ILRS QCB Meeting
September 29th, 2025
9:00 – 11:00 AM EST (13:00 UTC)
Next QCB Meeting: November 24th, 2025, 09:00-11:00 AM EDT (14:00 UTC)

Participants: Van Husson, Matthew Wilkinson, Graham Appleby, Magdalena Kuzmicz-Cieslak, Frank Lemoine, José Carlos Rodríguez Pérez, Alexandre Belli, Mike Pearlman, Peter Dunn, Julie Horvath, David Sarrocco, Antonio Basoni, Randy Ricklefs, Claudia Carabajal

Agenda:

Peter Dunn:

- The Blue Band; a cautionary tale

Van Husson:

- Data Handling File Updates and Systematic Errors
- 2024 ILRS Network Tracking Performance

Claudia Carabajal/Mike Pearlman:

- ILRS CB updates

Others?

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Notes from the Meeting:

Peter Dunn: see "The Blue Band; a cautionary tale" presentation.

The discussion of the results of applying MRBE to the MOBLAS5 ranges included a suggestion from Alexandre that the observed height behavior be compared with the results from other techniques.

A comparison with ITRF2020 heights from VLBI and DORIS showed a significant difference during the periods with MRBE applied.

Comparison with independent SLR estimates confirms that the MRBE step as implemented produces results which deviate from those derived directly from the SSEM process advocated by Appleby, Rodriguez and Altamimi.

The QCB should consider a recommendation to the ASC that all stations be treated identically, but in two separate solutions.

One would have no MRBE step for any station; the other would have MRBE applied to all stations, at all times.

The values of the weekly estimated RBs in the MRBE case would also be made available.

The current ITRF2020_u2023 and 2024 solution could each be constructed from these two channels, and the effect of any deviation from the Appleby, Rodriguez and Altamimi procedure could be calibrated.

If this option was implemented with an updated DHF which includes all known corrections, we would have all the information we need to produce a robust, improved solution for ITRF2020_u2025.

Perhaps this could be considered a pilot project; it is very simple to execute.

Van Husson: see "Data Handling Issues" presentation.

Discontinuities in NASA SLR ITRF2020 Station Heights

Four NASA SLR sites (7210, 7080, 7105, 7501) exhibit ITRF2020 mm level height discontinuities. The root causes of these discontinuities were data handling related. Below are some action items to address these discontinuities. See presentation for more detail.

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) and then update the DHF accordingly. (Action: ASC)

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

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)

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

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)

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

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)

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)

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)

Other Data Handling Issues

Below are some action items to address other data handling issues that were presented. See presentation for more detail.

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) and then update the 7110 ranges biases in the DHF. (Action: ASC)

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)

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) and update the DHF accordingly (Action: ASC)

Discussions:

Graham Appleby commented that there is danger in applying a bias not allowing the analyst to be able to estimate/correct based on their analysis.

The stations follow DHF and what is specified for a particular station.

For EOP parameters, both station positions and biases are estimated.

When the time series is not stationary or it has too much scatter, they have to provide a value, estimating biases along with the station coordinates.

The ACs are doing what they are supposed to be doing. They cannot dictate what to do when the behavior is not linear. In consequence, Yarragadee's data gets degraded.

Antonio pointed out that 1 year of observations are needed to establish stability. Maybe next year they will have more data to provide a value that is reliable to include in the DHF.

Alex Belli asked if the station can perform a calibration, and the answer was that the station is contacted when they see a jump, and the engineering team is informed.

José stated that there are no situations where biases were estimated just because. It is the price one pays to not introduce systematic errors.

Some stations in the DHF are asked to estimate biases for LAGEOS but not for ETHALONs. This is problematic and could influence the height determination. There was a suggestion to wait until LARES-2 is included in the solutions.

The comparisons with GPS or local surveys are also important. Some of the survey results are not available yet.

Van also reported that currently four of the ILRS core stations (7090, 7110, 7124 and 7501), all NASA, have MRBE assigned based on the DHF and their station heights since MRBE all show large variations in the 2024 ITRF2020 update.

Peter is alarmed to learn this but not surprised. Surprised, however, that that the MRBE step as implemented produces results which deviate so widely from those derived directly from the SSEM process advocated by Appleby, Rodriguez and Altamimi. Peter will put that in the placeholder.

Antonio Basoni stated that the ASC needs to discuss when to release the updated DHF.

In relation to correcting errors in the meteorological data, this can be done accessing external sources. Zenith troposphere corrections can be applied weekly (Krzysztof Sośnica's recommendation).

Van could provide troposphere corrections for the DHF.

Many of the stations from the 90's have this issue with the meteorological data.

This could be a good topic to discuss at the UAW meeting in Munich.

When there is a small discontinuity in height, is to always best to apply the trop/epoch biases a priori when estimating range biases. SSME data from the JCET's website showed a big 14 mbar swing (big error).

Frank pointed out that it is important to determine what is needed for the next 2026 ITRF update. Reprocessing period is not known, clarification is needed. ILRS will try to incorporate issues presented at this meeting before the next reprocess of the ITRF.

Please also refer to the document "ILRS_QCB_Meeting_September29_2025_PostMeetingComments-1.pdf" and "ASC_meetings.pdf" for further discussions that took place before and after the meeting.

Claudia Carabajal: see "ILRS CB updates" presentation for details on activities reported

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Appendix A: DHF Updates

*CODE	PT	SOLN	T	START_DATE__	END_DATE____	M	__E-VALUE___	STD_DEV	_E-RATE__	UNIT	CMNTS
7080	--	----	A	90:001:00000	91:199:00000	P	-1.8	0.5		mB	BRE
7080	--	----	A	94:333:54000	94:335:32400	P	-4.6	0.5		mB	BRE
7080	--	----	A	95:065:00000	95:362:08100	P	2.4	0.5		mB	BRE
7080	--	----	A	95:362:08100	96:026:00000	P	4.4	0.5		mB	BRE
7080	--	----	A	96:026:00000	96:129:72000	P	-9.4	0.5		mB	BRE
7080	--	----	A	02:038:00000	03:137:00000	P	-1.7	0.5		mB	BRE
7080	--	----	A	03:150:26340	03:150:43200	P	-11.5	1.0		mB	BRE
7105	--	----	A	96:301:75600	96:302:10800	P	4.7	2		mB	FPR
7105	--	----	A	96:302:10800	96:302:32400	P	8.5	2		mB	FPR
7105	--	----	A	96:302:54000	96:302:75600	P	16.3	2		mB	FPR
7105	--	----	A	96:302:75600	96:303:10800	P	13.4	2		mB	FPR
7105	--	----	A	97:079:75600	97:080:10800	P	13.9	2		mB	FPR
7105	--	----	A	97:080:10800	97:080:32400	P	12.8	2		mB	FPR
7105	--	----	A	97:080:32400	97:080:54000	P	11.6	2		mB	FPR
7105	--	----	A	97:080:54000	97:080:75600	P	15.5	2		mB	FPR
7105	--	----	A	97:181:75600	97:182:10800	P	3.9	2		mB	FPR
7105	--	----	A	97:183:75600	97:184:10800	P	11.0	2		mB	FPR
7105	--	----	A	97:295:75600	97:297:54000	P	-3.1	2		mB	FPR
7105	--	----	A	97:304:54000	97:304:75600	P	2.1	2		mB	FPR
7105	--	----	A	97:304:75600	97:305:10800	P	4.8	2		mB	FPR
7105	--	----	A	97:306:10800	97:306:75600	P	22.5	2		mB	FPR
7105	--	----	A	97:306:75600	97:307:10800	P	16.5	2		mB	FPR
7105	--	----	A	97:307:10800	97:307:32400	P	13.9	2		mB	FPR
7105	--	----	A	97:307:32400	97:307:75600	P	10.2	2		mB	FPR
7105	--	----	A	97:307:75600	97:308:10800	P	4.1	2		mB	FPR
7105	--	----	A	97:308:32400	97:308:54000	P	-2.0	2		mB	FPR
7105	--	----	A	97:308:75600	97:309:10800	P	-10.7	2		mB	FPR
7105	--	----	A	97:309:10800	97:309:32400	P	-8.3	2		mB	FPR
7105	--	----	A	97:309:32400	97:309:54000	P	-3.7	2		mB	FPR
7105	--	----	A	97:310:10800	97:310:32400	P	2.1	2		mB	FPR
7105	--	----	A	97:310:32400	97:310:54000	P	3.4	2		mB	FPR
7105	--	----	A	97:313:75600	97:314:10800	P	-2.3	2		mB	FPR
7105	--	----	A	97:314:10800	97:314:32400	P	-4.4	2		mB	FPR
7105	--	----	A	97:314:32400	97:314:54000	P	-7.1	2		mB	FPR

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7105 -- ---- A 98:025:32400 98:025:54000 P        -6.6      2              mB   FPR
7105 -- ---- A 98:025:54000 98:025:75600 P       -10.9      2              mB   FPR
7105 -- ---- A 98:025:75600 98:026:10800 P       -14.5      2              mB   FPR
7105 -- ---- A 98:026:10800 98:026:32400 P       -17.2      2              mB   FPR
7105 -- ---- A 98:026:32400 98:027:54000 P       -19.2      2              mB   FPR
7105 -- ---- A 98:043:54000 98:043:75600 P        20.0      2              mB   FPR
7105 -- ---- A 98:043:75600 98:044:10800 P        14.3      2              mB   FPR
7105 -- ---- A 98:044:10800 98:044:32400 P         9.8      2              mB   FPR
7105 -- ---- A 98:044:32400 98:045:10800 P         6.5      2              mB   FPR
7105 -- ---- A 98:046:10800 98:046:32400 P        -5.1      2              mB   FPR
7105 -- ---- A 98:046:32400 98:046:75600 P        -8.9      2              mB   FPR
7105 -- ---- A 98:046:75600 98:047:10800 P        -4.0      2              mB   FPR
7105 -- ---- A 98:321:75600 98:322:10800 P        -5.0      2              mB   FPR
7105 -- ---- A 98:322:54000 98:323:32400 P       -15.1      2              mB   FPR
7105 -- ---- A 98:323:32400 98:323:54000 P       -13.1      2              mB   FPR
7105 -- ---- A 98:323:75600 98:324:10800 P        -6.7      2              mB   FPR
7105 -- ---- A 99:037:79008 99:038:13140 P        -4.0      1              mB   FPR
7105 -- ---- A 99:058:21180 99:058:65000 P        -2.0      1              mB   FPR
7105 -- ---- A 99:060:27728 99:060:57500 P        21.0      1              mB   FPR
7105 -- ---- A 99:061:01743 99:061:13938 P        14.5      2              mB   FPR
7105 -- ---- A 99:061:13938 99:061:41379 P        12.4      2              mB   FPR
7105 -- ---- A 99:061:41379 99:061:51692 P         8.6      2              mB   FPR
7105 -- ---- A 99:061:51692 99:061:64616 P         7.0      1              mB   FPR
7105 -- ---- A 99:138:68412 99:138:76980 P         5.6      1              mB   FPR
7105 -- ---- A 99:159:20580 99:159:32580 P         0.6      0.5            mB   FPR
7105 -- ---- A 99:159:32580 99:159:44820 P         1.2      0.5            mB   FPR
7105 -- ---- A 99:159:44820 99:159:48420 P         0.9      0.5            mB   FPR
7105 -- ---- A 99:190:07320 99:190:51000 P        -1.0      0.5            mB   FPR
7105 -- ---- A 99:191:05400 99:191:52000 P         4.0      1              mB   FPR
7105 -- ---- A 99:192:51720 99:192:78000 P        -7.5      1              mB   FPR
7105 -- ---- A 99:204:68500 99:205:35200 P         2.2      0.5            mB   FPR
7105 -- ---- A 99:205:72714 99:206:29580 P         6.5      1              mB   FPR
7105 -- ---- A 99:206:29580 99:206:37742 P         6.2      1              mB   FPR
7105 -- ---- A 99:206:37742 99:206:69461 P         4.8      1              mB   FPR
7105 -- ---- A 99:206:69461 99:206:85500 P         7.0      1              mB   FPR
7105 -- ---- A 99:216:07020 99:216:26607 P        -0.4      0.5            mB   FPR
7105 -- ---- A 99:216:26607 99:216:47460 P         0.7      0.5            mB   FPR
7105 -- ---- A 99:216:47460 99:216:51060 P         0.8      0.5            mB   FPR
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7105 -- ---- A 99:216:73834 99:216:83000 P         6.2      1              mB   FPR
7105 -- ---- A 99:266:02460 99:266:08062 P        -1.5      0.5            mB   FPR
7105 -- ---- A 99:266:08062 99:266:14700 P        -2.0      0.5            mB   FPR
7105 -- ---- A 99:266:14700 99:266:23100 P        -3.2      1              mB   FPR
7105 -- ---- A 99:266:23100 99:266:27060 P        -3.7      1              mB   FPR
7105 -- ---- A 99:266:27060 99:266:39780 P        -4.1      1              mB   FPR
7105 -- ---- A 99:266:39780 99:266:49214 P        -5.1      1              mB   FPR
7105 -- ---- A 99:266:49214 99:266:70775 P        -5.8      1              mB   FPR
7105 -- ---- A 99:266:70775 99:266:83959 P        -3.5      1              mB   FPR
7105 -- ---- A 09:352:32400 09:352:54000 P         1.8      2              mB   FPR
7105 -- ---- A 10:003:75600 10:004:32400 P         2.9      2              mB   FPR
7105 -- ---- A 23:307:63120 23:307:65760 P         1.1      1              mB   FPR
7105 -- ---- A 23:307:65760 23:307:71400 P         2.1      1              mB   FPR
7105 -- ---- A 23:307:71400 23:307:78120 P         3.3      1              mB   FPR
7105 -- ---- A 23:307:78120 23:308:04000 P         4.1      1              mB   FPR
7105 -- ---- A 23:310:10620 23:310:15300 P        13.2      1              mB   FPR
7105 -- ---- A 23:310:15300 23:310:21420 P        12.5      1              mB   FPR
7105 -- ---- A 23:310:21420 23:310:43440 P        11.2      1              mB   FPR
7105 -- ---- A 23:310:43440 23:310:60840 P        10.1      1              mB   FPR
7105 -- ---- A 23:310:60840 23:310:72240 P        12.7      1              mB   FPR
7105 -- ---- A 23:310:72240 23:311:02040 P        16.1      1              mB   FPR
7105 -- ---- A 24:085:11028 24:085:41429 P        -1.4      1              mB   FPR
7105 -- ---- A 24:085:41429 24:085:58558 P        -3.1      1              mB   FPR
7105 -- ---- A 25:013:11970 25:013:26681 P       -16.5      1              mB   FPR
7105 -- ---- A 25:013:26681 25:013:40816 P       -14.8      1              mB   FPR
```

Table 1. History Log Voids by Station (2025.11.17)

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					251115
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 2025.11.19