

August 18, 2021

**ILRS QCB Meeting
August 10, 2021
Virtual Meeting
Next Meeting October 5, 2021
9:00 am EDT (13:00 UT)**

Participants

Erricos Pavlis, Peter Dunn, Van Husson, Mike Pearlman, Randy Ricklefs, Toshi Otsubo, Claudia Carabajal, Frank Lemoine, Tom Oldham, Tom Varghese, Jason Laing, David Sarrocco, Stefan Riepl.

The charts from the meeting are available at
<https://ilrs.cddis.eosdis.nasa.gov/science/qcb/qcbActivities/index.html>

See the charts for more detail.

Agenda

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| 1. Update on SLR ITRF 2020 submission | Erricos (10 min) |
| 2. Recent contacts with stations on barometers and procedures. | Erricos (10 min) |
| 3. OrbitNP vs station generated results | Van, Peter, Randy, etc. (20 Min) |
| 4. Barometric sensors used in the network along with their specifications
(e.g. accuracy, long term stability). | Van (10 min) |
| 5. Comparison of meteorological data from the 2 stations in Hartebeesthoek. | Van (10 min) |
| 6. Status of the Wiener Filter activity | Stefan (10 min) |
| 7. Status of the SOS-W | Stefan (10 min) |

The times are suggestions; there is sufficient time for discussion. We can rearrange topics if appropriate.

Meeting adjourned at 11:45 am.

Status of the ILRS ITRF contribution (Erricos)

UMBC has completed its analyses of the pre-1993 data; Awaiting results from ASI; target early September

Recent Contacts with Stations on Barometers and Procedures (Erricos)

Erricos reviewed the latest summary of the current site logs for all active SLR stations to identify which of these listed more than one barometer on site. Some had proper "Installation date", but a blank "Date removed", so it had to be clarified that this unit was still in operation. Clarification was requested; all stations, except Simiez, replied almost immediately.

The stations in Simiez, Kunming, Mt Stromlo, Graz, and NRL have two or more barometers on site; all other have one. (see details in Erricos' Charts)

Randy and Christian should suggest how we might document barometer redundancy in the site logs.

Progress on Matt's OrbitNP program (Randy)

Randy talked with Matt on Monday on the status and plans for his orbitNP normal pointing program. Some of the results are as follows.

1. Matt is finishing work on a new beta version of the program, which he will send to me Friday. I'll rerun the January 2020 data and check for any changes. None are expected. Matt intends to make the new version available to the ILRS in 1-2 months.
2. The new version includes additional filtering options including two stages of filtering.
3. OrbitNP has some issues with the huge number of returns from some of the Graz Ajsai data, which Matt is exploring.
4. CPF v2 and CRD v2 changes need to be incorporated.
5. We discussed Peter's request to be able to re-process pre-CPF and pre-CRD data. Merit II full rate data can be handled simply through a script that would create an alternative data flow that orbitNP is set up to handle. The old TIV predictions would have to be converted into CPF files, either on-the-fly during processing or as a batch for all the TIVs. IT could be built from the old UT interpreter for TIVs. The question is: Is this reprocessing option important enough to spend the time and effort on?

Jan 2020 LAGEOS-1 Normal Point (NP) Comparison OrbitNP vs Station Generated NP's; Aug 2021 (Van/Peter)

1. NP range comparisons between OrbitNP and the station were sub-mm for the high performing ILRS stations
2. There appears to be missing full-rate data from select stations near the beginning and the end of January 2020
3. Two stations (1824 Golosiiv and 7824 San Fernando) didn't remove the system delay in their full-rate data, although their H4 header record indicates that the system delay was applied
4. The mean epoch of station 7827's (Wetzell) normal point bins is based on the epoch with the smallest full rate residual and is therefore not in compliance with the Herstmonceux NP definition: there is no need for this issue to be fixed.

5. There is no recommended standard peak minus mean algorithm, but this value can be simply computed from the recorded normal moments, as shown in the ILRS definition of normal points (Sinclair et al. 1984).
6. OrbitNP smooths a histogram then finds the peak by fitting tangents to points near the max point of the curve and chooses the flattest, a standard recipe for Peak-Mean.
7. OrbitNP sometimes has issues computing the higher moments (skew and kurtosis) for the leading-edge systems
8. OrbitNP does not appear to compute independent session (50 record) higher moments (RMS, skew, kurtosis) and peak minus mean
9. We could use this same analysis technique to qualify CRD V2 NPs by comparing CRD V1 and V2 station generated NPs from different satellites.

From the charts presented by Van, several stations displayed issues that could be easily remedied; Van will contact the stations to see if some of these can be addressed.

A working group including Peter, Van, Stefan, Tom V and Tom O has been formed to examine ways of isolating systematic errors. We should expect a clever name for this WG.

Post Meeting Comments

From Randy:

In answer to a couple of questions from the QCB meeting, I checked the orbitNP code and a couple stations' data'

The station 1824 and 7824 full rate pass "H4" headers' "Station system delay applied indicator" is set to "true" (1). From what Van showed at the meeting, it looks like the stations are not applying the system delay despite the flag. In addition, orbitNP does check the "Station system delay applied indicator," and acts accordingly.

I also checked the "50" session statistics record handling in orbitNP. If there is a "50" record in the full rate data, it is copied to the normal point without change. If there is no such record, one is created and written. Maybe this procedure should be rethought?

From Van

I agree with Randy's comments. I checked the H4 records after our meeting and they were set to applied. I will check some recent full rate from those two stations and see if the system delay is applied by comparing the full rate to their NPs. If this issue still exists, I will contact the stations.

I vote for OrbitNP to compute independent 50 session statistics.

From Peter

I agree with Van that orbitNP should compute independent statistics.
The program could copy each field from the standing record which cannot be recomputed.
And put all this out in the right format!
The stations would then have examples of complete records in correct form and format.
A picture is worth a thousand words (attached).

PS. A further orbitNP development would be to use the already computed normal points to start the orbitNP nmpt fit; they are all out there, even if the orbit predicts are not.

From Erricos

We have been devoting oodles of time in discussing how “peak minus mean” is computed, by who, etc. however, I have never seen to this day HOW this quantity is used and for what! It’s not a formal statistic, it’s a heuristic measure of skewness, and since we ask that all stations deliver skewness and kurtosis with their data, I fail to see what is all this fuss about getting the right definition for P-M...

Status of Wiener Filter activity (Stefan)

Stefan has the automated system configuration scanning in process, including graph visualization (GANNT) and retrieval of electronic data processing parameters. Data modeling for Wiener Filter transfer function identified four configurations used by ILRS core stations, which require different modeling strategies in terms of reference point: single photon data from APD, MCP-PMT multiphoton systems, SPAD systems, and PMT and novel MCP-PMTs with novel discriminators.

Status of the SOS-W

SOS-W has been inactive since January 2021 due to guiding camera failure (and connected procedures), software, air conditioning, laser and telescope issues. Remediation work is underway; expect the system to be operating in September 2021.

Next ILRS QCB Meeting is set for October 5th, 2021, 9:00-11:00 EDT (13:00-15:00 UTC).