ILRS QCB Meeting
November 24th, 2025
9:00 – 11:00 AM EST (13:00 UTC)
Next QCB Meeting: March 18th, 2026

Participants: Van Husson, Stephen Riepl, Franck Reinquin, Matthew Wilkinson, Graham Appleby, Mike Croteau, Frank Lemoine, Magdalena Kuzmicz-Cieslak, Peter Dunn, José Carlos Rodríguez Pérez, Antonio Basoni, Tom Oldham, Alexandre Belli, Peter Dunn, Julie Horvath, Randy Ricklefs, Claudia Carabajal

Agenda:

Jose Rodriguez:

- YEBL QC 2025 and1064 vs 532 nm
- Analysis of the apparently anomalous estimation of YARL height

Van Husson:

- Noisy ITRF2020_u2024 Core Station Heights
- VMF News
- Yarragadee (7090) Etalon Range Bias Investigation
- MEO Signal Strength Investigation
- Review of QCB Action Items

Claudia Carabajal/Mike Pearlman:

- ILRS CB updates

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Notes from the Meeting:

Jose Rodriguez: see "20251124.IGN-Yebes.YEBL_QC.pdf" presentation: "YEBL QC 2025 and1064 vs 532 nm."

The Yebes stations, 7817 YEBL, passed the quarantine with data taken at the wavelength of 1064 nm. The station can range at 532 nm, but there is no formal process in the ILRS to check the performance of stations firing at alternative wavelengths. As agreed at the QCB, currently the validation consists in an informal assessment by the ASC, i.e. no official metrics are in place to assess the alternative observations. With the purpose of providing these data, the station has operated at both wavelengths from August to November 2025, and the data collected analysed by the AAC IGN-Yebes. The results show no differences in the distribution of residuals, and the range biases are comparable. IGN-Yebes has computed preliminary values for the centre of mass corrections for the two wavelengths, which have been found satisfactory in light of the estimated range biases. Other tests that confirm the good behaviour of the station were conducted (absence of time of the day and satellite elevation effects).

The station requests permission to upload the observations in gree, which have already helped to uncover a potential problem in the calibrations of three other similar stations. The QCB confirms that there is no quarantine process to be followed for secondary wavelenghts, and that a simpler assessment of the data is due. Magdalena Kuzmizc-Cieslak, from JCET, offered to do this once the data is sent to her, together with the provisional centre of mass corrections computed by IGN-Yebes.

José will share the data with Magda and the NASA/UMBC/JCET AC.

Jose Rodriguez: see "20251009.IGN-Yebes.Analysis_7090_heights.pdf" presentation: "Analysis of the apparently anomalous estimation of YARL height."

At the previous QCB meeting Van Husson reported the presence of a seemingly anomalous behaviour in the height time series of Yarragadee station. This coincides with the directive in the

ASC Data Handling File (DHF) to estimate range biases (mandatory range bias estimation), which prompted a discussion on the strategy followed by the ASC. José Rodríguez performed an analysis of the data for the 2018-2015 time period, exploring several configurations of the solution in terms of the application of the DHF and the estimation of range biases. What transpires is that the apparent height anomaly is present in the solutions with range bias estimation, and it only appears anomalous because of the sudden change from the period when biases are not estimated to the period of so-called mandatory range bias. However, there is no difference of any kind between estimating range biases and the DHF "mandatory range bias estimation"; these are one and the same analysis strategy, consisting in the simultaneous estimation of station positions and range biases, resulting in unbiased coordinates (in principle).

The results show that when biases are not estimated, the coordinates time series are much less noisy and apparently well behaved. But in fact, even when the DHF is (unjustifiably) extended to the whole period of analysis, in these solutions there appear spurious negative velocities in the height component of the positions. The additional negative velocities are caused by the failure to accommodate significant positive range biases at the station, which bias the station height, particularly in the last period. The ASC strategy is found to be sound, although questions remain about the specific criteria employed to decide when bias must be estimated, and how to deal with the potential discontinuities between periods when biases are either estimated or applied from the DHF.

Estimating biases implies arriving at an unbiased solution. ACs are already estimating biases, and ASI is using that data. Antonio Basoni pointed out that for ILRS products: v280 estimates RB for all station/satellite (LAGEOS and Etalon); v320 estimates RB for all stations/satellites (LAGEOS, Etalon and LARES-2) all at EDC /test folder.

Frank Lemoine pointed out that the EOST Loading Service estimates loading for the atmosphere, hydrology and oceans, which are not modeled. This may be affecting the bias estimations. RBs should be estimated on a regular basis.

Graham said RBs are separated from heights, not removing geophysical signals when you are doing estimates on the long term. Spurious heigh changes in YARL are not as pronounced.

Alex sees a negative trend after 2021. He used the summary file available online.

Peter Dunn expressed concern that 7090 YARL ITRF2020_2024 Up Residuals (Velocity Removed) could fall into the wrong hands. If they applied the estimated biases to the data, it will be a better solution.

Van Husson: see “Noisy ITRF2020_u2024 Core Station Heights” presentation.

Of the current sixteen active ILRS core sites, six have been assigned Mandatory Bias Estimation (MBE). The heights residuals when MBE is applied increases random scatter and larger error bars for five of these six sites, except for Yarragadee (7090).

Updates Changchun (7237) LAGEOS(-1,-2)/LARES(-1,-2) Center of Mass (CoM) corrections for when they implemented a Leading Edge (LE) filter on 19-Dec-2023 and 28-Jan-2024; respectively. (Action; Jose)

Provide a DHF frequency correction (-4.2E-09) for 7124 THTL for the period 17-Apr-2018 to 30-May-2019. (Action; Van)

Van Husson: see "VMF News" presentation.

The VMF3o time series were retroactively updated in August 2025 based on more accurate station heights and the addition of six new SLR sites.

Van Husson: see "7090 Etalon Range Bias Investigation" presentation.

The 7090 Etalon Range Bias changed on 21-Oct-2023, when a new amplifier was installed in the secondary receive chain. The differences between the old and new amplifier were presented. Based on 7090 system characterization ground tests, the change in range bias was not caused by a calibration error but instead was caused by a change in the Etalon CoM correction due to the ability to now trigger on single photoelectrons.

The NASA MOBLAS systems at YARL, GODL, MONL, THTL and HARL need to update their respective site logs for when the new amplifier was installed in their system. (Action; Each MOBLAS station). Once the site logs have been updated, the 7090, 7105, 7110, 7124 and 7501 Etalon Center of Mass (CoM) corrections need updating. (Action; Jose)

Van Husson: see "MEO Signal Strength Investigation" presentation.

Based on this analysis, LAGEOS-2 and LARES-2 signal strengths appear weaker relative to LAGEOS-1 and LAGEOS-2 signal strengths have degraded over time.

Van Husson: see "QCB Action Items" presentation.

7210 HALL Actions

Update the Data Handling File (DHF) to delete 7210 between 1-Jan-1983 and 21-Jan-1994 or solve for a frequency error (Action; NASA/JCET AC; Status: Open) and then update the DHF accordingly. (Action: ASC)

Provide 7210 barometric corrections for the DHF. (Action: Van Husson; Status: Open). Then new 7210 range biases need to be computed (Action: Each AC; Status: Open). Then based on the new range bias estimates update the DHF (Action: ASC; Status: Open)

7080 MDOL Actions

Analysis Centers (ACs) to check their software to ensure any elevation (tropospheric), range (frequency) or range-rate (epoch) dependent biases in the DHF are applied *a priori*. (Action: Each AC; Status: Open)

Update the DHF based on the 7080 barometric corrections listed in Appendix A below. (Action: ASC; Status: Open)

7105 GODL Actions

Update the 7105 start date from day 20:047:00000 to 20:227:00000 for Satellites 51, 52, 53, and 54 in the DHF. (Action: ASC; Status: Open)

Replace the existing 7105 barometric corrections in the DHF with the 7105 corrections provided in Appendix. (Action: ASC; Status: Open)

7501 HARL Actions

Remove the optional 7501 HARL -66 mm range bias corrections in the DHF and add a new entry to delete all 7501 data between 12:071:00000 and 12:099:00000 due to range bias instability. (Action: ASC; Status: Open)

Compute a 7501 LAGEOS-1 and LAGEOS-2 fixed range bias for the two periods 00:219:0000 to 12:071:00000 and 12:099:0000 to 17:050:00000 and update the DHF. (Action: ASC; Status: Open)

Determine if 7501 LAGEOS (-1,-2) range biases can be computed for the MTLRS occupation in early 1993 and if not, consider deleting this data in the DHF because it may negatively influence 7501's height rate. (Action: ASC; Status: Open)

7110 MONL Actions

Reanalyze the 7110 LAGEOS (1,2) and Etalon (1,2) data since19-Aug-2001 using the updated 7110 Center of Mass (CoM) corrections (version 220915) and the 2011 update to the 7110 system eccentricities (Action: Each AC; Status: Open) and then update the 7110 ranges biases in the DHF. (Action: ASC; Status: Open)

7119 HA4T Actions

Update the 7119 end-date of the LAGEOS-1 and -2 range bias entries of +9.9 and +10.9 mm; respectively, from 00:000:00000 to 25:089:25200. (Action: ASC; Status: Open)

New Etalon Range Bias Estimation Actions

Compute new Etalon range biases for 7090, 7105, and 7110 starting on 21-Oct-2023, 02-Jul-2022 and 28-Mar-2023; respectively (Action: Each AC; Status: Open) and update the DHF accordingly (Action: ASC; Status: Open)

Claudia Carabajal: see "ILRS_QCB_11242025_Claudia.pdf" presentation for details on activities reported.

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Table 1. History Log Voids by Station (2025.11.25)

Station Location	CDP #	Time Gap(s)*				Last entry
Kiev	1824	000120-080302	080402-110515			141010
Komsomolsk	1868	NO DATA				
Simeiz	1873	NO DATA				
Mendeleevo	1874	NO DATA				
Altay	1879	NO DATA				
Riga	1884					250315
Arkhyz	1886	NO DATA				
Baikonur	1887	NO DATA				
Svetloe	1888	NO DATA				
Zelenchukskaya	1889	NO DATA				
Badary	1890	NO DATA				
Irkutsk	1891	NO DATA				
Katzively	1893	NO DATA				
Yarragadee	7090					251024
Greenbelt	7105					251122
Monument_Peak	7110					250414
Haleakala	7119					250330
Tahiti	7124	020825-080414	130321-191022			230520
Changchun	7237	950101-970802	020714-051002	180410-210106		251023
Beijing	7249	881101-940301	940301-981116	981116-211013		240923
Tsukuba	7306					240919
Sejong	7394	NO DATA				
Wuhan	7396	NO DATA				
Arequipa	7403	920718-951023	951023-981130	981130-010523		200629
San Juan, Argentina	7406	NO DATA				
Brasilia	7407	NO DATA				
Hartebeesthoek_HARL	7501	020409-081105				250916
Hartebeesthoek_HRTL	7503	NO DATA				
Izana	7701					230406
Zimmerwald_532	7810	030905-060203	080715-100901			250805
Borowiec	7811	030329-071227	080205-131218			211005
Kunming	7819					241208
Shanghai_2	7821	140222-170315	170720-190811			231113
San_Fernando	7824	900703-930222	971216-010124	090302-110601	180801-210518	250122
Mount_Stromlo_2	7825					210901
Wettzell_SOSW	7827	140501-160511	160511-190528	200424-230607		250319
Simosato	7838	900701-950810	950810-991007	991019-040701	080401-181212	211209
Graz	7839	150504-190311				241009
Herstmonceux	7840					240109
Potsdam_3	7841	040906-081026	081026-110501	170303-200303		250422
Grasse_MEO	7845	010601-200818				240517
Matera_MLRO	7941	140902-171204	171206-210629			250521
Wettzell	8834	980720-001012	001012-090324	090324-131021	170407-190604	240605

* Assuming at least 2 year data gap

Status 2025.11.26