

## 3.3 Analysis Coordinator

**1. Introduction** In this report we outline the activities of the Analysis Coordinator during 2013. The main activities were running and summarizing the IERS Retreat held in May 2013 and planning the Unified Analysis Workshop to be held 2014 in conjunction with the IGS Workshop. The future of the leap second continues to be addressed with no clear resolution to either retain or do away with them.

**2. Summary of 2013 IERS Retreat** The full details of the IERS Retreat are summarized later in this annual report (see Chapter 4.2). Here we briefly note the sessions and recommendations from the sessions.

*Session 1: Move towards “real-time” products*

The main recommendations were assessments of the accuracy and latency of real-time eVLBI and SLR EOP products and how these may be improved by being coupled to GNSS analyses. It was also recommended that the sensitivity of GNSS results to EOP prediction errors be determined.

*Session 2: Rigorous combined products*

The recommendations from this session focused on ICRF/ITRF consistency and the level to which this consistency is needed. Studies are also recommended to evaluate the impact of adding GPS gradient and atmospheric delays to the analysis of the VLBI intensives to how this processing effects biases and noise in the intensive UT1 estimates. Combinations at the observation level are expected to be submitted to ITRF2013 and these combinations can be used to determine the potential improvements afforded by combinations at the observation level. Differences between the IGS ultra rapid EOP estimates (generated with constrained site coordinates) and the final estimates (generated with minimal constraint approaches) are to be investigated by the IGS.

*Session 3: Long-term stability and parameterization of the reference frame*

A number of studies are recommended to look at extended position parameterizations (e.g. log post-seismic functions), how to best incorporate loading into the reference frame and the effects of GNSS antenna effects. The session also requested the development of methods to allow easy comparison of time series. The format definition study group report on this subject appears later in the report.

#### *Session 4: Next Generation of models and Center-of-Mass products*

Activities here would be carried out by the Global Geophysical Fluids Center in generating possible models for these products and assessing possible secular motions of the center of mass relative the center of figure. Secular motion of the pole and its impact on the pole-tide corrections are also be studied.

#### *Session 5: EOP prediction improvements*

The IERS product centers should look into formats and methods for delivering real-time EOP values. There should be continued studies of the impact of incorporating atmospheric and oceanic angular momentum results into the predictions. The benefits of ensemble averaging of current predictions will also be investigated.

#### *Session 6: Unification of product formats*

There is strong consensus that uniform EOP formats including web 2.0 (xml formats) should be developed. A machine-readable leap second format should be made available as soon as possible as well. The IAG position time-series-format working group should continue. A draft report appears in this annual report.

#### *Session 7: Mechanisms for IERS evolution*

Current Terms of Reference were reviewed and update to these will need to be addressed by the DB.

### **3. 4th Unified Analysis Workshop Preparation**

This workshop will be held in Pasadena, June 27–28, 2014. Discussions within the community and the services have lead to the following issues to be addressed. These topics are not presented in any specific order.

- (1) ~1 ppb scale difference between VLBI and SLR. This issue is critical to the ITRF realization and should be addressed as thoroughly as possible.
- (2) Antenna phase center models for DORIS systems. The recent implementation of phase center models for the DORIS ground transmitters has increased the scale difference between DORIS results and the ITRF2008 scale. It is likely this difference will persist with ITRF2013 as well.
- (3) Time variable gravity field effects (DORIS LEO satellites). Although the IDS raised this issue, it also has impacts on the ILRS and even GNSS orbits could be affected by time variable low degree gravity field coefficients.
- (4) Sub-daily loading and S1/S2 loading. Two issues are involved here (a) the coefficients of the S1 and S2 loading signals and how they vary during the year and (b) the

effects of any remaining sub-daily variations after the S1 and S2 terms are removed.

- (5) Update time scales for atmospheric and hydrographic loading: Frequency dependence and signal to noise ratio of loading?
- (6) Diurnal and Semidiurnal EOP variations. Impact of new models available from the IVS and how these model impact geodetic parameter estimates.
- (7) EOP parameterization for high-time resolution representation: Is piece-wise linear adequate for current accuracies?
- (8) Collocation issues: Ground and space based: Assessment of where we stand at the moment.
- (9) Monument stability (Large and small, physical and electrical): UNAVCO and NASA SGP have been studying this issue and there are measurements that try to address this issue.
- (10) Intersystem observations (e.g. VLBI of satellites, SLR of GNSS systems): Assessment of current status, future prospects and likely impacts on geodetic parameter estimates.
- (11) Error models for data and parameter estimates: What are the impacts and best methods for determining correlations within and between geodetic systems and how do account for these correlations so that error estimates on geodetic parameters are more robust and realistic.
- (12) Unification of gravity contributions: How do we start addressing the integration of gravity services with the geometric services to ensure consistent models and results.
- (13) Combination at the Observation (CIO) level results. Update on current status and long-term impact of these approaches.

#### **4. Discussions of the future of Leap Seconds**

The future of the leap second and their future treatment still remains under discussion with no universal consensus forming.

*Thomas Herring*