rapid products. But in the context of daily rapid solutions, the VLBI intensive sessions are of great interest, e.g., for combining them with the already existing IGS rapid products (contribution of UT1 by VLBI).

The fourth product type is not completely new, as the IERS already provides predicted ERP time series. However, in future, the prediction should be based on the combined rapid inter-technique solutions or at least on the rapid technique-specific solutions instead of the confusing mixture of solutions belonging to different combination levels. Furthermore, as a long-term goal, it should be envisaged to provide daily updated predictions in order to increase the timeliness.

The main characteristics concerning parameter types, latency, generation cycle and computation strategy of the planned future IERS products are summarized in Tab. 1.

It is clear that the present structure of the IERS may have to change, if the IERS undergoes the change from the actual products to the new product types explained above. Especially the division into separate product centres for ITRF, ICRF and EOP will become meaningless if the transition to combined products is fully performed. Therefore, the establishment of "IERS Combination Centres" is proposed for the routine generation of the new IERS products.

The plan for future IERS products and an adapted structure of the IERS components has been presented at the IERS Workshop on Combination at GFZ Potsdam in October 2005 by the IERS Analysis Coordinator together with the chair of the IERS Directing Board (see IERS Technical Note 35).

Meetings and Workshops on Combination Issues

- 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

Table 1: Four different types of future IERS products.

Product Type	Main Parameters	Generation Cycle	Maximum Latency	Based on
Multi-Year	ITRF EOPs ICRF	Yearly	Maximum 1 year	Reprocessed high-accuracy combined long term intra-technique series
Weekly "Final"	EOPs Station Coordinates	Weekly	2 weeks	Based on the "final" routine intra-technique combined products and the multi-year solution
Daily "Rapid"	EOPs Station Coordinates Troposphere Param.	Daily	1 day	VLBI Intensives and IGS Rapid Products and ...
Daily "Predicted"	EOPs	Daily	1 day	Combined daily rapid IERS products

Markus Rothacher, Daniela Thaller, Robert Dill