Deutsches Geodätisches Forschungsinstitut (DGFI-TUM)
Technische Universität München

2024/3 ILRS Analysis Standing Committee meeting

Mathis Bloßfeld[(1)] and Cinzia Luceri[(2)]

(Conveners)

(1) DGFI-TUM

(2) ASI/e-geos

Tuesday, July 23rd, 2024, Zoom, 12:00 AM to 3:00 PM (UTC)

Today's agenda

0)	Last meeting + open Action Items (AIs)	(MB, CL)	10 minutes
1)	Status reports of SLR CCs	(CL, FL)	30 minutes
2)	Satellite-/station-weighting strategies	(AB, MB)	20 minutes
3)	Update of the SLRF2020 and ILRS ECC files	(MB)	10 minutes
4)	LARES and SH pilot project	(MB)	20 minutes
5)	ESA's Genesis mission	(CC, MB)	10 minutes
6)	DSC files at ILRS website	(MB)	10 minutes
7)	Any other business and next ASC meeting	(all)	10 minutes

- IWLR 2024 in Kunming, China
- IAG/IERS JWG 1.2.4
- Next ILRS ASC meeting

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Last meeting + open Action Items (AIs)

	NEW ACTIONS		
# AI	Description	AC/person	
1_apr2024	Clarify origin of y-pole jump in Sept. 2023	NSGF	status?
2_apr2024	Provide complete v85 time series to ASI/JCET	BKG	finished
3_apr2024	Check implementation of ILRS DHF	JCET	finished?
4_apr2024	Make sure that TS models and DHF are consistent	C. Luceri, M. Bloßfeld	ongoing
5_apr2024	Provide a list of problems related to the ILRS DHF	V. Husson	ongoing
5_apr2024	Update most recent DLRF2020 version for new Tsukuba station coordinates	M. Bloßfeld, F. Lemoine	ongoing

	OLD OPEN ACTIONS		
# AI	Description	AC	
1_jan2024	Clarify with GRGS which steps are necessary to get GRGS becoming an ILRS AC in 2024.	F. Deleflie, M. Bloßfeld	ongoing
2_jan2024	New product-based DSC files (instead of old AC-based DSC files).	M. Bloßfeld	nearly finished
3_jan2024	Compute orbit product based on v85 reprocessed solutions.	all	status?
4_jan2024	Compile report on SINEX format updates wanted by the ILRS for IERS DB; organize test phase for commented new SINEX blocks.	All, M. Bloßfeld	not yet started
5_jan2024	New format for AC-based DSC files.	M. Bloßfeld	same as 2_jan2024
6_jan2024	Investigation of test solutions based on different satellite- and station-weighting strategies.	DGFI/ASI CC/JCET CC	finished
7_jan2024	Investigation of large cross-track orbit differences of NSGF w.r.t. other AC orbits; orbit issues of BKG	NSGF, BKG	status?
1_apr2023	Large scatter of GFZ LOD w.r.t. USNO.	GFZ	status?
3_apr2023	Publication on ILRS contribution to ITRF2020.	E. Pavlis, C. Luceri	status?
5_apr2023	New stra	C. Luceri, M. Bloßfeld	not yet started

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Status reports of SLR CCs

- Slides to be presented by ASI and JCET/GSFC

- Questions:
  - When should we start with the inclusion of LARES-2 into the operational v180 product?

ASI AC&CC report

A. Basoni . V. Luceri. D. Sarrocco
e-GEOS S.p.A.. ASI/CGS - Matera

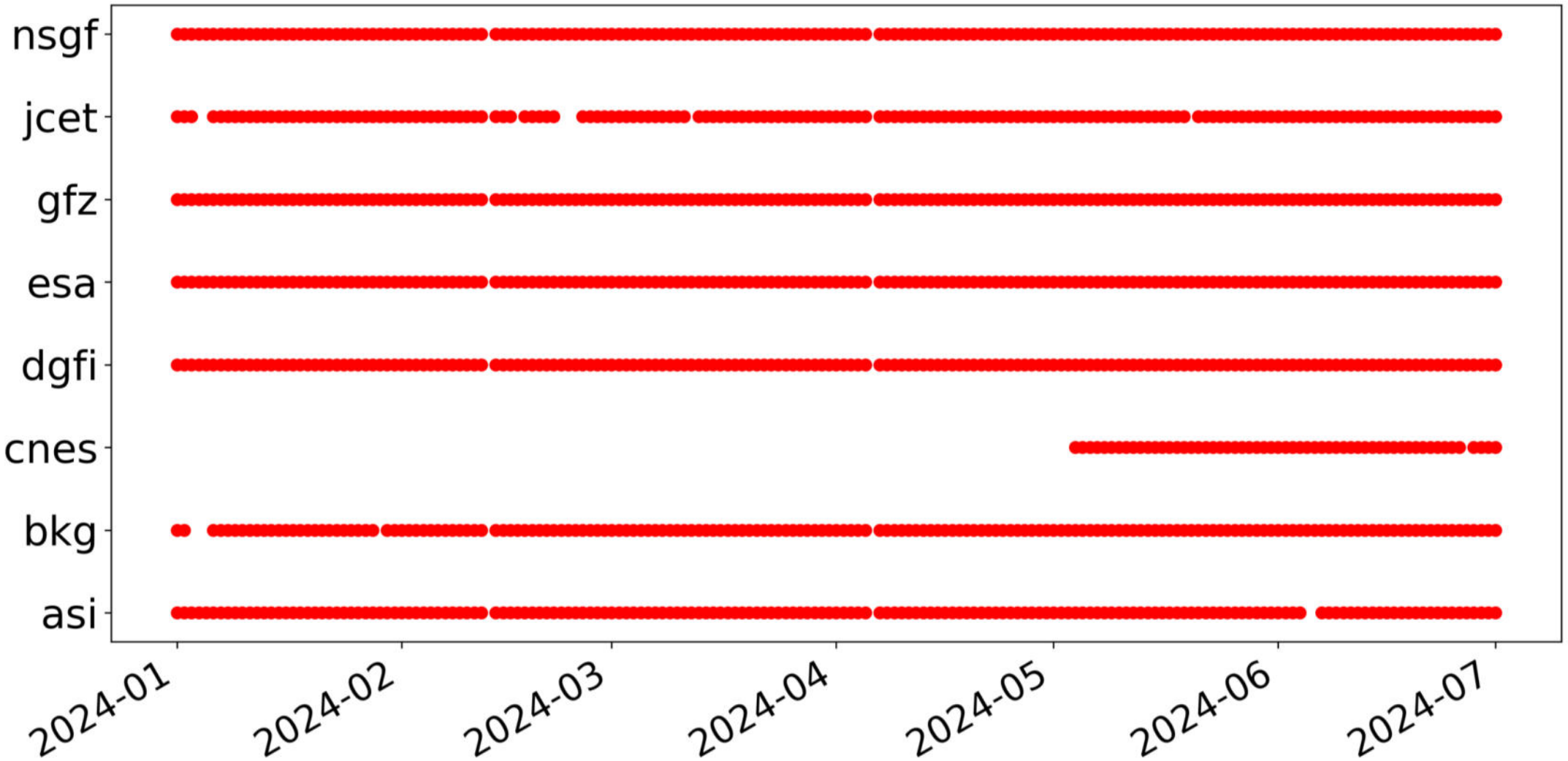
G. Bianco
Agenzia Spaziale Italiana. CGS - Matera

ASI/CGS Activities since last ASC meeting

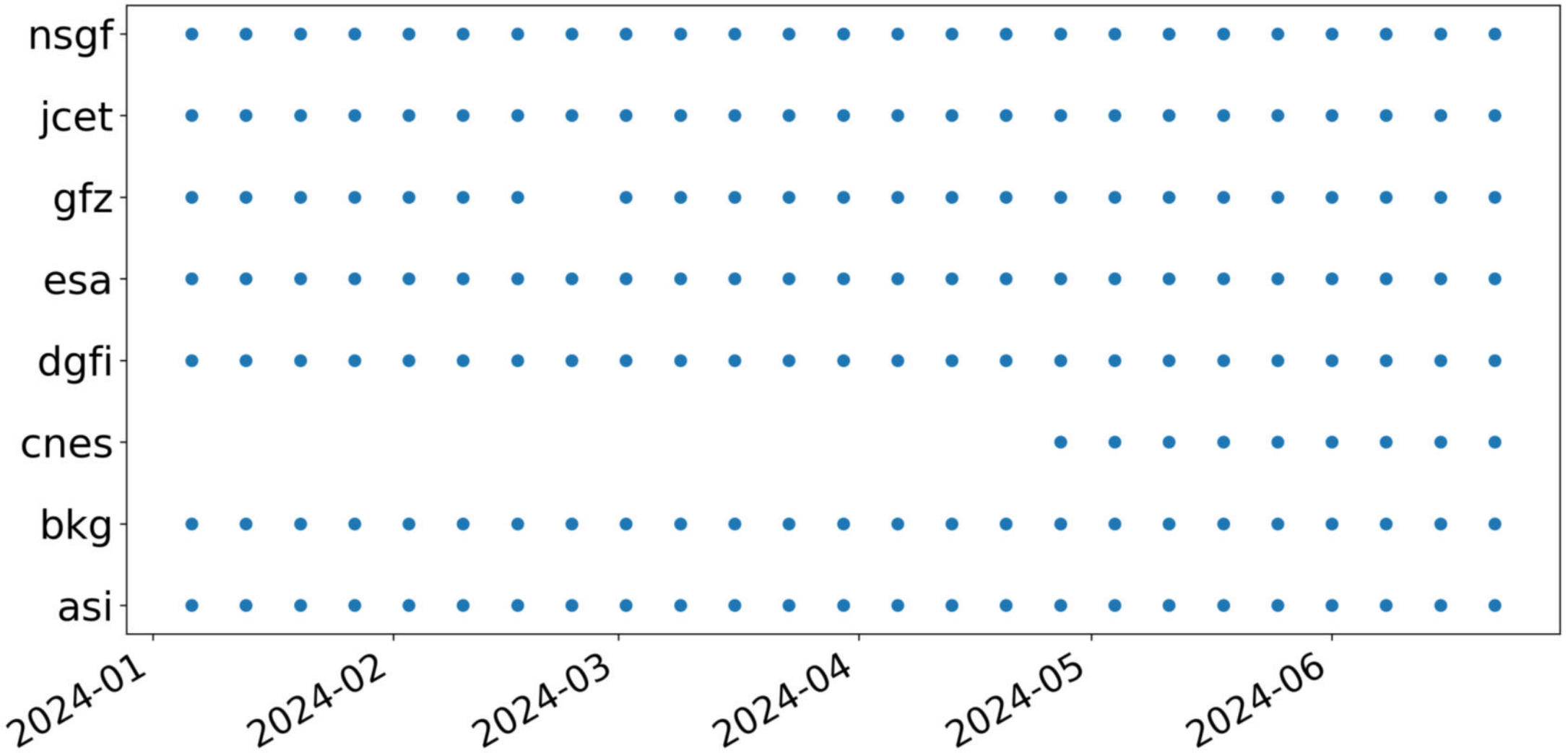
- ACs performance check
  - Product submissions
  - 3D wrms of the residuals w.r.t. SLRF (daily and weekly)
  - Scale
  - Geocenter motion
  - EOP
  - Orbits: RMS of residuals w.r.t. combination
  - Monitoring of systematic error. comparison between v320 and v280 products.

Solution submissions

Daily v180 ACs time series (valid only)
2024/01/01 – 2024/07/01



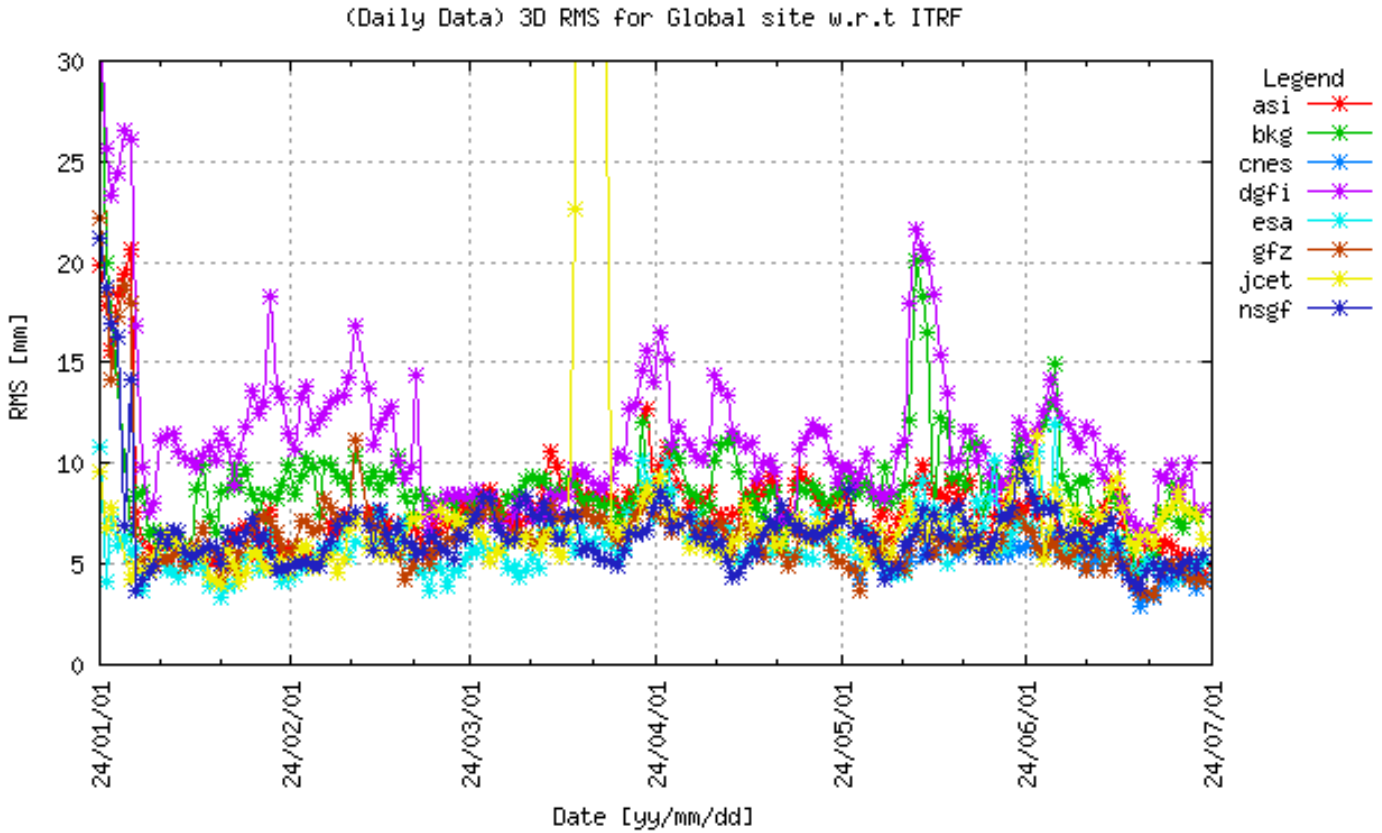
Solution submissions



***Stations coordinates** from **daily** solutions*

3D wrms of the residual w.r.t. SLRF2020

GLOBAL SITES



DGFI:

- Higher values.
- End of February – End of March good allignement

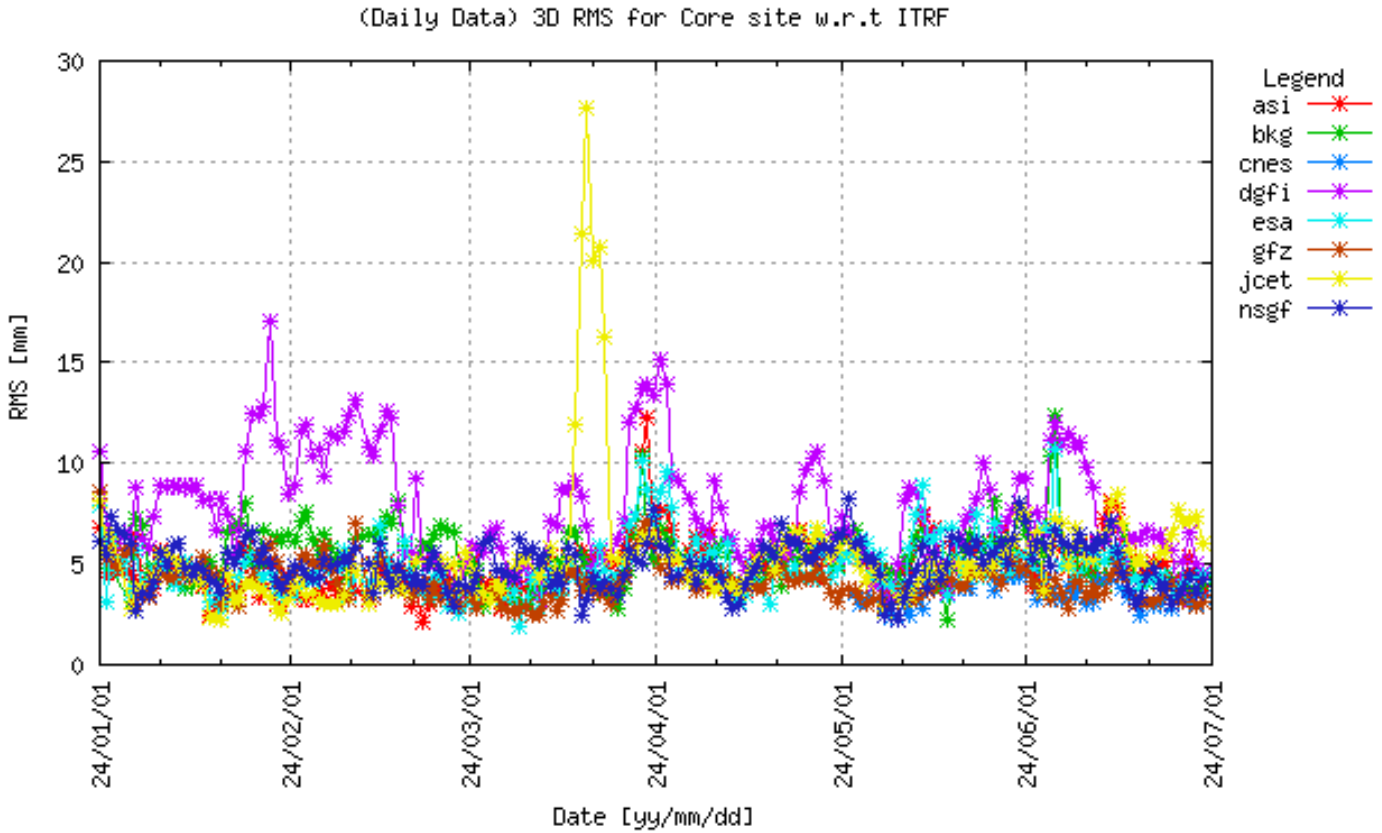
JCET:

- Spikes at the end of March

***Stations coordinates** from **daily** solutions*

3D wrms of the residual w.r.t. SLRF2020

CORE SITES



DGFI:

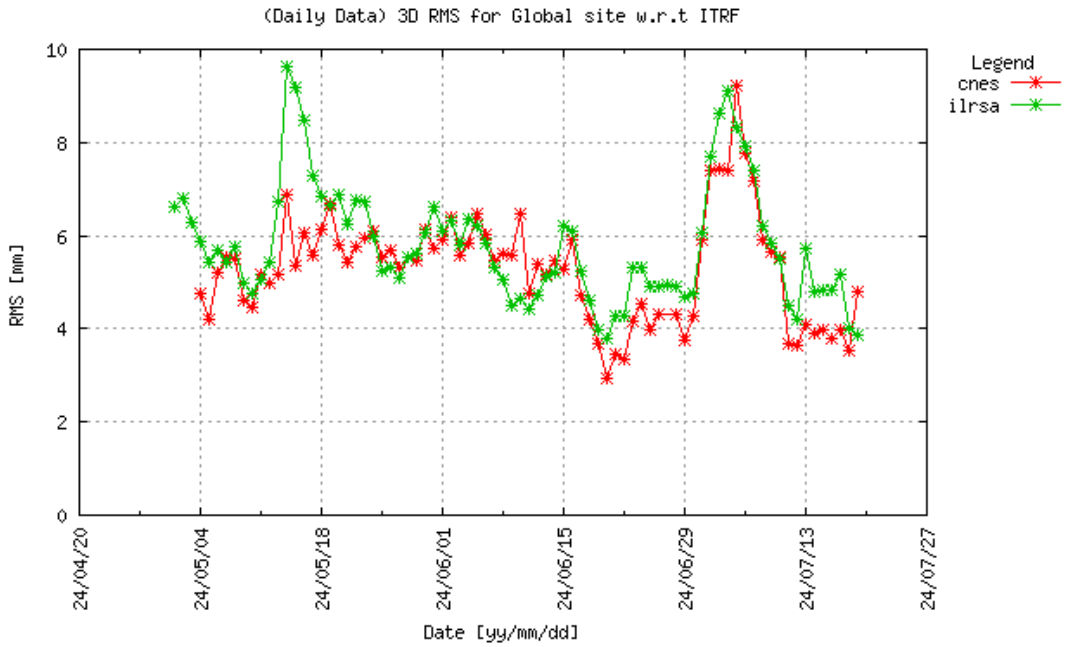
- Higher values.
- End of February – Mid March good allignement

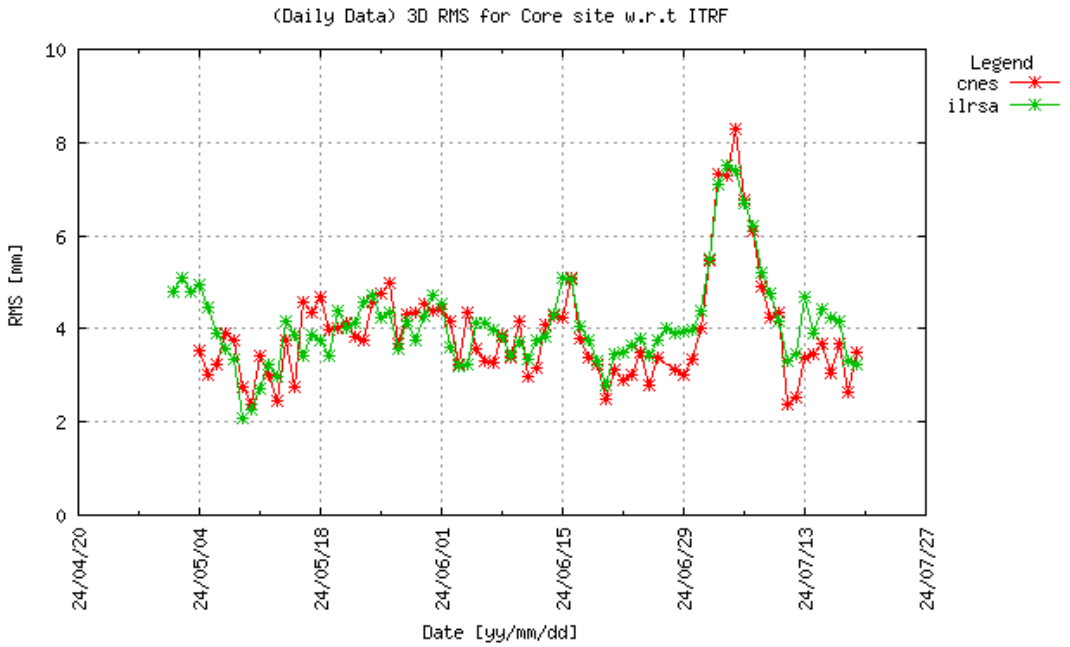
JCET:

- Spikes at the end of March

***Stations coordinates** from **daily** solutions*

3D wrms of the residual w.r.t. SLRF2020
GLOBAL and **CORE** SITES

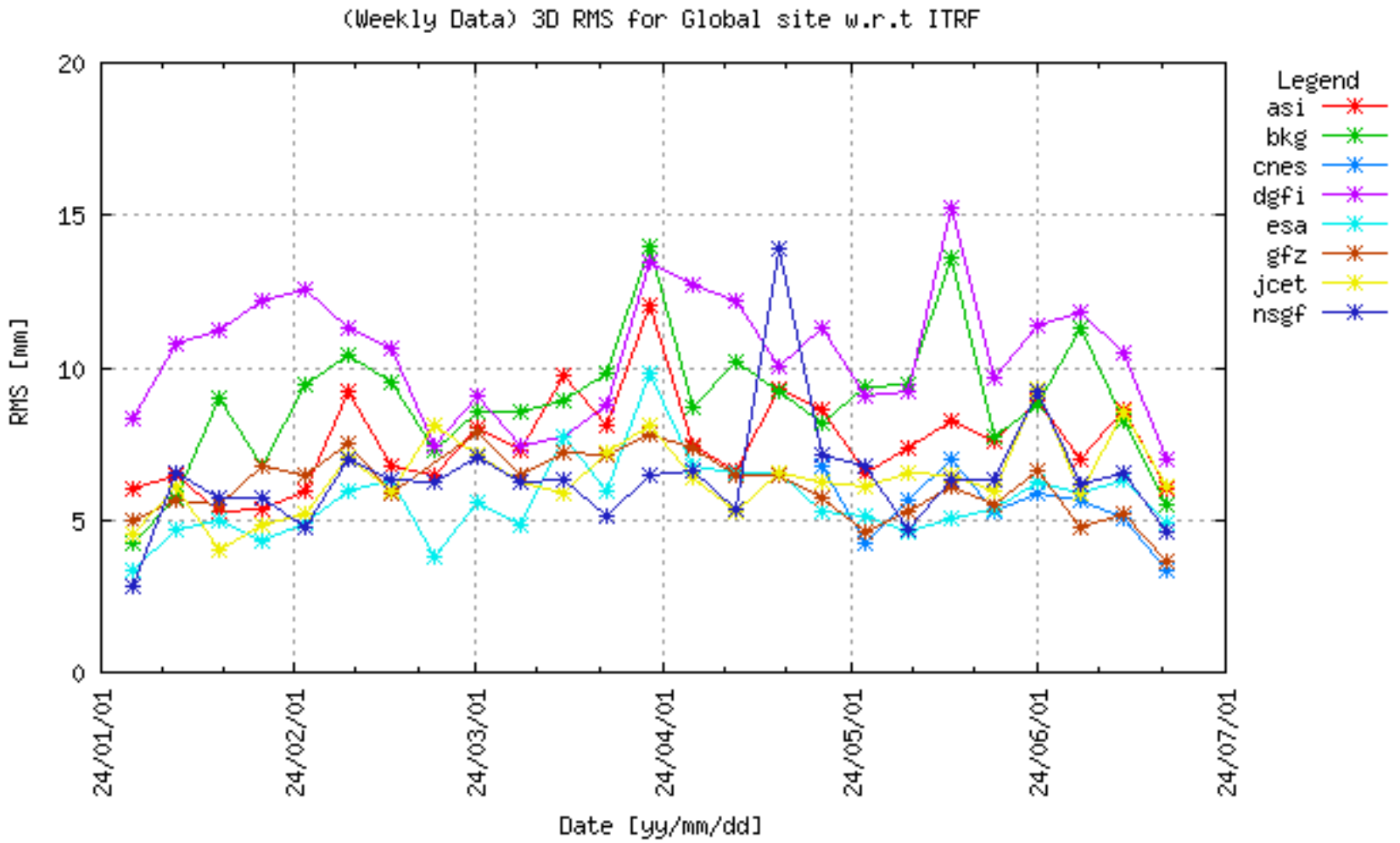




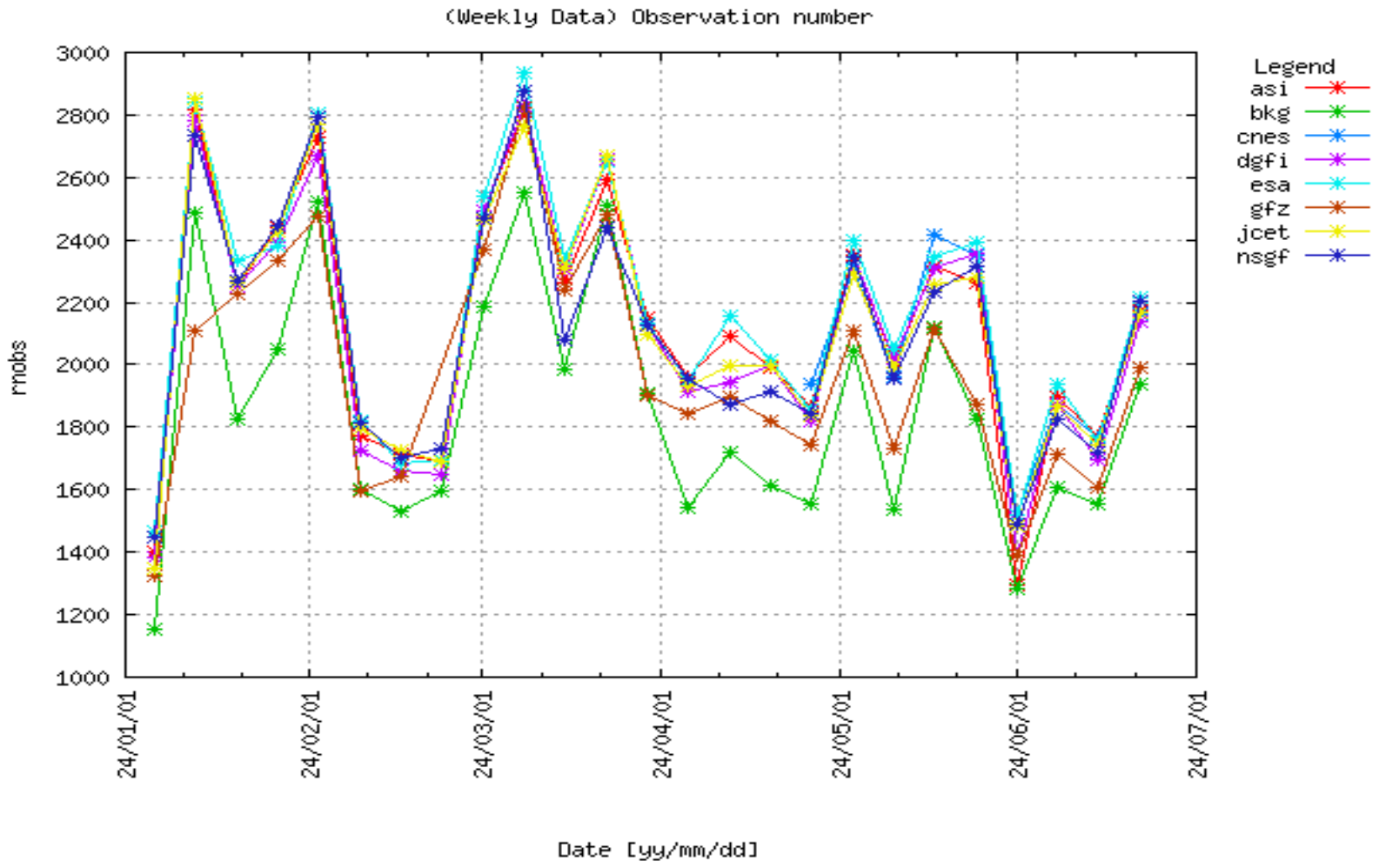
CNES: Good agreement w.r.t ILRSA

Stations coordinates *from* ***weekly*** *solutions*

3D wrms of the residual w.r.t. SLRF2020
GLOBAL SITES

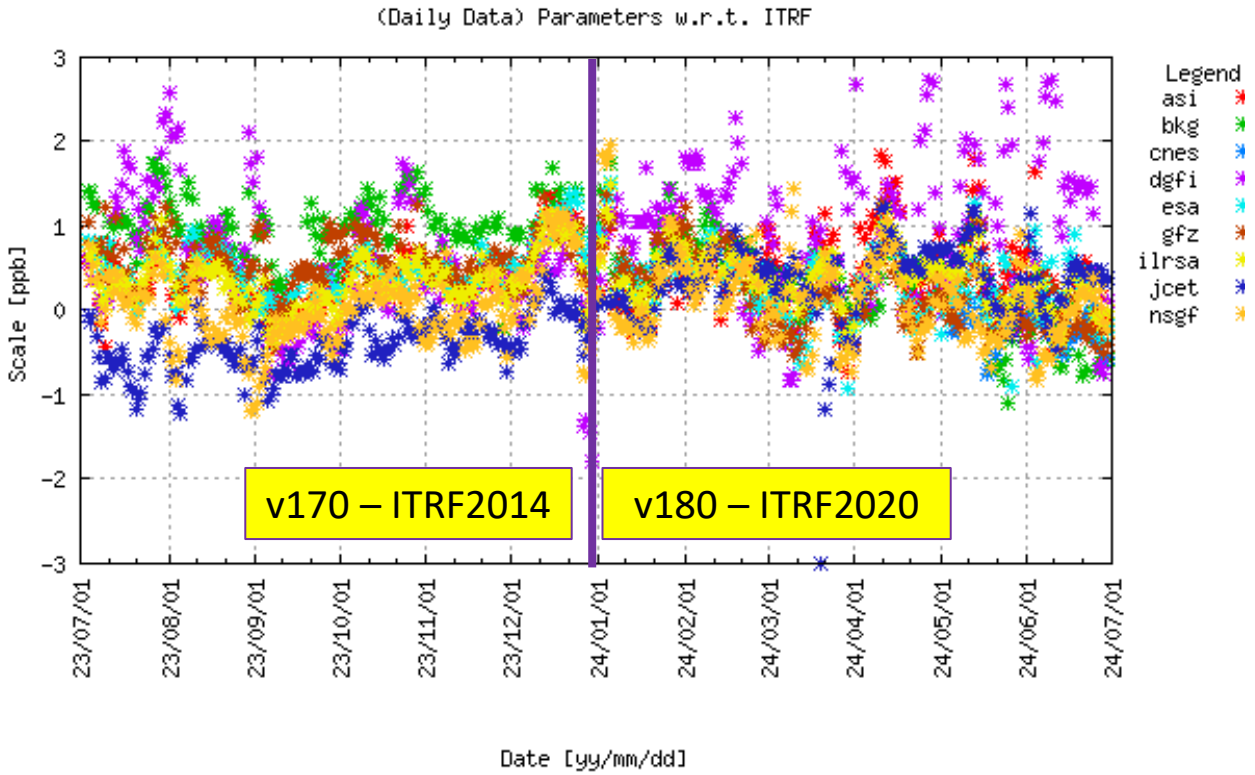


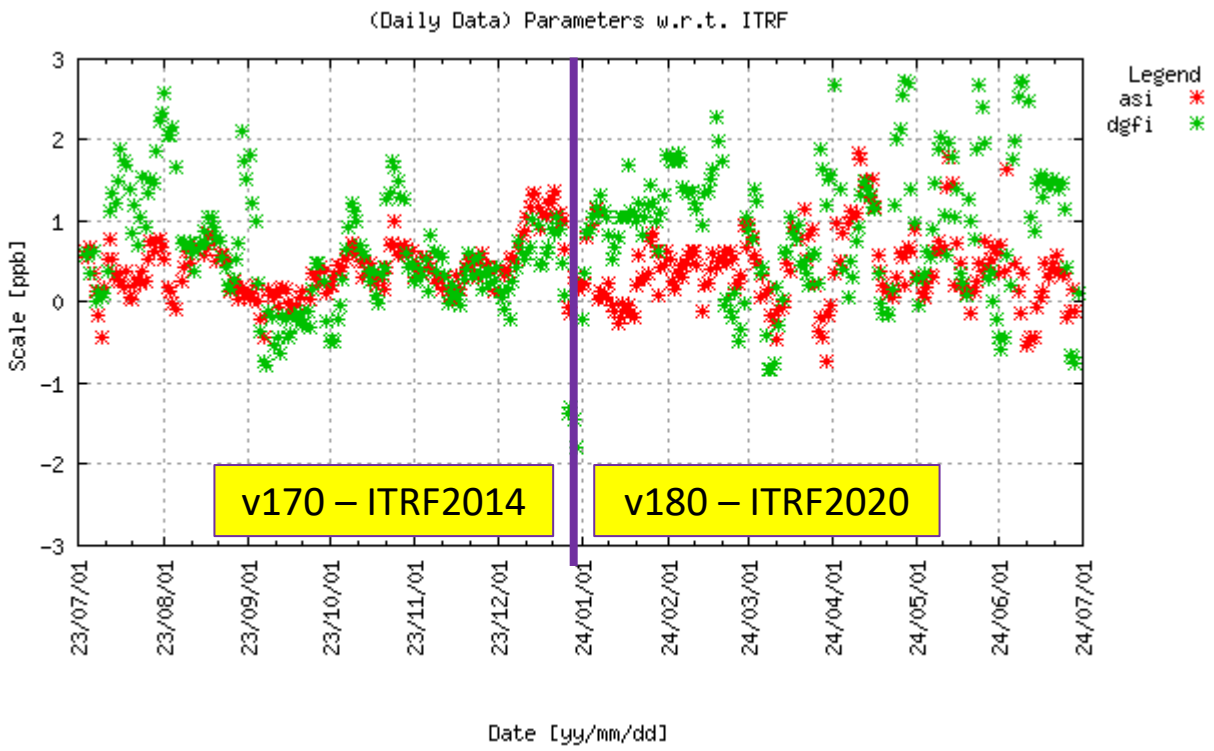
Weekly *-Number of observations*



BKG: Smaller number of observations

***Scale** from **daily** solutions*

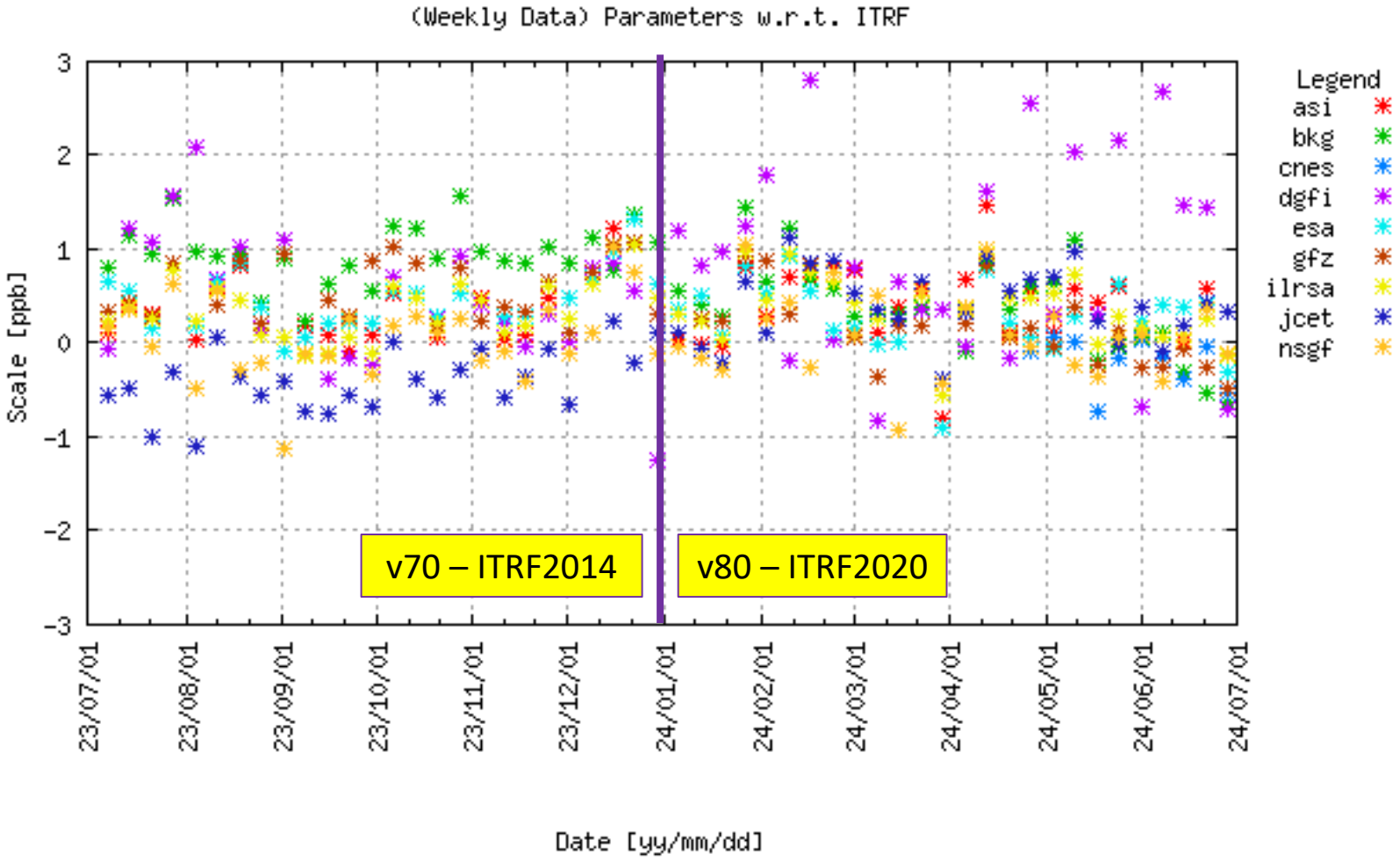




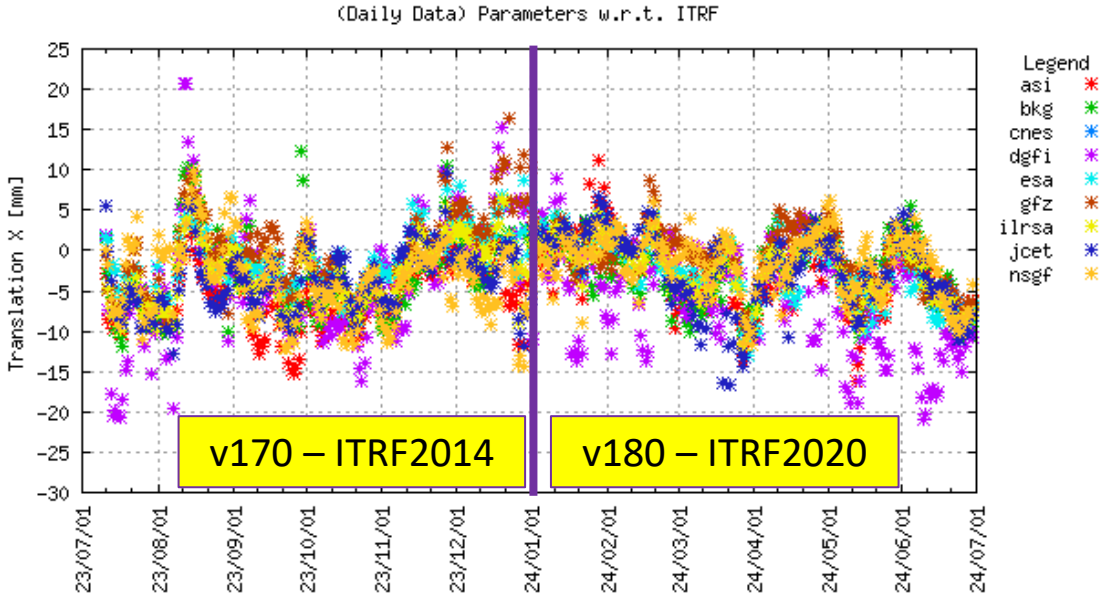
DGFI:

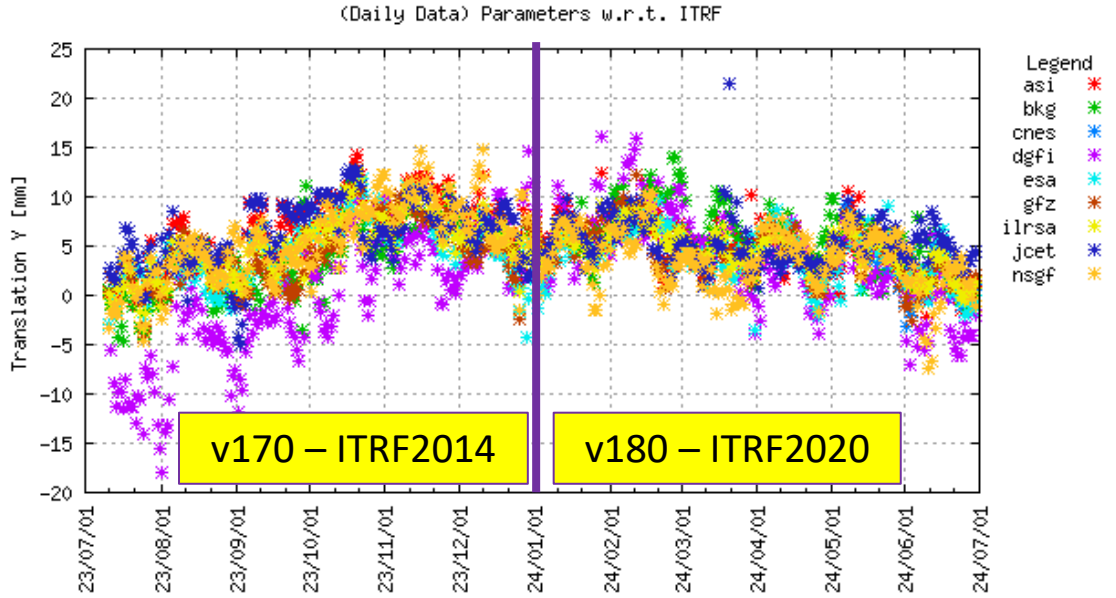
- More scattered with higher values.
- End of February – End of March good allignment

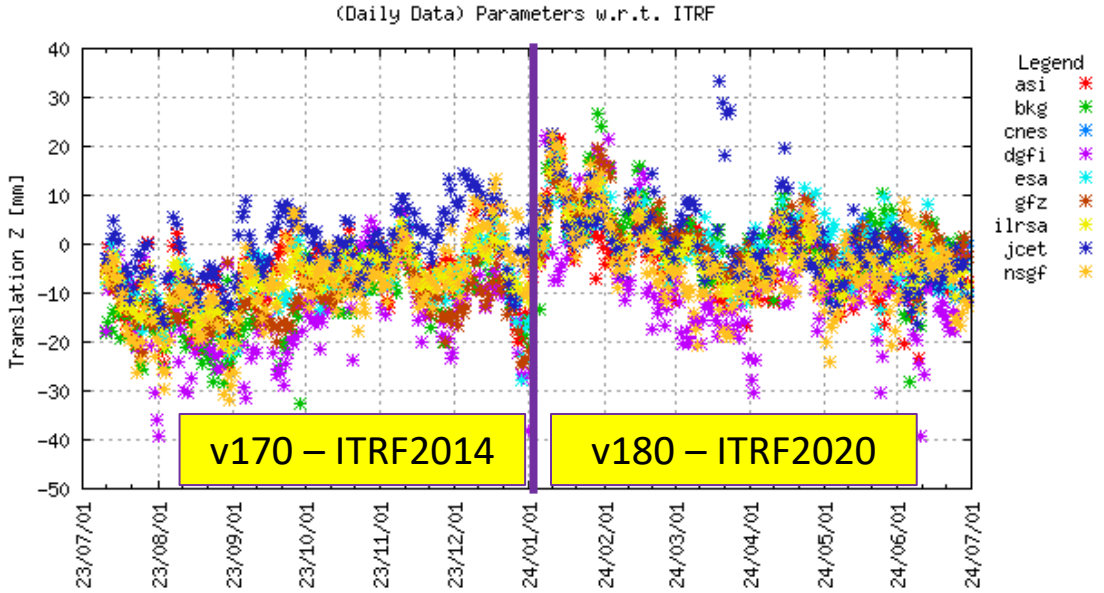
***Scale** from **weekly** solutions*



Geocenter *motion from* ***daily*** *solutions*



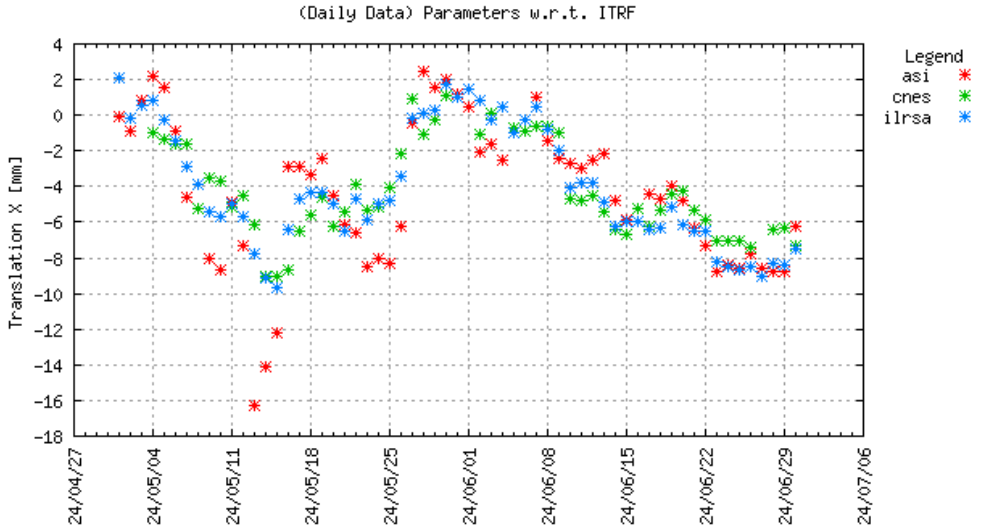


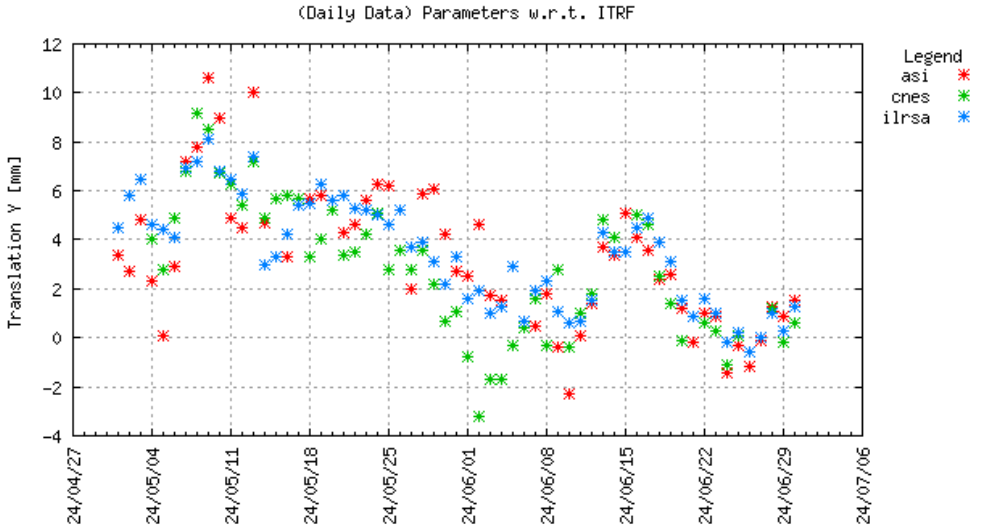


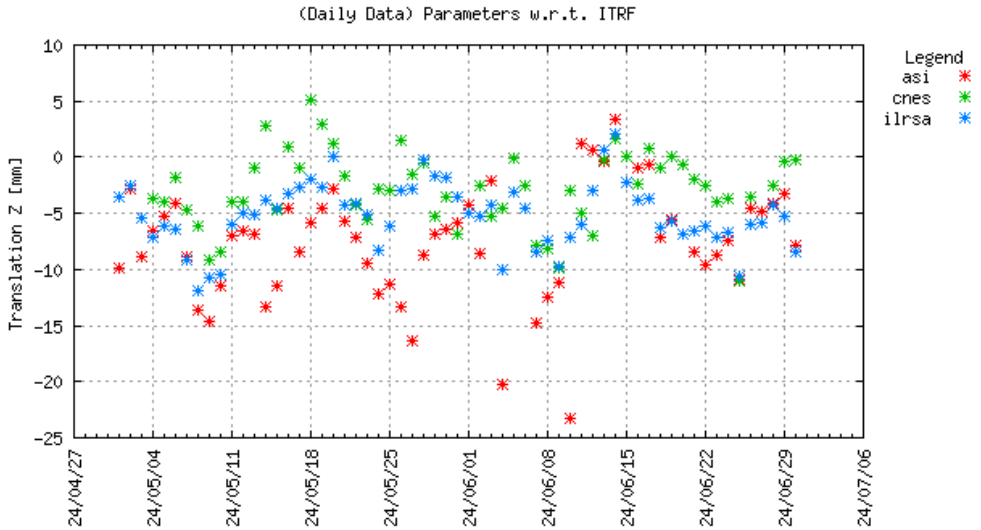
DGFI:

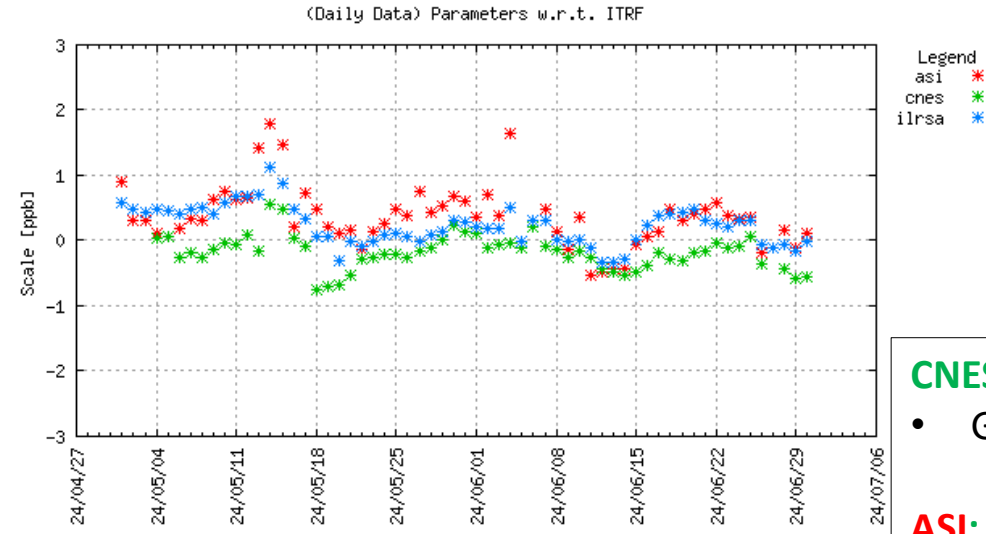
- X/Z components more scattered
- Y component better aligned

Scale *and* ***Geocenter*** *motion from daily solutions (CNES)*









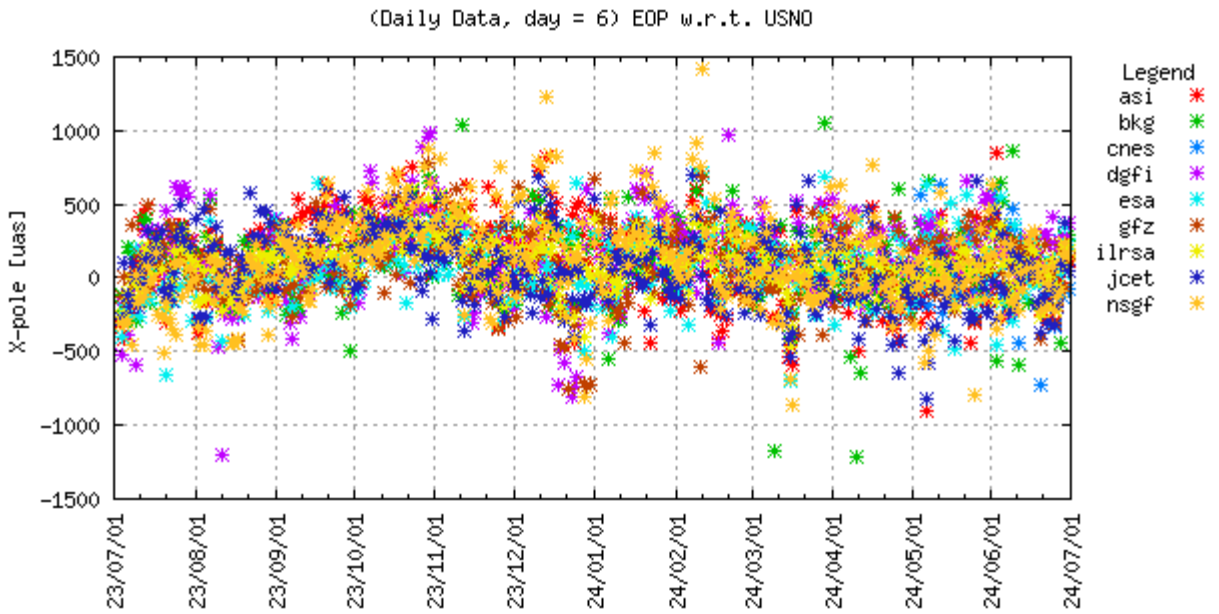
CNES:

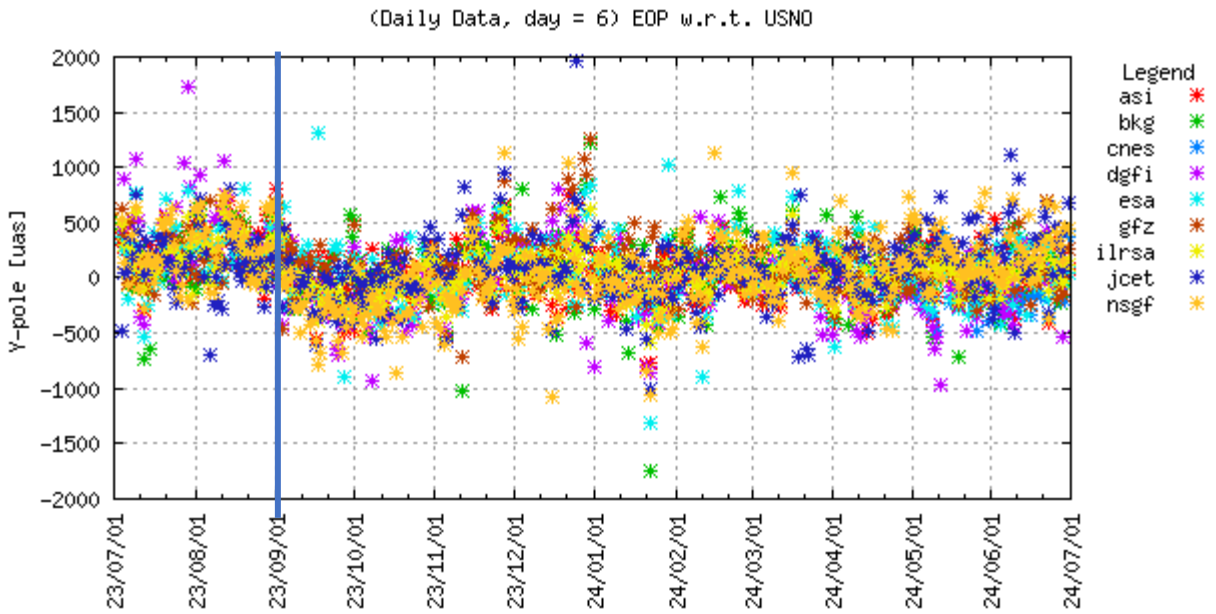
- Good agreement

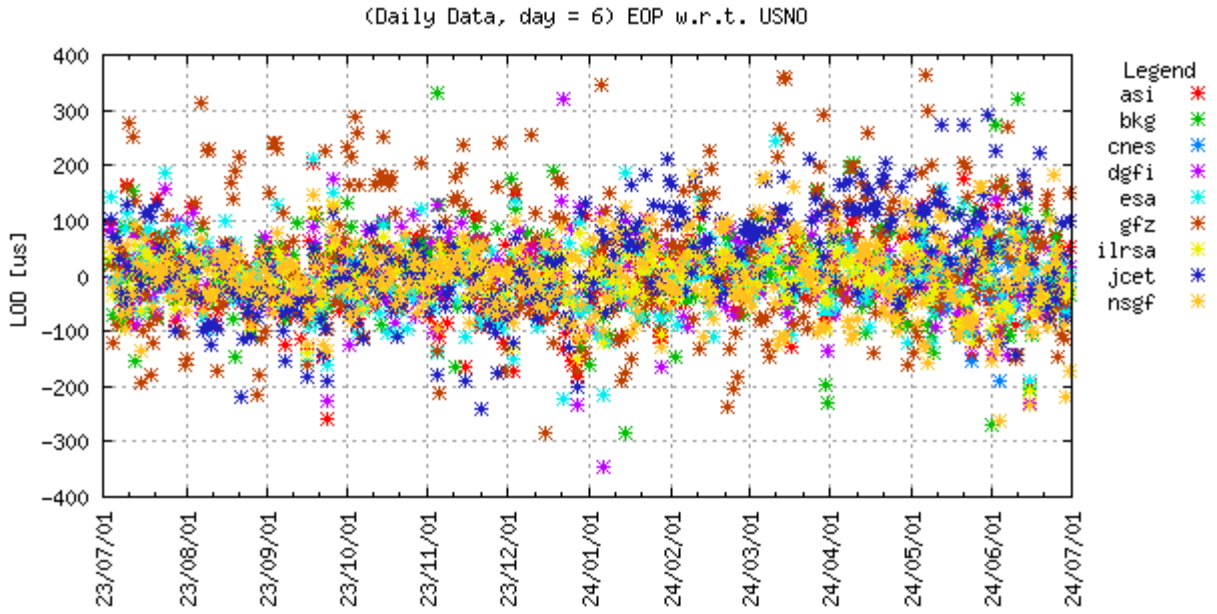
ASI:

- Z-component to be checked

***EOP** from **daily** solutions*

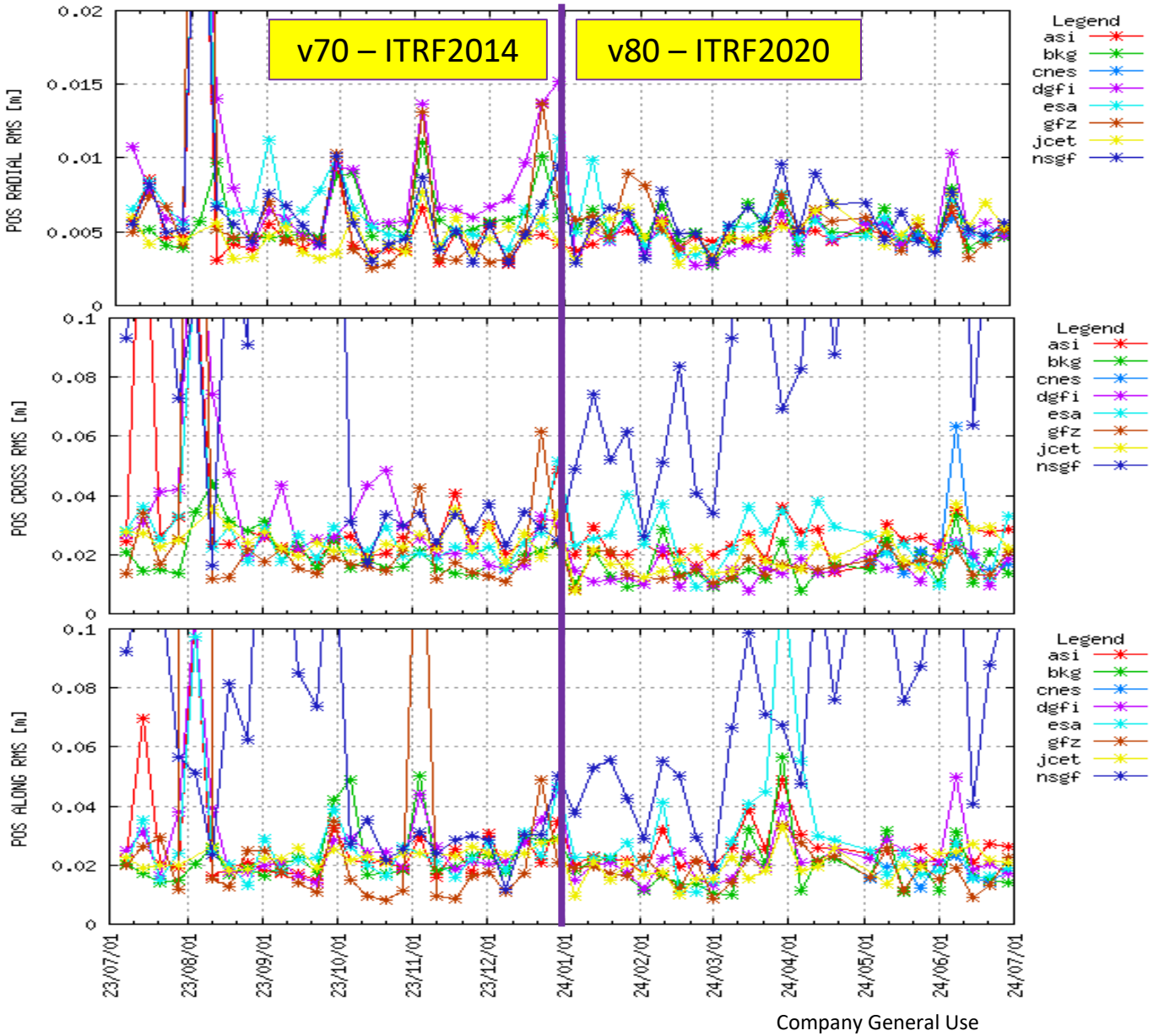






NSGF: Y-Pole jump solved

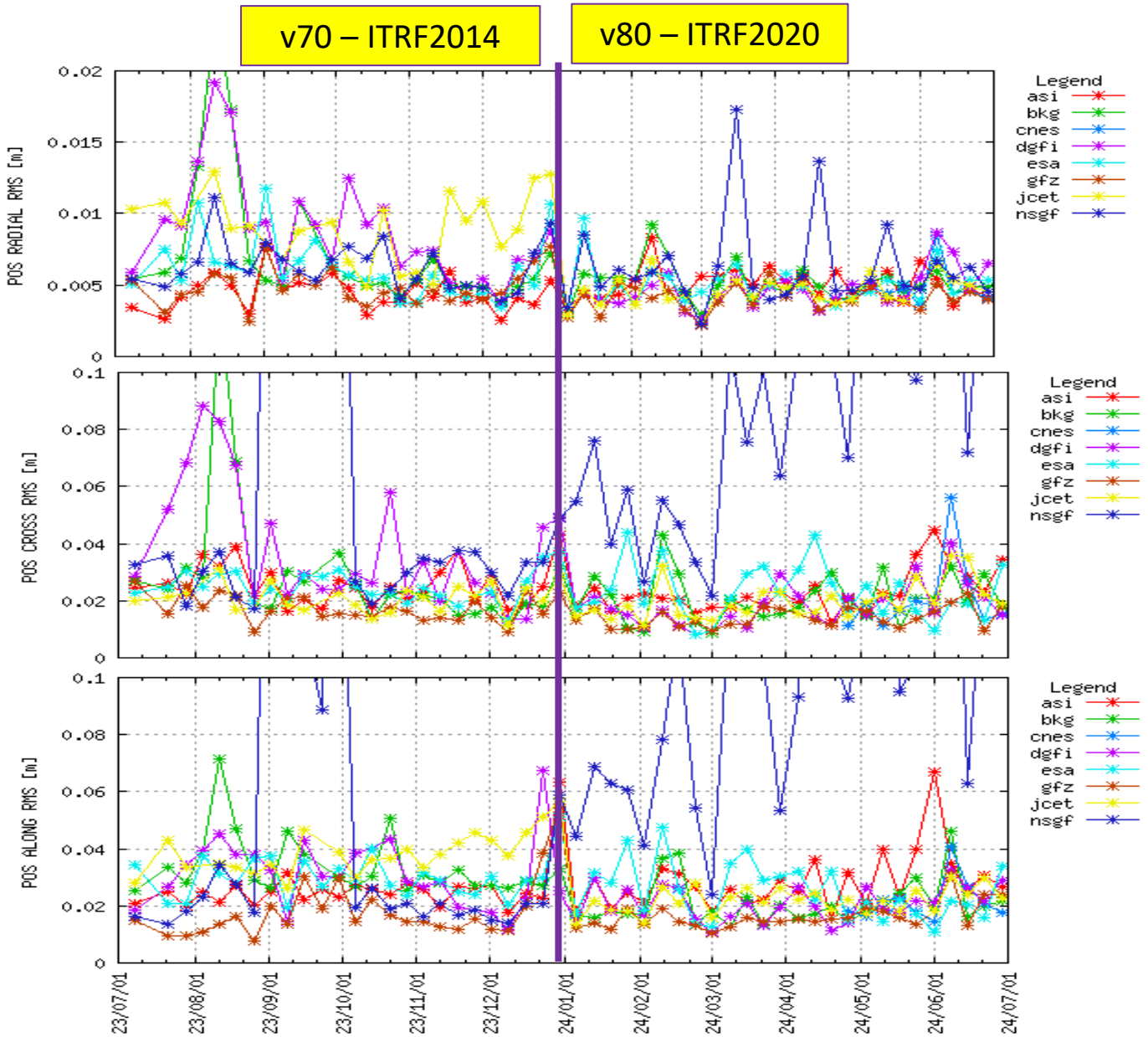
LAGEOS1 orbits – RMS of residuals w.r.t. combination



- **BKG:** fixed series from 240106 to 240427 for all satellites (uploaded on 2024-05) **included in ILRSA v81**.

- **NSGF** CROSS and ALONG component needs to be checked (OLD AI)

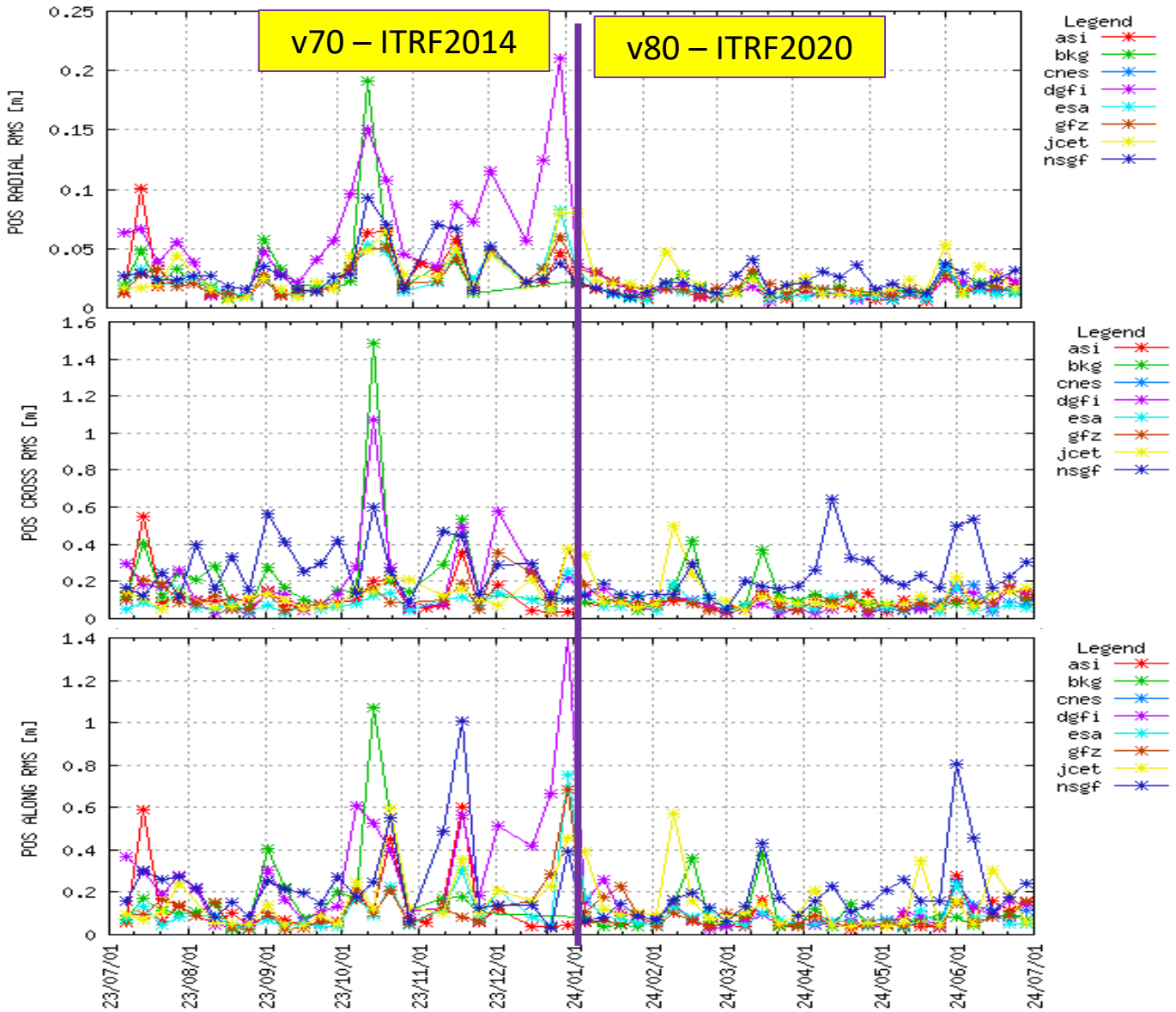
LAGEOS2 orbits – RMS of residuals w.r.t. combination



- **BKG:** fixed series from 240106 to 240427 for all satellites (uploaded on 2024-05) **included in ILRSA v81**.

- **NSGF** RADIAL, CROSS and ALONG component needs to be checked (OLD AI)

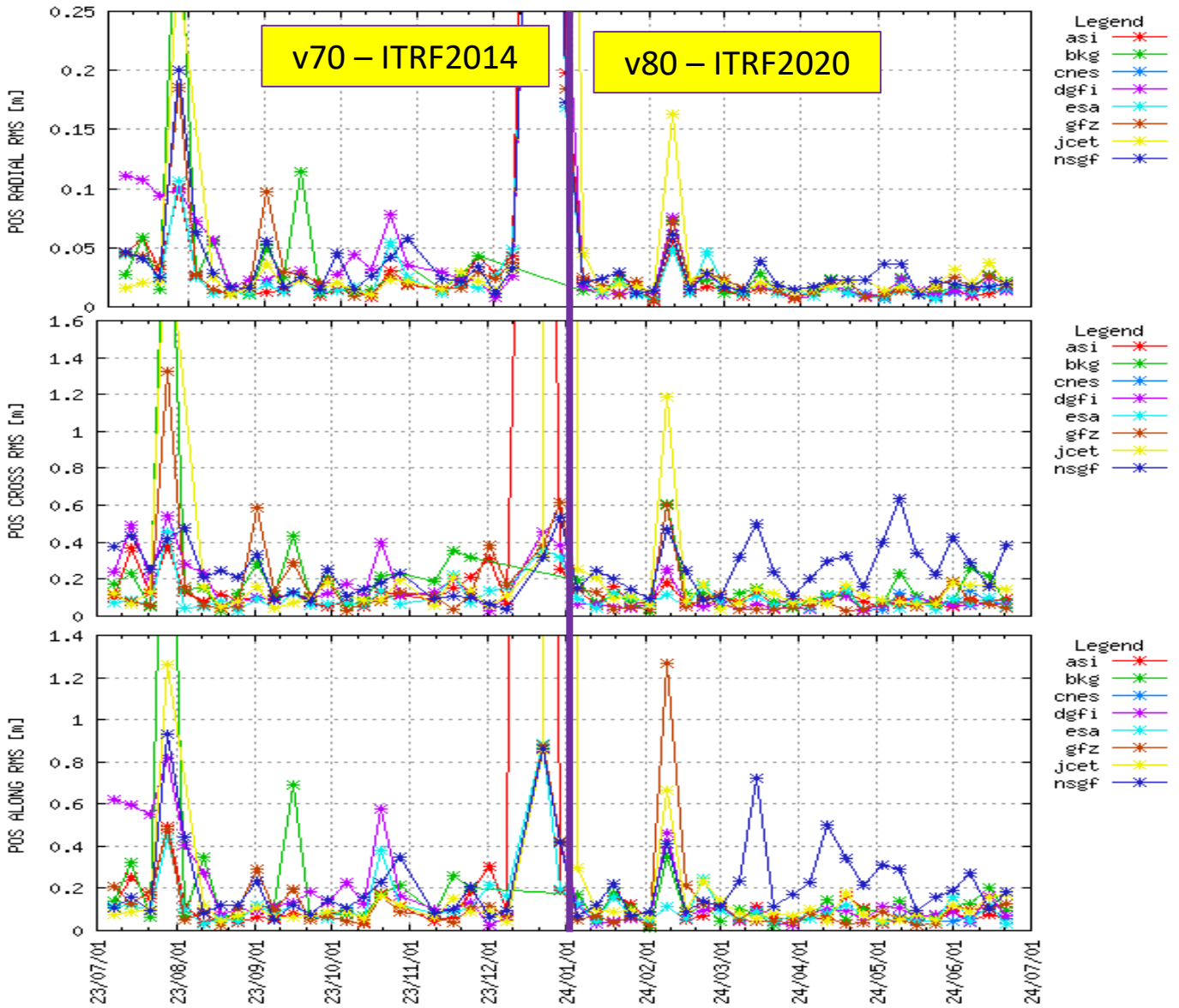
Etalon 1 orbits – RMS of residuals w.r.t. combination



- **BKG:** fixed series from 240106 to 240427 for all satellites (uploaded on 2024-05) **included in ILRSA v81**.

- **NSGF** CROSS and ALONG component needs to be checked (OLD AI)

Etalon 2 orbits – RMS of residuals w.r.t. combination



- **BKG:** fixed series from 240106 to 240427 for all satellites (uploaded on 2024-05) **included in ILRSA v81**.

- **NSGF** CROSS and ALONG component needs to be checked (OLD AI)

v85 product – submission status

AC	Number of Files	Starting date	Ending date	Internal Missing Sinex
ASI	1619	02/01/1993	06/01/2024	1994-12-31 2010-02-06
BKG	1614	02/01/1993	16/12/2023	2000-01-01, 2022-12-31, 2023-12-31, 2023-12-30
DGFI	1617	09/01/1993	06/01/2024	31/07/1999
ESA	1618	09/01/1993	06/01/2024	
GFZ	1607	30/01/1993	06/01/2024	1993-02-13, 1994-07-02, 1996-01-06, 1997-07-05, 1999-01-02, 2008-07-26, 2008-09-06, 2010-01-16, 2010-01-23, 2012-10-27, 2015-01-03, 2018-01-06
JCET	1617	09/01/1993	30/12/2023	
NSGF	1612	09/01/1993	06/01/2024	1993-07-10, 1993-12-04, 1995-12-30, 1999-01-02, 2006-01-07, 2012-07-07

ILRSA Combination expected by end of September

- v85 Orbit-product status?

v320 product - submission status

Pos/Eop estimates

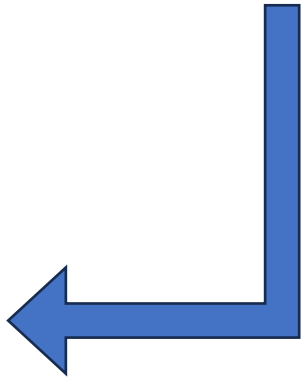
+

RBIAS estimates for the stations for:

1) Lageos1/2
2) Etalon Combined
3) **Lares2**

- ASI, DGFI, ESA, GFZ routinely submission
- CNES routinely submission from 240427
- NSGF uploaded complete series uploaded 17/04, last solution 240413.
- BKG uploaded complete series (uploaded 14/06) and since then routinely submission
- JCET no solution

*LAGEOS/LARES2 RBIAS – **v280** and **v320** comparison*



Pos/Eop estimates

+

RBIAS estimates for the stations for:

1) Lageos1/2
2) Etalon Combined

Pos/Eop estimates

+

RBIAS estimates for the stations for:

1) Lageos1/2
2) Etalon Combined
3) **Lares2**

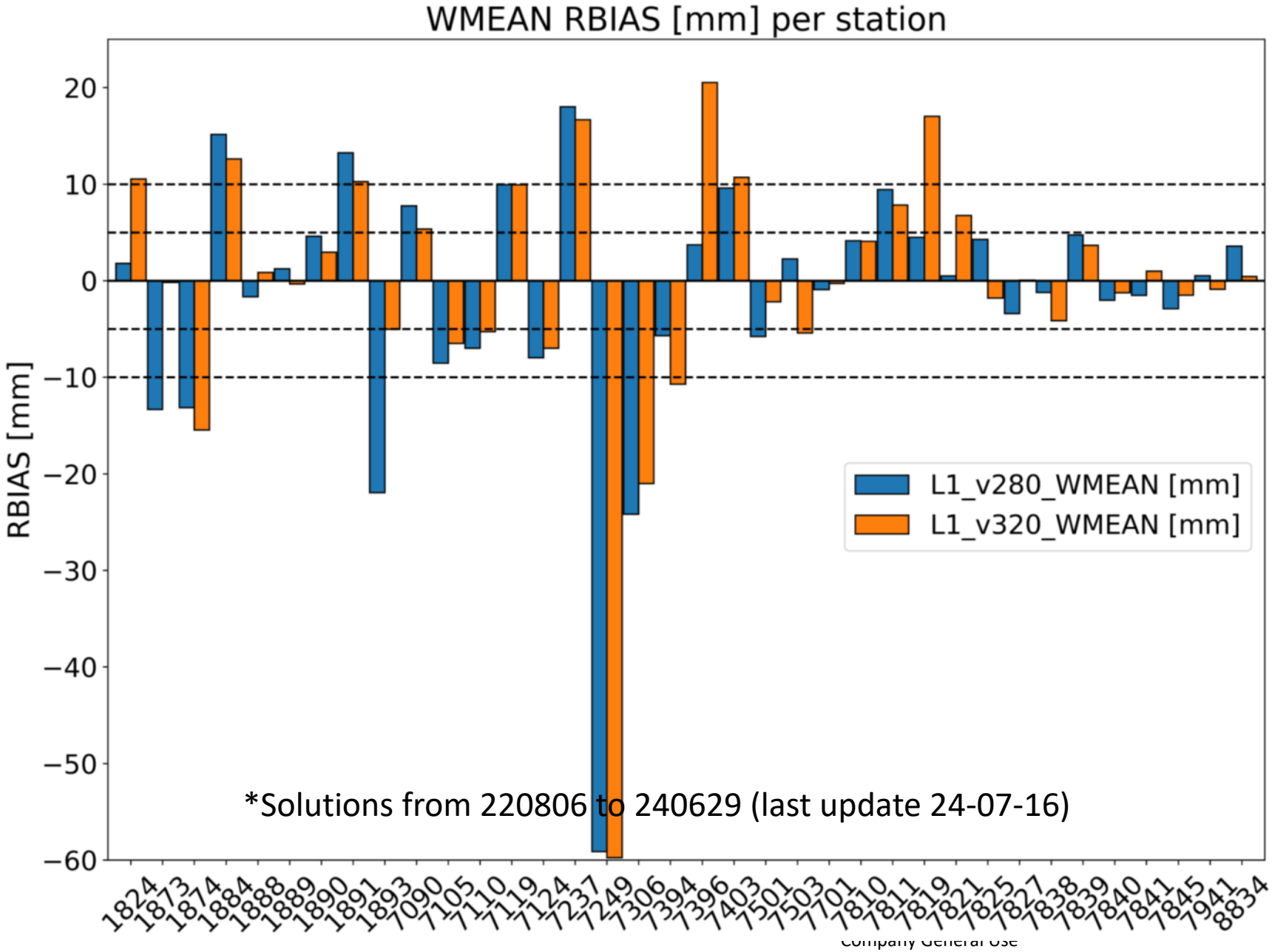
*LAGEOS/LARES2 RBIAS – **v280** and **v320** comparison*

1. Comparison **Lageos** RBIAS **v320/v280** product*.

2. Comparison **Lageos/LARES-2** RBIAS **v320** product.

*v280 is extended backward with v230 product

*LAGEOS RBIAS – **v280** and **v320** comparison*



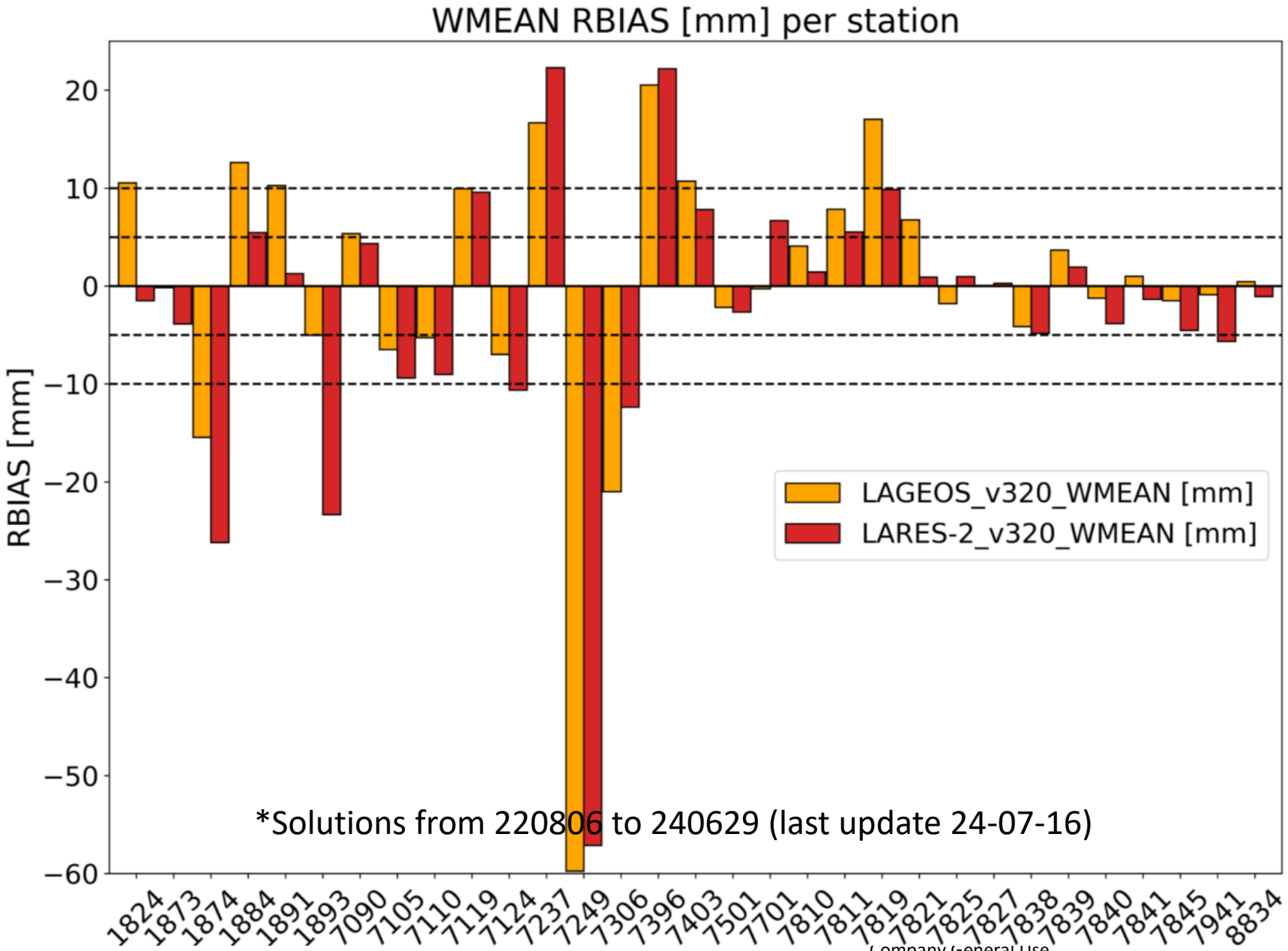
*Solutions from 220806 to 240629 (last update 24-07-16)

Station	L1_v280_WMEAN [mm]	L1_v320_WMEAN [mm]
1824	1.78	10.53
1873	-13.32	-0.18
1874	-13.15	-15.46
1884	15.15	12.61
1888	-1.67	0.84
1889	1.24	-0.33
1890	4.61	2.95
1891	13.23	10.25
1893	-21.95	-5.03
7090	7.74	5.35
7105	-8.52	-6.49
7110	-6.98	-5.27
7119	9.97	9.92
7124	-7.99	-6.99
7237	18.01	16.66
7249	-59.12	-59.74
7306	-24.19	-21.00
7394	-5.70	-10.71
7396	3.71	20.52
7403	9.61	10.71
7501	-5.78	-2.18
7503	2.26	-5.40
7701	-0.92	-0.28
7810	4.14	4.08
7811	9.44	7.83
7819	4.49	17.02
7821	0.49	6.75
7825	4.27	-1.79
7827	-3.39	0.04
7838	-1.21	-4.14
7839	4.75	3.66
7840	-2.02	-1.24
7841	-1.51	1.00
7845	-2.89	-1.49
7941	0.51	-0.90
8834	3.58	0.44

Very Preliminary analysis

- Comparable Values (except some cases)
- Further investigation needed

LAGEOS/LARES-2 RBIAS – v320 comparison



*Solutions from 220806 to 240629 (last update 24-07-16)

Station	LAGEOS_v320_WMEAN [mm]	LARES-2_v320_WMEAN [mm]
1824	10.53	-1.48
1873	-0.18	-3.86
1874	-15.46	-26.19
1884	12.61	5.45
1891	10.25	1.27
1893	-5.03	-23.35
7090	5.35	4.34
7105	-6.49	-9.38
7110	-5.27	-9.03
7119	9.92	9.58
7124	-6.99	-10.64
7237	16.66	22.30
7249	-59.74	-57.14
7306	-21.00	-12.38
7396	20.52	22.19
7403	10.71	7.81
7501	-2.18	-2.65
7701	-0.28	6.67
7810	4.08	1.42
7811	7.83	5.53
7819	17.02	9.84
7821	6.75	0.91
7825	-1.79	0.97
7827	0.04	0.27
7838	-4.14	-4.82
7839	3.66	1.93
7840	-1.24	-3.84
7841	1.00	-1.36
7845	-1.49	-4.54
7941	-0.90	-5.67
8834	0.44	-1.08

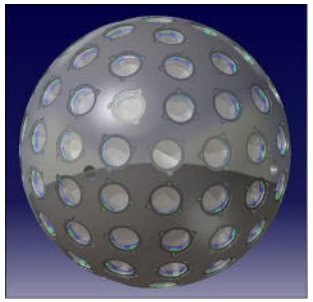
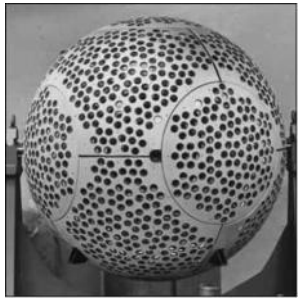
Very Preliminary analysis

- Lares2 seems to have smaller RBIAS (except some cases)
- Further investigation needed

NASA GSFC/JCET ILRSB Update, 2024/07

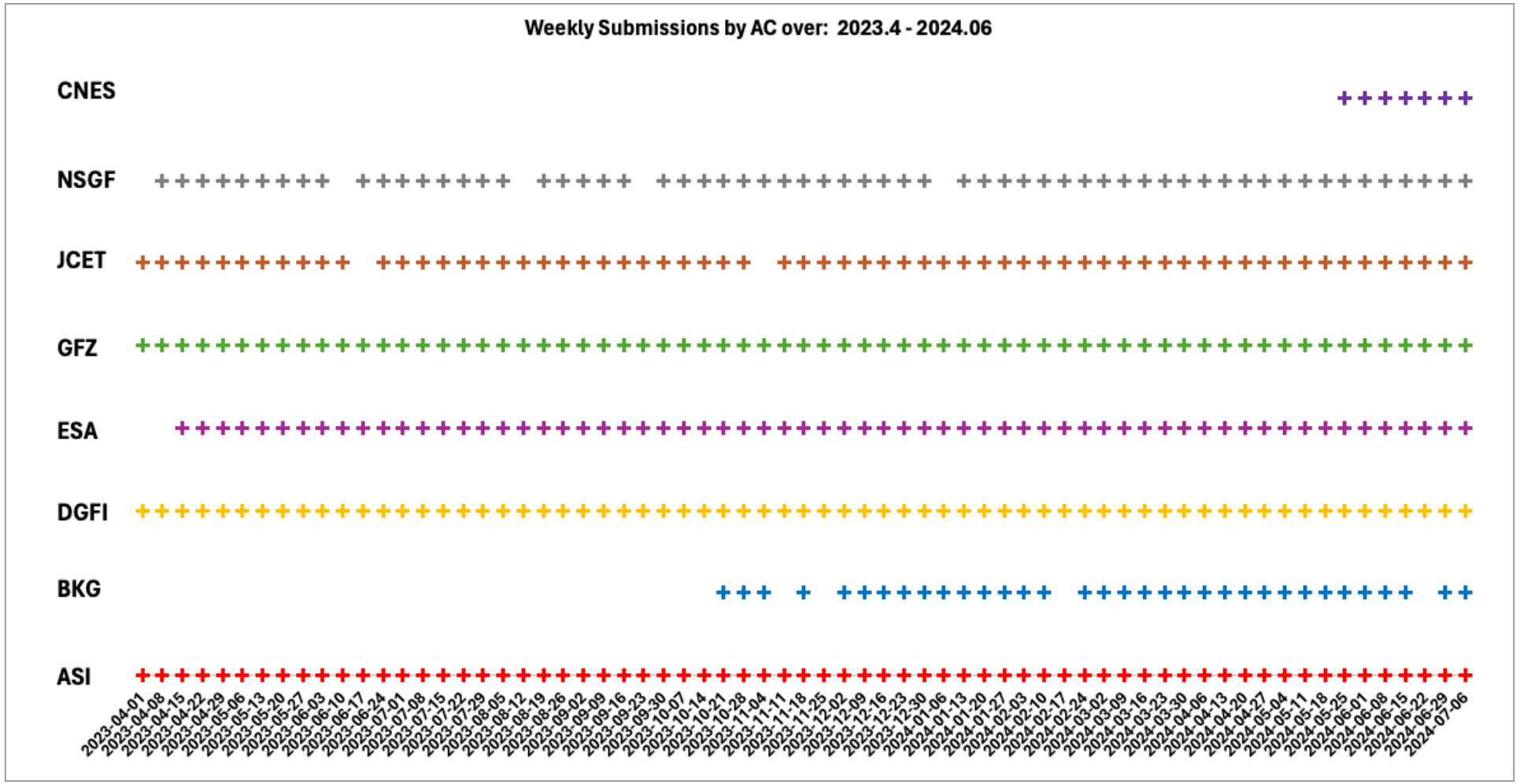
ILRS Analysis Standing Committee Meeting (2024/07)
Cyberspace,
July 23, 2024

Frank G. Lemoine (1), Magdalena-Kuzmicz Cieslak (2,1), Keith Evans (2,1)
(1) NASA GSFC, Greenbelt, Maryland, U.S.A.
(2) Joint Center for Earth System Technology, Univ. of Maryland, Baltimore County, Baltimore, Maryland, U.S.A.

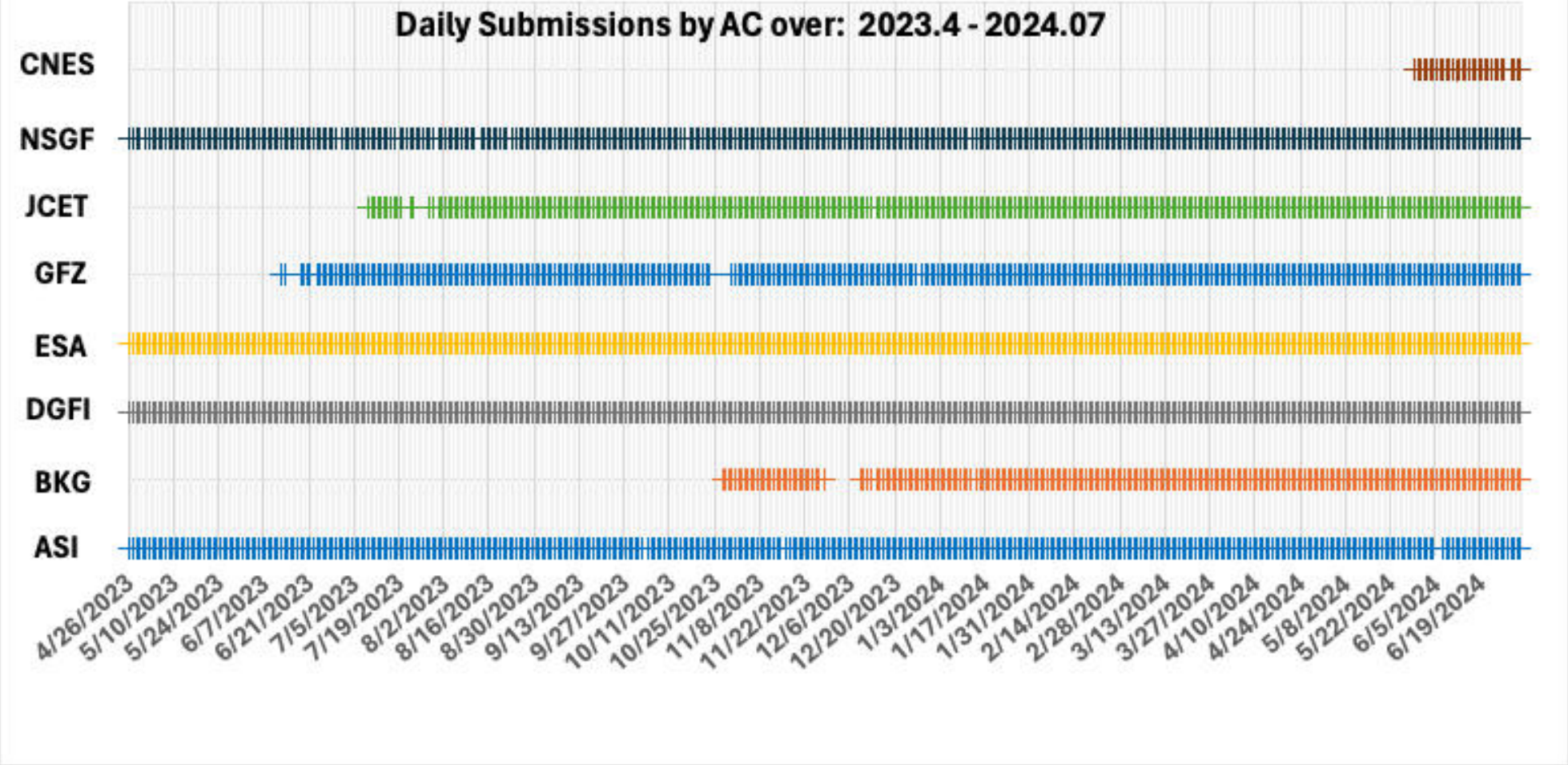

ILRSB Status v80: Solution availability by AC

v80

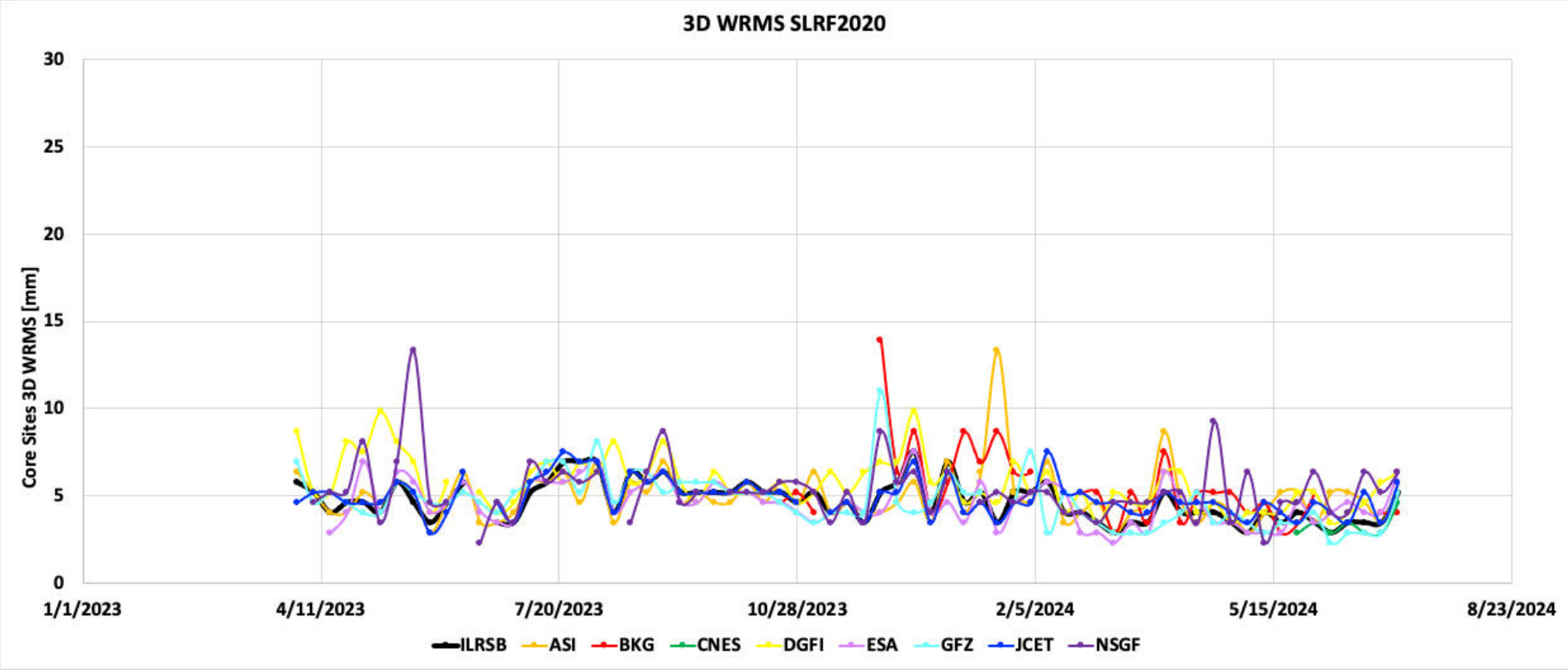


ILRSB Status v180: Solution availability by AC

v180

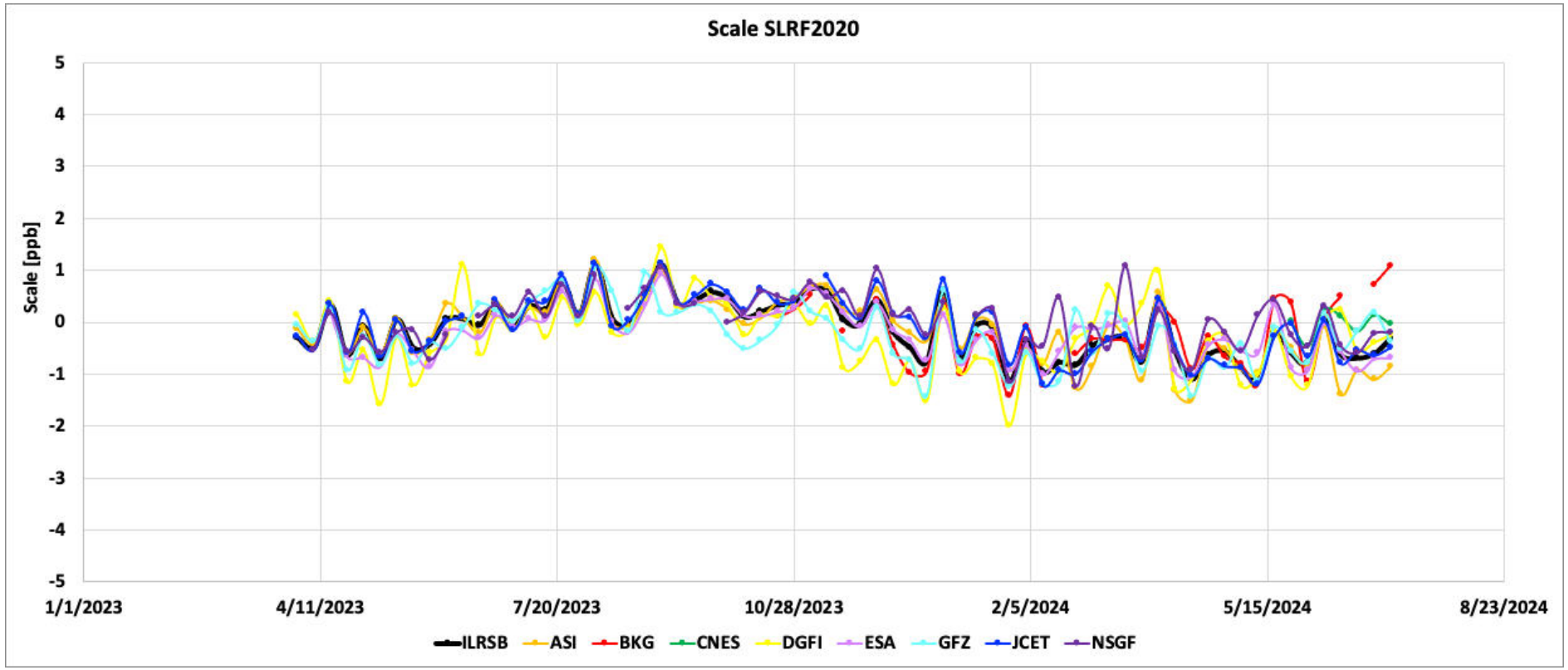


ILRSB Status v80: Core WRMS



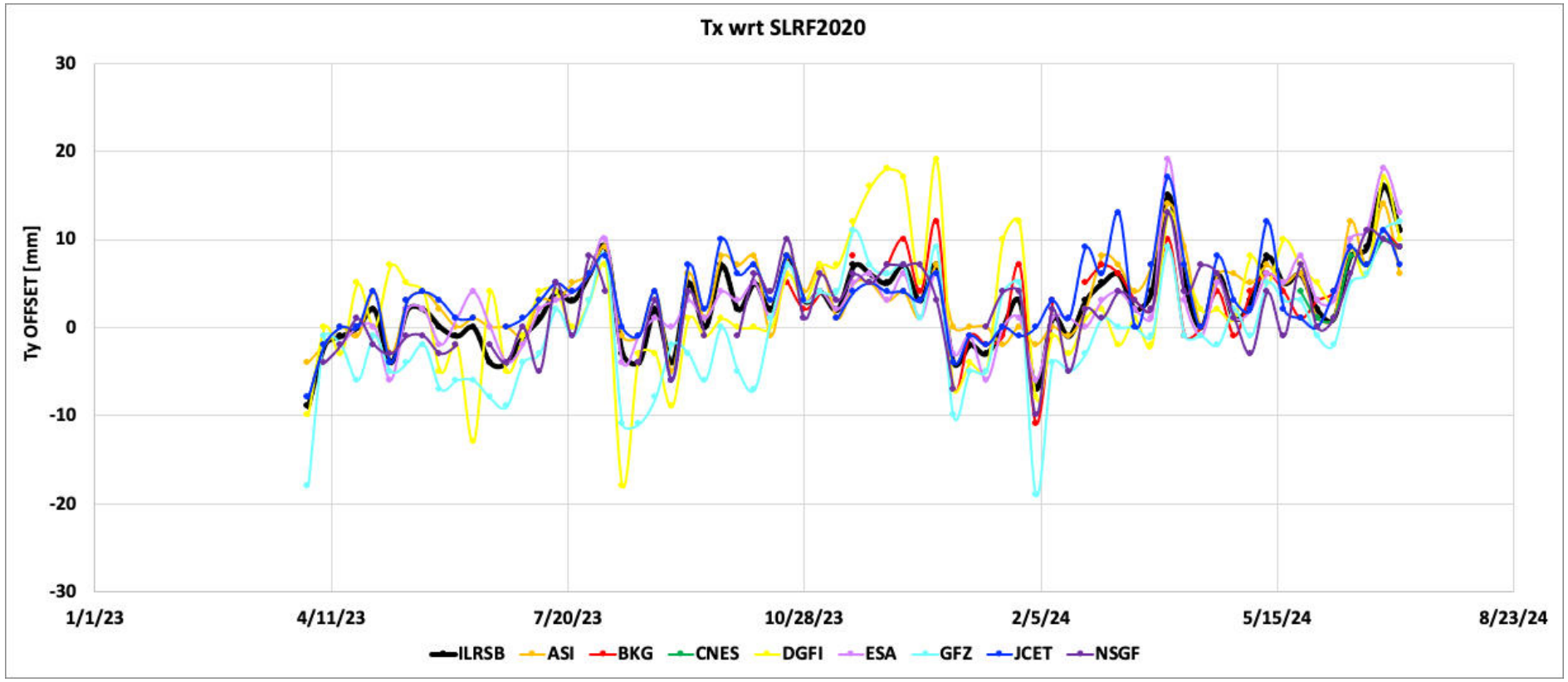
AC	Mean ± StdDev
ILRSB	4.7±1.1
ASI	5.0±1.5
BKG	5.5±2.2
CNES	3.3±0.6
DGFI	5.7±1.4
ESA	4.6±1.2
GFZ	4.7±1.5
JCET	4.9±1.0

ILRSB Status v80: Scale



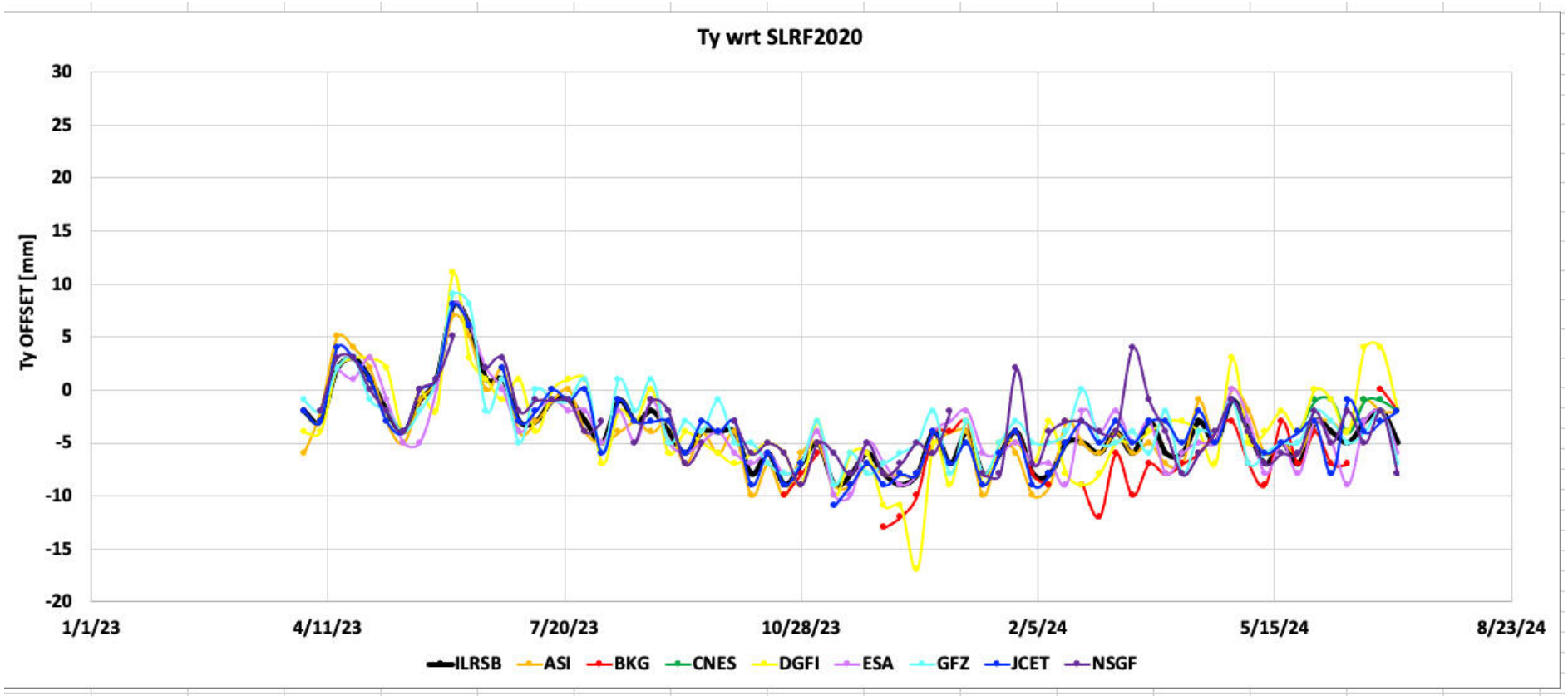
AC	Mean ± StdDev
ILRSB	-0.1±0.5
ASI	-0.2±0.6
BKG	-0.3±0.6
CNES	0.0±0.2
DGFI	-0.3±0.7
ESA	-0.2±0.5
GFZ	-0.2±0.6
JCET	-0.1±0.6

ILRSB Status v80: Tx



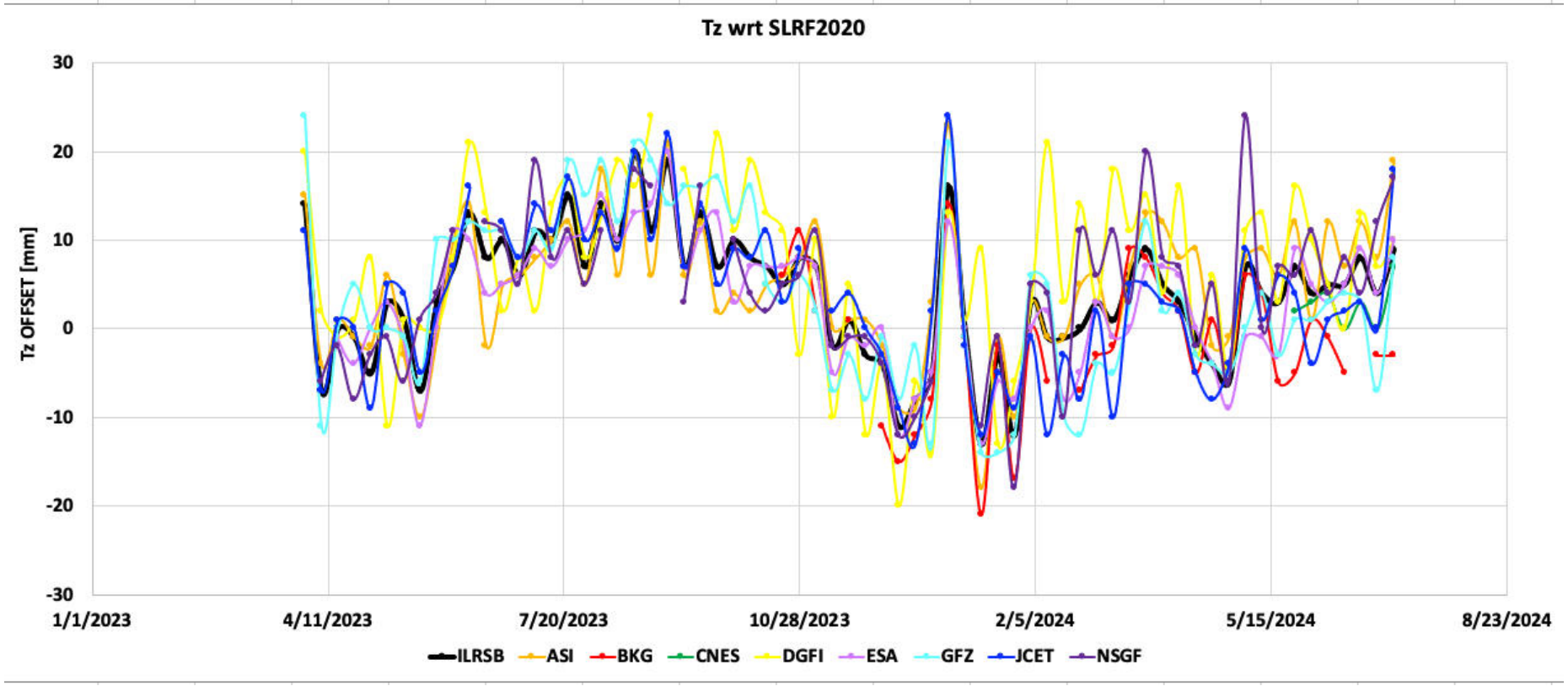
AC	Mean ± StdDev
ILRSB	2.5±4.7
ASI	3.3±4.1
BKG	3.7±4.9
CNES	5.7±3.7
DGFI	2.7±7.2
ESA	2.7±4.8
GFZ	-0.9±6.3
JCET	3.4±4.5
NSGF	2.0±4.8

ILRSB Status v80: Ty



AC	Mean ± StdDev
ILRSB	-3.9±3.4
ASI	-4.0±3.7
BKG	-6.8±3.0
CNES	-2.0±1.4
DGFI	-3.5±4.5
ESA	-4.0±3.6
GFZ	-3.3±3.5
JCET	-3.7±3.7
NSGF	-3.4±3.3

ILRSB Status v80: Tz



AC	Mean ± StdDev
ILRSB	3.8±7.2
ASI	4.7±7.7
BKG	-2.0±7.9
CNES	2.0±1.7
DGFI	6.5±9.9
ESA	2.8±7.2
GFZ	3.6±9.7
JCET	3.2±8.5
NSGF	4.0±8.6

Today's agenda

0)	Last meeting + open Action Items (AIs)	(MB, CL)	10 minutes
1)	Status reports of SLR CCs	(CL, FL)	30 minutes
2)	**Satellite-/station-weighting strategies**	(AB, MB)	20 minutes
3)	Update of the SLRF2020 and ILRS ECC files	(MB)	10 minutes
4)	LARES and SH pilot project	(MB)	20 minutes
5)	ESA's Genesis mission	(CC, MB)	10 minutes
6)	DSC files at ILRS website	(MB)	10 minutes
7)	Any other business and next ASC meeting	(all)	10 minutes

Satellite-/station-weighting strategies

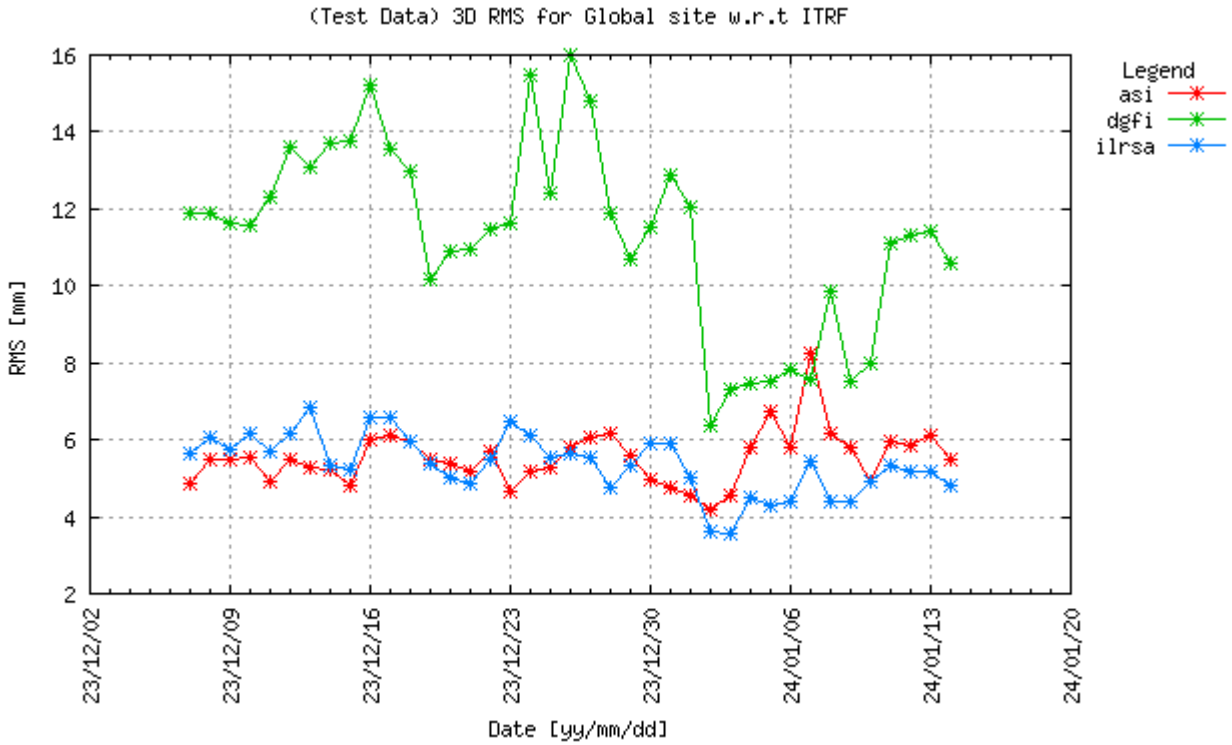
- Motivation of the survey: DGFI-TUM and other ACs have significant higher WRMS values when comparing HT residuals for ILRS (core) network
  - potential causes: different station/observation weighting strategy or different satellite weighting strategy?
  - strategy to quantify impact on DGFI-TUM solution: providing 4 different solutions to ASI CC to check ;-)

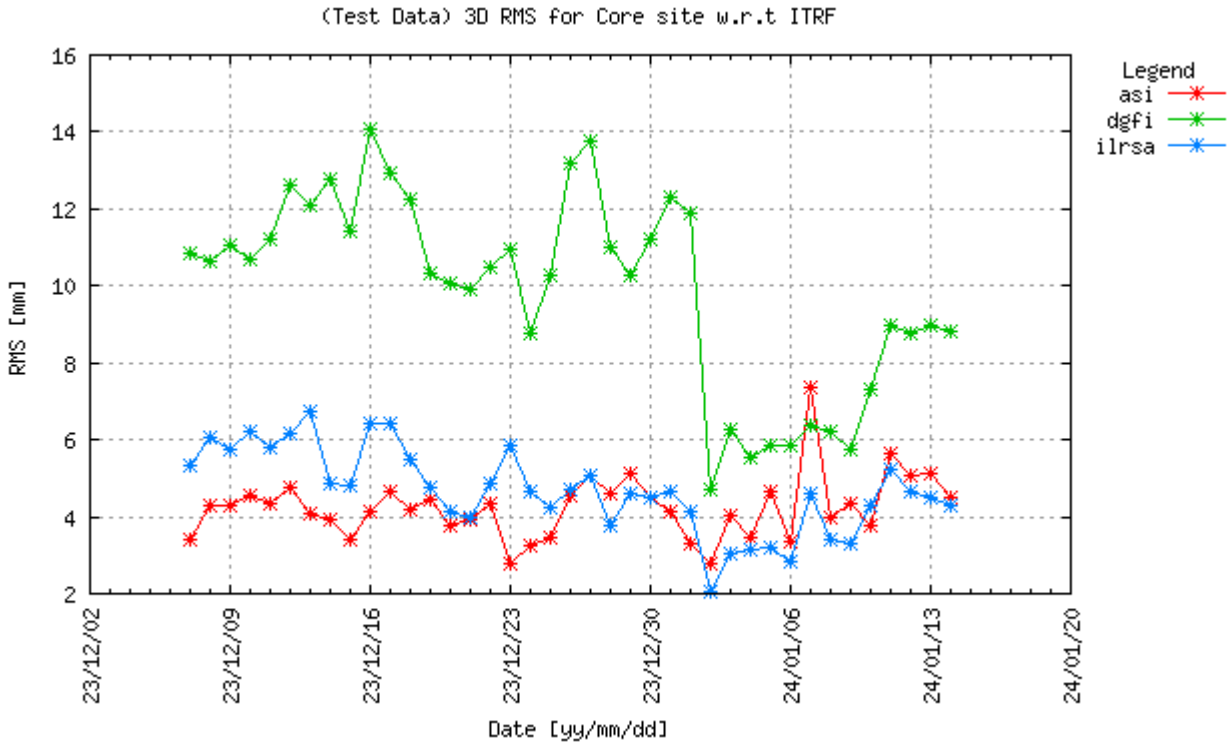
	station/observation weighting	satellite weighting	short code
v180 (operational)	1 cm constant	VCE	A
v180 (special_1)	categorized weighting scheme applied*	VCE	B
v180 (special_2)	1 cm constant	equal weights	C
v180 (special_3)	categorized weighting scheme applied*	equal weights	D

(*) 4 station categories defined: 1st (best/core stations): 2 cm σ, 2nd level (good stations): 5 cm σ, 3rd level (OK stations): 20 cm σ, 4th (rest) level (unknown, new, or bad stations): 50 cm σ

Satellite-/station-weighting strategies

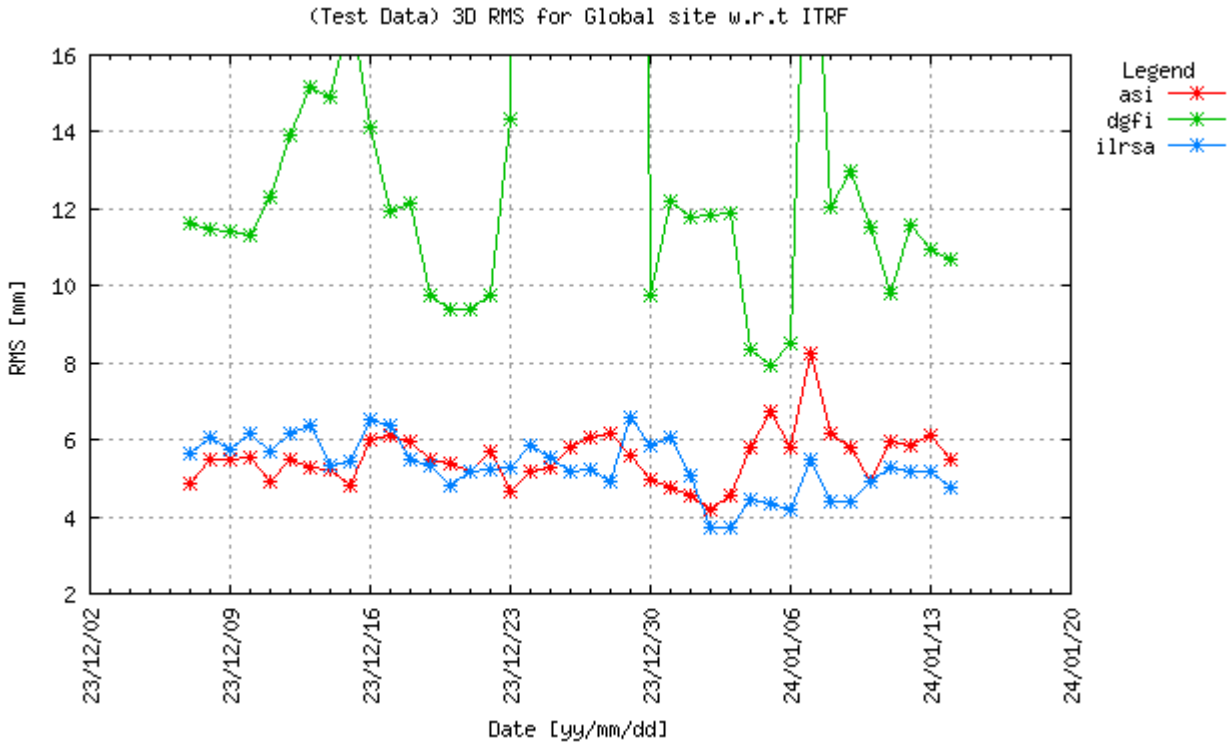
- A: v180-like DGFI-TUM solution (1cm equal weights for all stations, satellite weighting based on VCE)

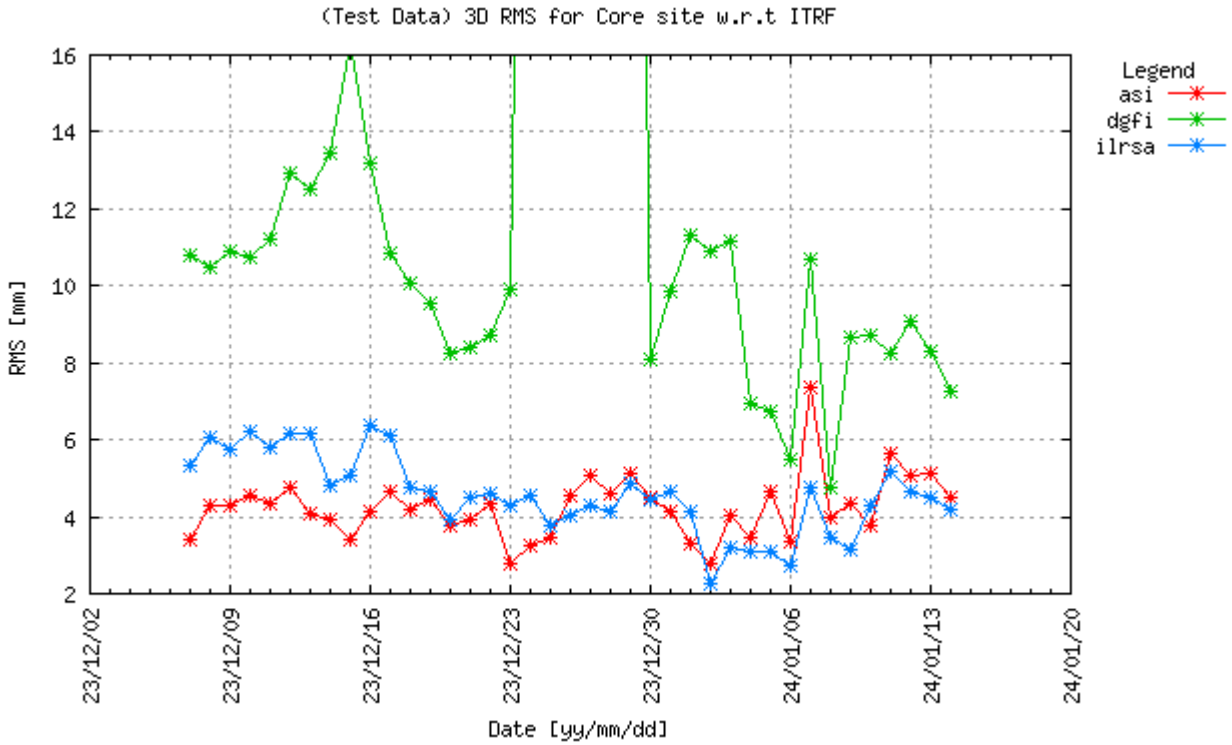




Satellite-/station-weighting strategies

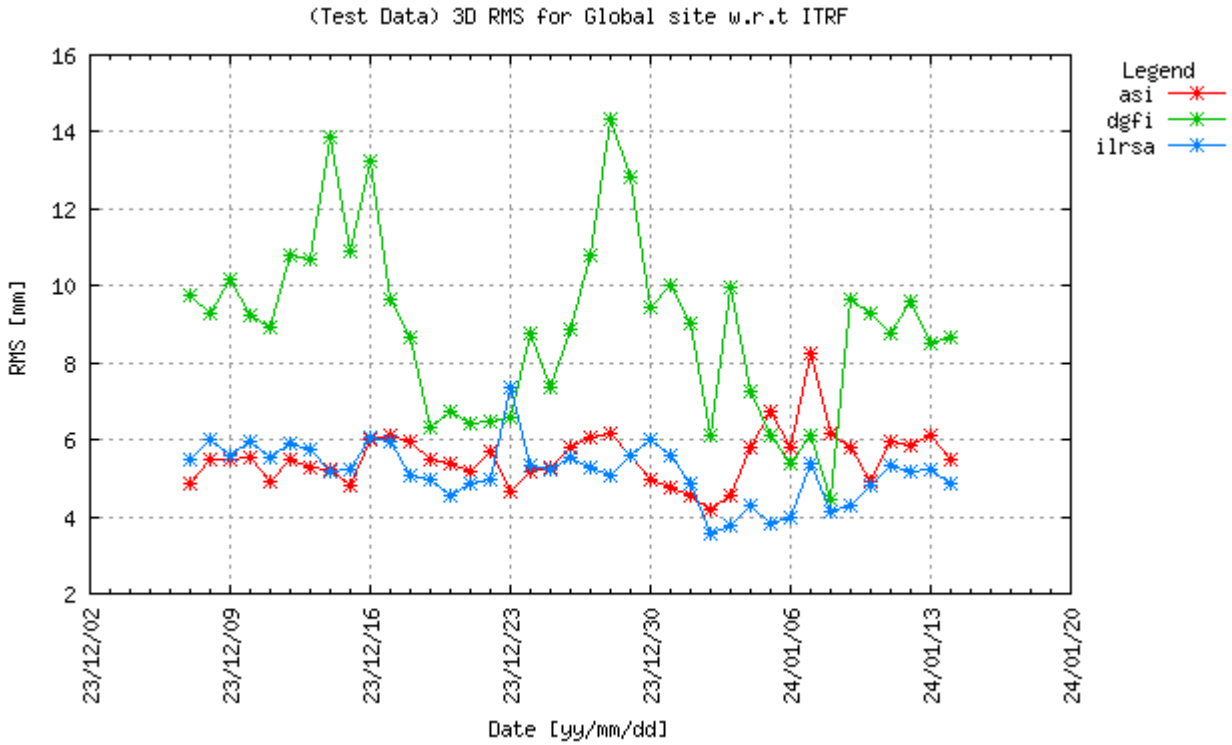
- C: equal satellite weights applied (1cm equal weights for all stations, equal (1.0) weights for all satellites)
- Equally weighted satellites negatively impacts the solution!

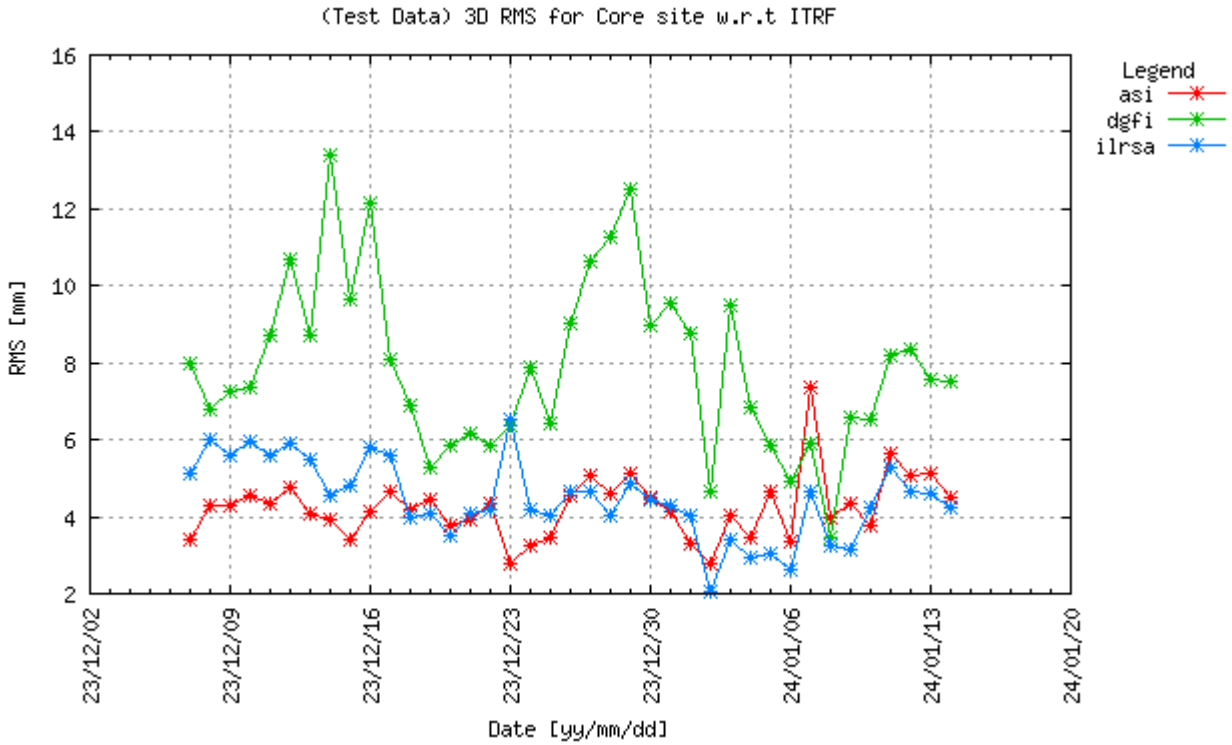




Satellite-/station-weighting strategies

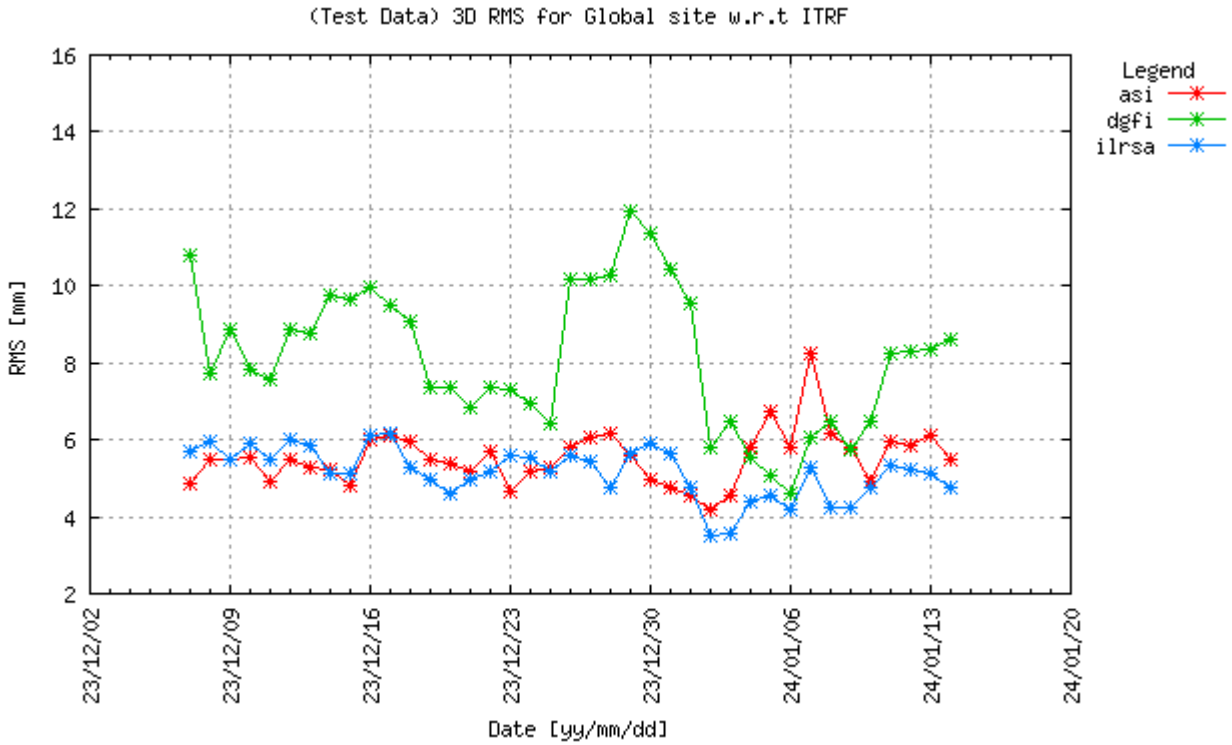
- D: categorized station weighting (4 categories for stations, 2cm to 50 cm σ, equal (1.0) weights for all satellites)
- “individual/categorized” station weighting positively impacts the solutions!

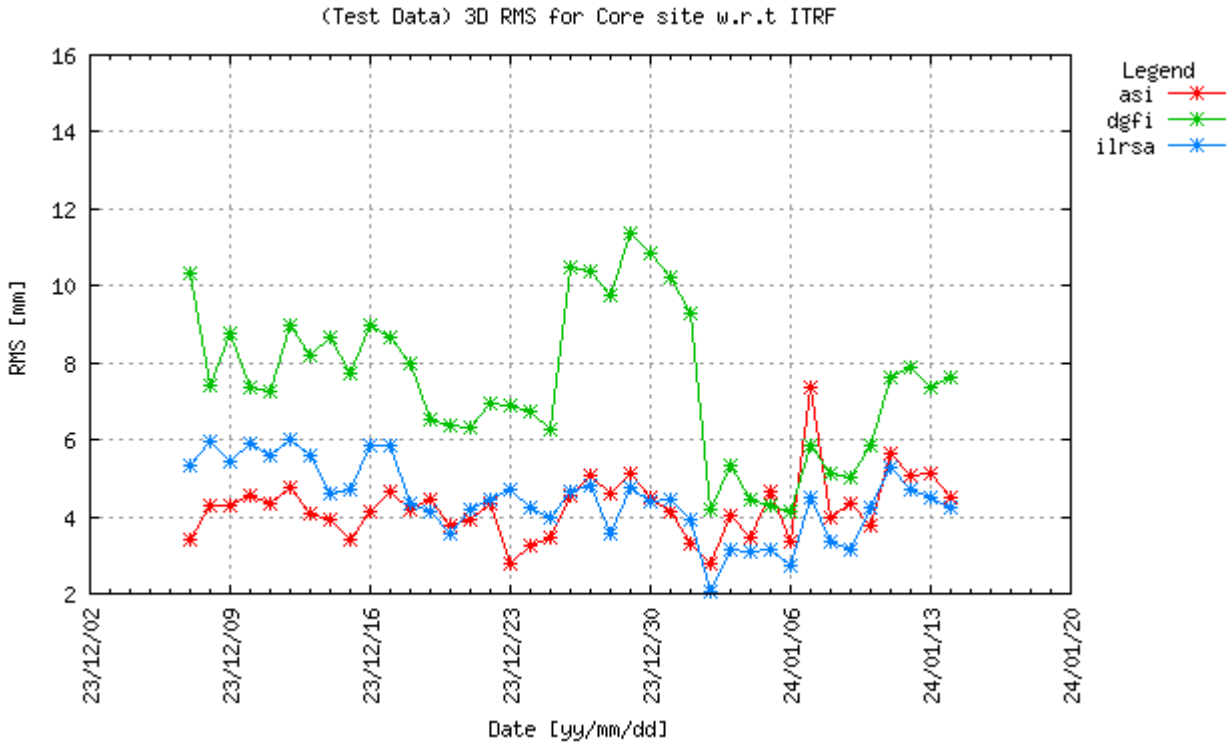




Satellite-/station-weighting strategies

- B: categorized station weighting (4 categories for stations, 2cm to 50 cm σ, satellite weighting based on VCE)
- Best results obtained by using the categorized station weighting + VCE-based satellite weighting!





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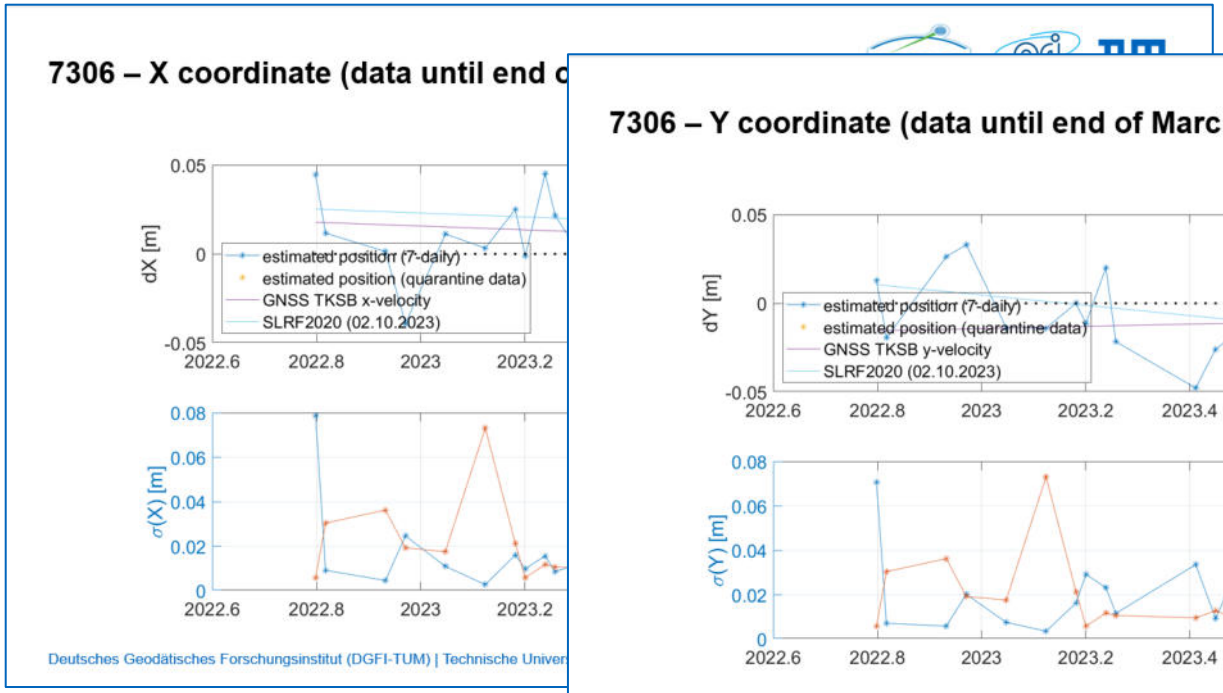
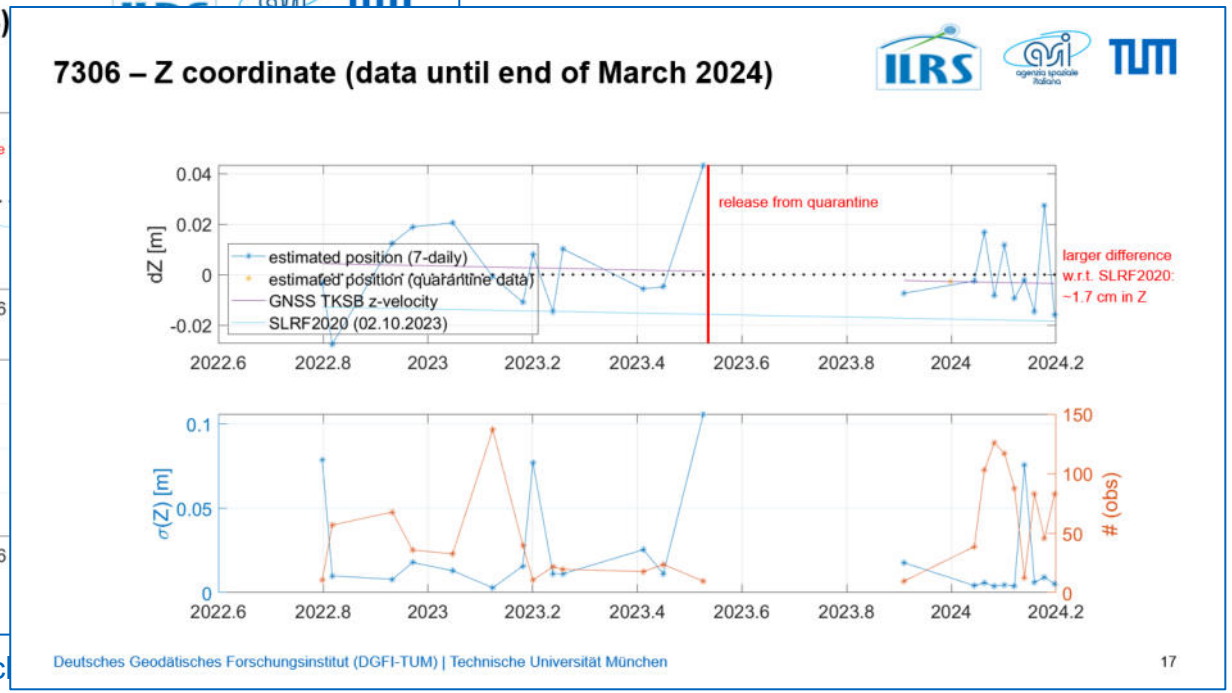
Update of the SLRF2020 and ILRS ECC files

- Updates of the SLRF2020
  - current version: SLRF2020_POS+VEL_2023.10.02.snx
  - updates: new coordinates for Tsukuba after earthquake mid of 2023 and quarantine release in fall 2023





Update of the SLRF2020 and ILRS ECC files

- Updates of the SLRF2020
  - current version: SLRF2020_POS+VEL_2023.10.02.snx
  - updates: new coordinates for Tsukuba after earthquake mid of 2023 and quarantine release in fall 2023
    - differences between SLRF2020 position and newly estimated position reach cm-level (esp. in Y and Z, i.e., east and height)
    - newly estimated 7306 coordinates
    - reference epoch: 01.01.2024
    - estimates based on v280-like solution

	(data until end of February 2024)		(data until end of March 2024)	
	offset [m, m/yr]	STD [m, m/yr]	offset [m, m/yr]	STD [m, m/yr]
X	-3961641.0325	0.0119	-3961641.0182	0.0099
Y	3308774.4441	0.0116	3308774.4428	0.0099
Z	3734291.4632	0.0168	3734291.4603	0.0139
dX	-0.0105	0.0050	-0.0105	0.0050
dY	0.0064	0.0050	0.0064	0.0050
dZ	-0.0042	0.0050	-0.0042	0.0050

Update of the SLRF2020 and ILRS ECC files

- Updates of the SLRF2020
  - current version: SLRF2020_POS+VEL_2023.10.02.snx
  - updates: new coordinates for Tsukuba after earthquake mid of 2023 and quarantine release in fall 2023

    new coordinates for San Fernando soon (acc. to Manuel Sánchez Piedra)

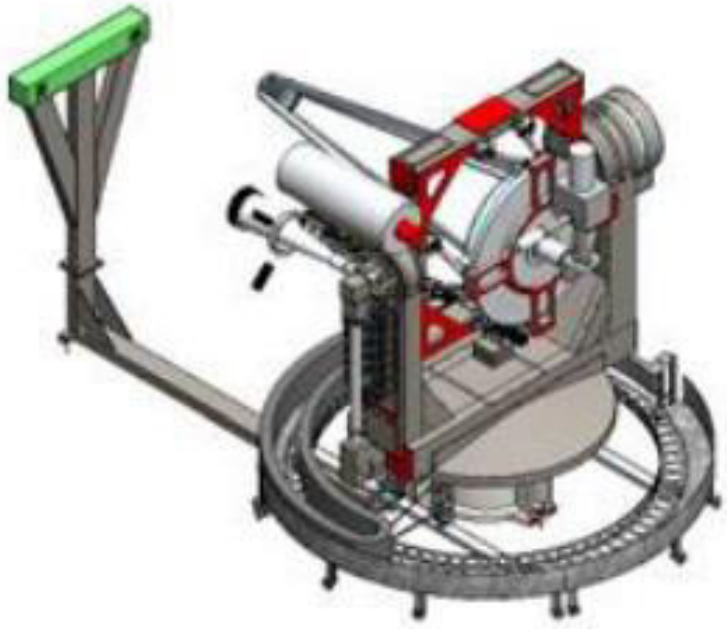
Dear Mathis,

Thank you for your quick response and the coordination that Van has done.

I confirm you that we have not rebuilt our mount, rather it is a completely new one so the reference point will be completely new.
What type of information do you need, do you want a design plan or documentation of the tests we have carried out?

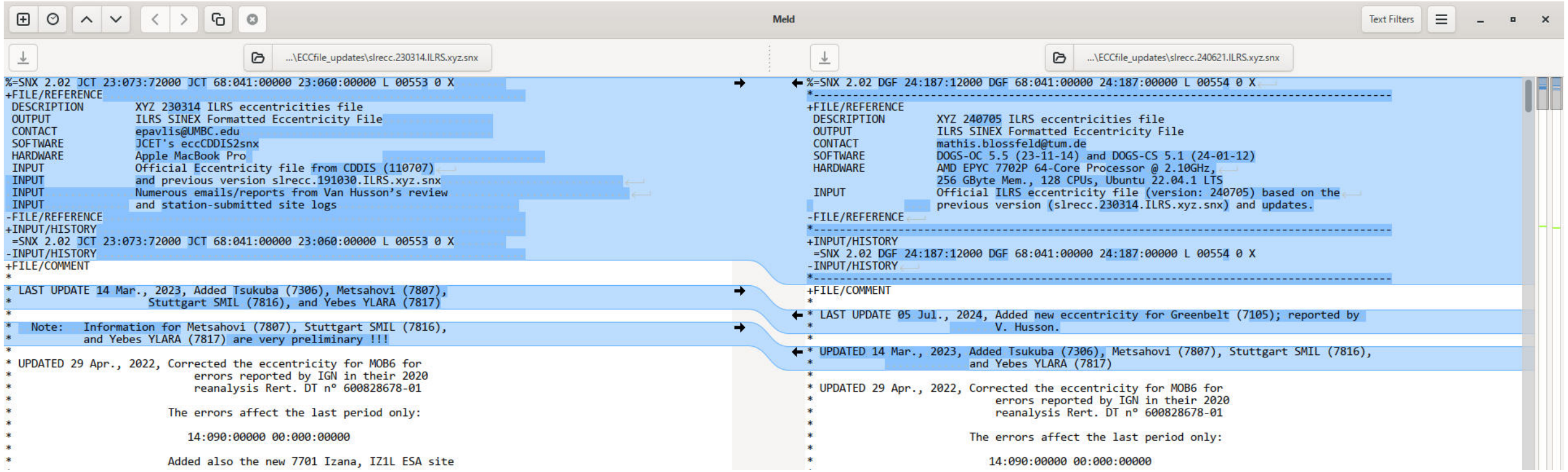
These are the values that we have obtained in relation with the design of our new mount (measured with a laser tracker):

- Azimuth rotation flatness 0.03mm
- Azimuth rotation circularity 0.02mm
- Turn flatness Elevation 0.01mm
- Turn circularity Elevation 0.01mm
- Crossing distance between Azimuth and Elevation axis 0.21mm
- Perpendicularity error between Azimuth and Elevation axis 0.0184°



Update of the SLRF2020 and ILRS ECC files

- Updates of the ILRS ECC file
  - current version: slrecc.230314.ILRS.xyz.snx, slrecc.230314.ILRS.une.snx
  - updates: new 7105 eccentricity (still ongoing), new mount at 7824, other issues reported by Van…



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LARES and SH pilot project

- Last step forward was made end of October 2023 (ASC meeting)
- Critical points:
  - several ACs indicate their availability for this PP (v300 label)
  - SINEX file interface is already well established
  - solution setup is clear: v80-like “solution” plus SH up to d/o 6; preferably, NEQs instead of solutions should be submitted to CDDIS
  - combination will be done at DGFI-TUM (to not cause additional workload to CCs)
  - When should we start?? After summer break? Reduced number of satellites, limited time, etc.

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ESA’s Genesis mission

- Slides to be presented by Clement Courde

ESA’s Genesis mission … and the ASC…

- How should the ILRS ASC position itself in the framework of Genesis?
- Main goal of ASC (cf. ILRS website)

The prime objective of ILRS' Analysis Standing Committee (ASC) is the exploitation of the tracking data collected by ILRS and the generation of several scientific data products, based on these Satellite Laser Ranging (SLR) and Lunar Laser Ranging (LLR) observations. At present, the most commonly available products include **station coordinates** and velocities, **Earth Orientation Parameters (EOP)**, reference frame (RF) realizations based exclusively on SLR data, time series of vector variations of the RF origin w.r.t. the geocenter (commonly referred to as 'geocenter motion'), time series of SINEX files (typically of weekly resolution) with position and EOP estimates and their covariance, time series of low degree harmonic variations, satellite orbits in SP3c formatted files, contributions to lunar ephemerides, and many others.

ESA's Genesis mission … and the ASC…

- How should the ILRS ASC position itself in the framework of Genesis?
- Main goal of ASC (cf. ILRS website)
- Genesis will impact the SLR-based (SLR-only, pre-combined, etc.) contribution to the ITRF; the ASC might think about connecting ACs/AACs which plan to analyze SLR observations to Genesis
- Advantages:
  - ASC can ensure high quality of SLR-based ITRF contribution (one main goal of the ASC!!)
  - Synergies of this communication might help official ACs to include other satellites (spherical/non-spherical) as well…
- How? Installation of an ASC pilot project?

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DSC files at ILRS website

- Update of the ILRS Analysis websites → I will start to work on this after the summer break…
  - Revisit the website structure
  - Include overview of products (and its labels;-)
  - Links to product-based DSC files


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                    INTERNATIONAL LASER RANGING SERVICE

                       Centre National d'Etudes Spatiales (CNES)

                        Analysis Strategy Summary


================================================================================
ANALYSIS CENTRE    | Centre National d'Etudes Spatiales (CNES),
                   | Toulouse, France
--------------------------------------------------------------------------------
CONTACT PERSONS    | Franck Reinquin (franck.reinquin@cnes.fr ;
                   |                  tel +33-5-61-33-28-91)
                   | Adrian BaÃ±os Garcia (abanos@groupcls.fr;
                   |                  tel +34-669-43-67-13)
--------------------------------------------------------------------------------
SOFTWARE USED      | GINS, DYNAMO
--------------------------------------------------------------------------------
ILRS PRODUCTS      | Weekly solution for coordinates of global SLR stations
                   | and daily Earth Orientation Parameters (x,y-pole, LOD)
                   | (SINEX format)
                   | Weekly solution for range biases of SLR stations
                   | (SINEX format)
                   | Daily 7-day solutions primarily for rapid EOP
                   | (SINEX format)
--------------------------------------------------------------------------------
PREPARATION DATE   | Effective for products after April 2024
================================================================================



--------------------------------------------------------------------------------
|                        MEASUREMENT MODELS                                    |
|------------------------------------------------------------------------------|
| Satellites used  | LAGEOS-1, LAGEOS-2, ETALON-1, ETALON-2, LARES-2           |
|------------------------------------------------------------------------------|
| Basic measurement| Satellite Laser Ranging (SLR): round-trip travel time     |
|                  |-----------------------------------------------------------|
|                  | Speed of light         : 299792458 m/s                    |
|                  | wavelength             : all wavelength values used by    |
|                  |                          stations                         |
|                  | Elevation angle cutoff : 12 degrees                       |
|                  | Weighting              : station-dependent                |
|                  | Range biases           : * a priori from the ILRS Data    |
|                  |                            Handling File (DHF)            |
|                  |                          * estimated (with a priori       |
|                  |                            set to 0) for stations         |
|                  |                            listed in the DHF, or all      |
|                  |                            stations for the dedicated     |
|                  |                            weekly product                 |
|                  | Time biases            : * a priori from the DHF          |
|                  |                          * not estimated                  |
|                  | Tropospheric biases    : not modeled/estimated            |
```

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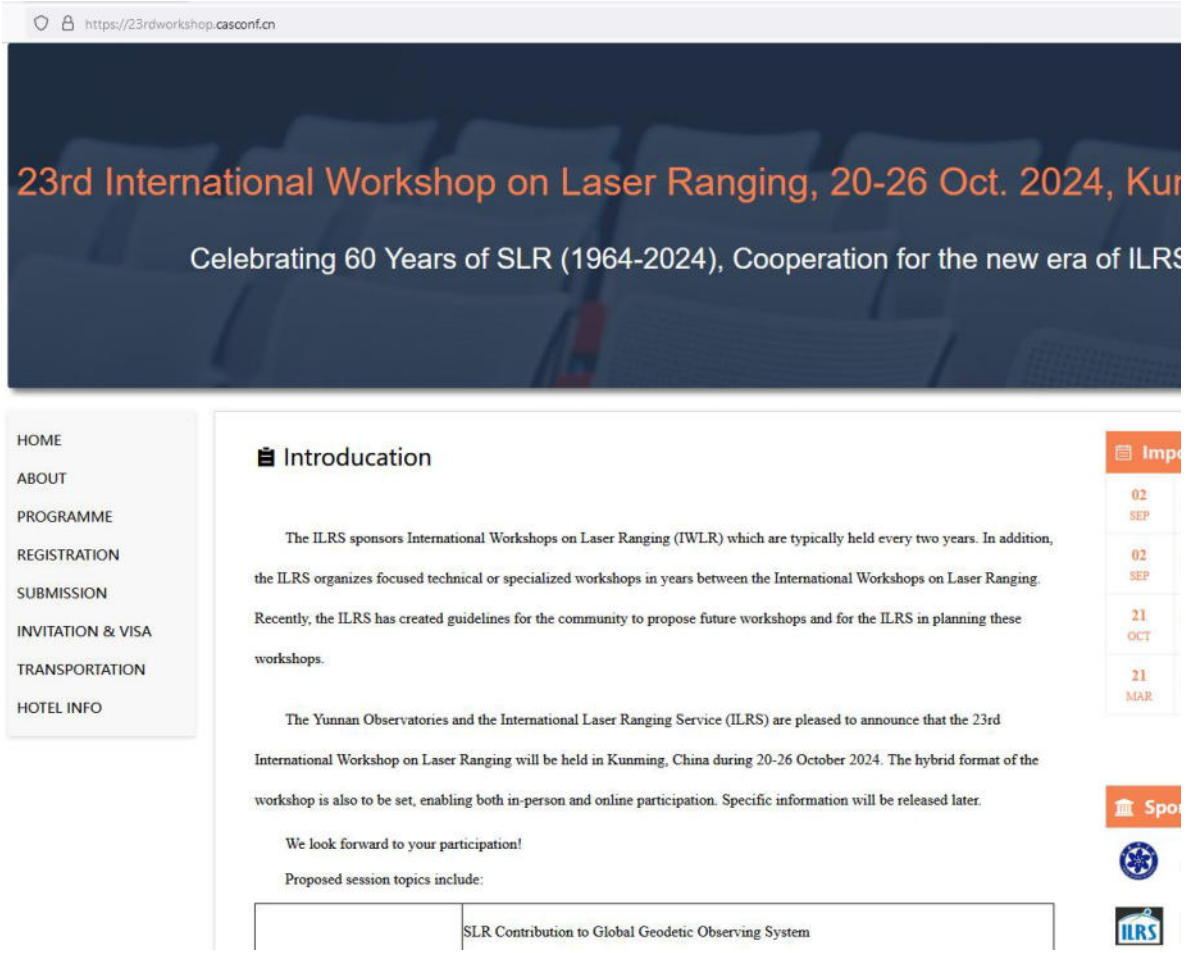
7)	**Any other business and next ASC meeting**	(all)	10 minutes

- IWLR 2024 in Kunming, China
- IAG/IERS JWG 1.2.4
- Next ILRS ASC meeting

ILRS WS in Kunming, China

- The ILRS circulated the **2nd announcement for the 23rd International Workshop on Laser Ranging**, to be held during the week of **October 20th- 26th, 2024, in Kunming, China** (website: **https://23rdworkshop.casconf.cn/**)



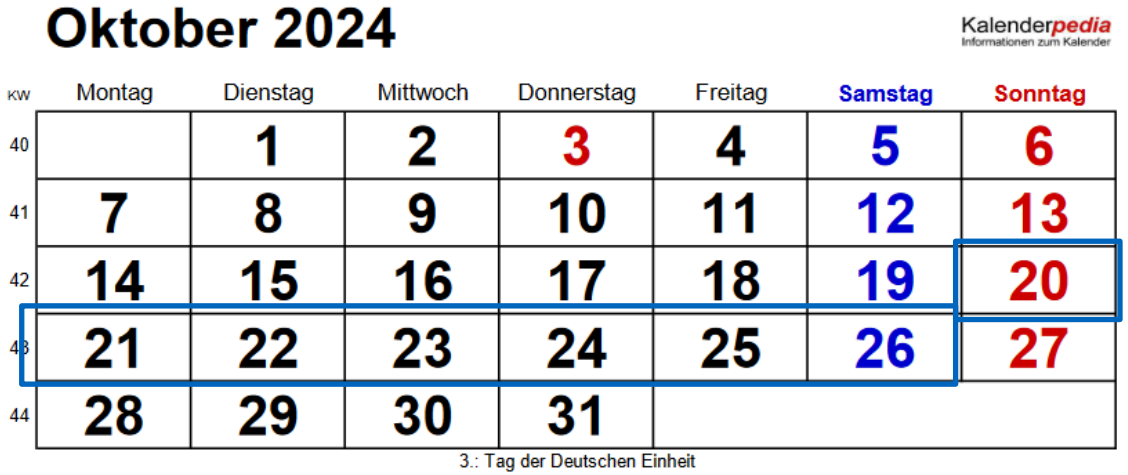
Sessions	Contents
Scientific application of SLR data	- SLR Contribution to Global Geodetic Observing System - Improvements in the SLR Product Quality & Precise Orbit Determination - Satellite Missions & Techniques for Geodetic Applications
Development of SLR technology	- New devices and technologies - Developments in instrumentation, detectors, timing systems, laser systems & laser safety
Lunar Laser Ranging & Deep Space Missions	- Advances in lunar laser ranging - Future deep space missions - Interplanetary laser ranging perspectives
Developments in Software& Automation	- Software techniques including automation, data processing - Operational safety - Optimised scheduling
Space Debris Sessions	- Sensors & Satellite Tracking - Orbit Determination & Propagation - Conjunction Analysis & Collision Avoidance - Mitigation & Remediation
Site Analysis	- Site operation and updates - Analysis on systematic errors
Corner cube reflector	- Design and development of new corner cube reflector

Short report from the IAG/IERS JWG 1.2.4

- Slides to be presented by A. Susnik

Next ILRS ASC meetings 2024?

- The next ILRS ASC meeting might be scheduled around the IWLR end of October…
- Between November 4th and 8th?

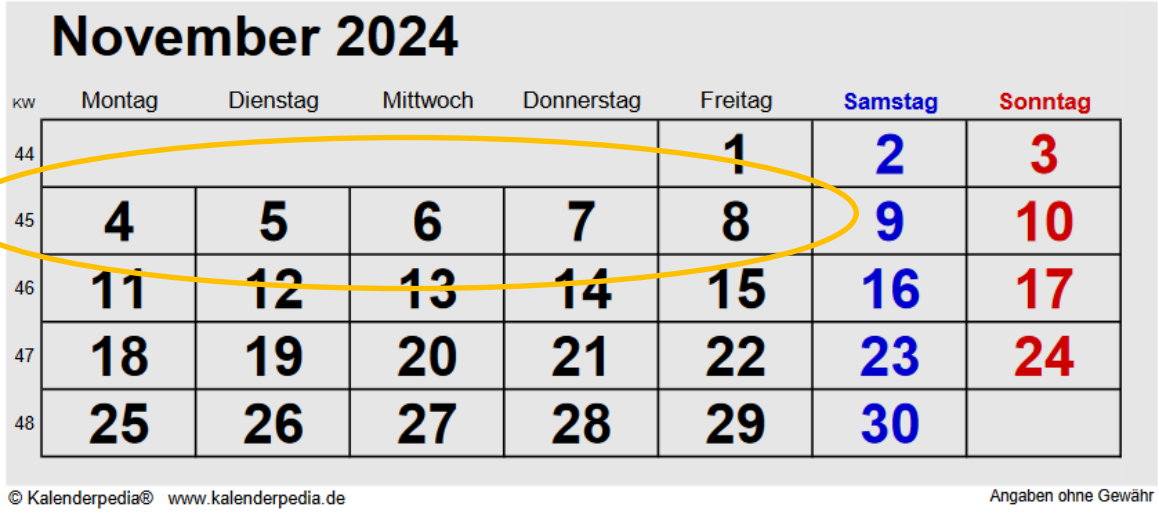


Oktober 2024

Kalenderpedia
Informationen zum Kalender

KW	Montag	Dienstag	Mittwoch	Donnerstag	Freitag	Samstag	Sonntag
40		1	2	3	4	5	6
41	7	8	9	10	11	12	13
42	14	15	16	17	18	19	20
43	21	22	23	24	25	26	27
44	28	29	30	31			

3.: Tag der Deutschen Einheit



November 2024

KW	Montag	Dienstag	Mittwoch	Donnerstag	Freitag	Samstag	Sonntag
44					1	2	3
45	4	5	6	7	8	9	10
46	11	12	13	14	15	16	17
47	18	19	20	21	22	23	24
48	25	26	27	28	29	30	

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