

November 8, 2017

**ILRS Quality Control Board (QCB)
Telecon
October 18, 2017**

Next meeting: Wednesday, November 15 at 14:00 UTC, 09:00 EST, 14:00 in UK; 15:00 in Central Europe; 23:00 in Japan.

The text in red are the areas that we discussed. The other areas are unchanged.

Participants: Carey Noll, Erricos C. Pavlis, Matt Wilkinson, Frank Lemoine, Toshi Otsubo, Horst Mueller, Frank Lemoine, Tom Varghese, and Mike Pearlman

Data Systematics Pilot Project (Erricos)

GRGS and NERC are working to provide their input. No word from ESA. All of the reanalysis submissions need to be updated to include the new linear mean pole. The process is in place to move ahead with the operational version in early 2018. The results will be uploaded to the web. If solutions from GRGS, ESA, and NERC appear before the end of 2017, they can be tested and added later.

Aggregated stations range biases have been estimated by the Systematic Pilot Project for the period 2005 – 2008, using the inputs from the five participating AC's. The effect of these biases is to substantially reduce the 1.4 ppb gap in scale between the SLR and VLBI.

Recent computations for the center of mass corrections for spherical satellites recently presented by Jose Rodrigues at Potsdam and Riga, show an offset of as much as 2-6 mm from our current posted values. Tests by Horst and others show that use of these presented values would also substantially close the 1.4 ppb scale gap with VLBI. The formal write-up explaining the process of his computations, however, will be not ready until at least mid-2018, so we are constrained to use the current posted values until these newly presented values can be carefully scrutinized.

It's quite possible that both approaches are making similar corrections but via different avenues.

It should be noted that reference frame models derived by DGFI and JPL do not show the offset in scale.

We obviously have some issues here that need to be resolved.

Web Based Station Performance Tool (Erricos)

The beta version of this tool is ready for testing (<http://geodesy.jcet.umbc.edu/QC/>).

The official transition date to the SLRF 2014 was mid-June 2017. Some of the QC ACs have re-analyzed the data using the new TRF (SLRF2014):

- JCET (since 2012)

- DGFI (since 2003)
- HITU (since June 2016)
- SHAO (since 2014, not yet submitted)

Since the long-term statistics that are reported in the Performance Cards, are the average RMS for each site over the previous year (the short-term is only based on the last three months), we need to have at least a full year prior to the transition date (June 15, 2017) processed with SLRF2014.

ACTION: We should check with the Russians and the Chinese on what they have done in this transfer to TRF 2014.

Nothing new on the CODE reports that show an SLR offset from the Galileo 201 and 202 orbits at both Yarragadee and Herstmonceux of about 5 - 6 cm. The offset could be satellite center of mass, but this seems rather large. This may not be noticed at other stations due to limited data.

The Web Based Station Performance Tool will provide users (analysts and missions) with a basis for comparing QC results over time and making standardized reports that can be interpreted by station personnel and augmented with highlights and recommended actions. Stations may also find these results useful in monitoring data stability over time.

Site Logs (Carey)

NASA is reviewing all of its site logs for accuracy. An updated site log has been drafted including many of the comments that have been suggested to provide more relevant information. The draft has been circulated to the DF&P SC and the N&E SC for review. A meeting will be organized in Riga (either at the DF&P SC or the N&E SC meeting) to try to bring this to closure. We have asked Randy to help with the coordination.

Christian has developed an on-line tool to change/update site logs. This will be reviewed at the DF&P SC meeting.

Range Dependent Errors (NO CHANGE)

Horst still does not see any significant range dependence biases. However, it looks the CoM corrections for the spherical satellites have noticeable errors, in some case due to improper correction for station configuration that may be changed during operations. Some issues may run from mm's to cm's in some cases. One question is whether we are properly noting the configuration changes on the CRD's and whether anybody is looking at them. Also at the Etalon level, system noise may be masking some issues.

Erricos will deal with this topic in the Analysis Standing Committee meeting on October 1 in Riga.

Full-Rate Data

We need to define the requirement for FR data on the whole constellation of ILRS satellites; do we need everything? FR volume from the KHz systems could be a burden but if they heed to the 1000-point rule, it should not be a problem. Another topic for Riga.

Tom Varghese will take a look at this and we will decide if we need a study activity,

Normal Point Tests

Horst has been trying to validate that normal point calculations at the station are done in a consistent manner by computing NP's from existing FR data and comparing them with the station provided NP's. Maybe we will get a reading from him in Riga.

In NP tests with Mount Stromlo the Horst found that the NP's he computed from the FR data showed some strange structure which was traced to the low precision truncation in the epoch data. This was a software issue and had no effect on the data stream NP's.

Matt has been rewriting and updating the Herstmonceux reduction software in Python to form full rate and normal point data from raw ranges. The software reads full rate FRD files or raw epoch-range files and can work with any SLR station. This software could be made available to other stations as an example procedure for comparison with the station's preferred method. Unfortunately, not many kHz stations are submitting full rate data. Matt has looked at some of the FR data from Changchun, which he said looked tightly clipped.

Erricos suggested looking at historical Jason-2 FR data that were recently delivered by several additional stations in support of the T2L2 experiment for time-synchronization of the ILRS network.

Horst will continue this work and report their results at the DFPSC meeting in Riga.

Low Elevation Data Modeling (NO CHANGE)

Horst is looking at the available low elevation (below 20 degrees) data on LARES to see the influence on station height and pass bias. A few stations (MOBLAS-5, MOBLAS-5, Changchun, Matera, and Graz) can track down to 10 degrees. JCET has cataloged all LAGEOS, LAGEOS-2 and LARES data from 2008 to present and generated annual histograms of the data distribution in elevation, the min and max elevation reached and the pass duration. Another option with a lot of data is Ajisai.

Horst has compared 30 deg horizon with 5 deg horizon on the small amount of data that has been forthcoming. At 5 deg there is a slight improvement in the separation between height and range bias?

Horst will continue working the low elevation data analysis and report at the DFPSC meeting in Riga.

Data Population on LAGEOS and Other Satellite Passes

Some stations (mainly NASA) submit their data in pass segments and some combine segments into passes. To the analysts, it makes no difference, but it can lead to inconsistencies in the

formulation of data yield. Carey is working in software at CDDIS to combine pass segments into passes.

Changchun appears to have increased the length of LAGEOS passes in response to our request.

The Study Group tasked with recommending new criteria for evaluating (and rewarding) station performance (than just pass numbers and estimated biases) is preparing a discussion for the Riga Workshop.

We should also look into how much the posted priorities influence that tracking schedules and procedures at the Stations. Georg Kirchner has agreed to lead this discussion at the Riga workshop.

Station Tools

We need to define tools/procedures/suggestions to help the stations detect system problems on-site, and to address issues when diagnostics are received from the QC process. Matt has started discussion on this within the Networks and Engineering Standing Committee; input from the stations on practices that they use might be useful.

Matt has established the on-line forum tool. It currently has about 70 members. Some messages have already been posted. Take a look.

Other Topics

In our 1 mm long-term interest, it probably is a good idea to do a rigorous component-by-component examination of the SLR systems, trying to understand all error sources in measurements. We should discuss this with Ivan Prochazka.

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