DPOD2020 version 4.0

Guilhem Moreaux (IDS Combination Center) – 2025/05/19

DPOD2020 v4.0

- **Based on the DORIS position and velocity cumulative solution ids25d01 (stacking of the IDS combined series ids 19/25 from 1993 doy 003 to 2024 doy 365).**

- **As version 3.0, this new release includes:**
  - **Annual and semi-annual corrections.**
  - **Periodic terms are only estimated for sites with observations after mid-2002.**
  - **Post-Seismic Deformation corrections from DORIS observations only.**

- **Available in SINEX and text formats.**

- **SINEX solution contains two additional (and unofficial) blocks:**
  - **SOLUTION/DISCONTINUITY: origin (ex: earthquake, beacon change, antenna problem…) of the position discontinuities.**
  - **SOLUTION/DATA_REJECT: periods of time not included in the combination.**

- **To facilitate the identification of stations which were active late 2024, for these stations, their ending time in the SOLUTION/EPOCHS were set to 49:365:86399.**

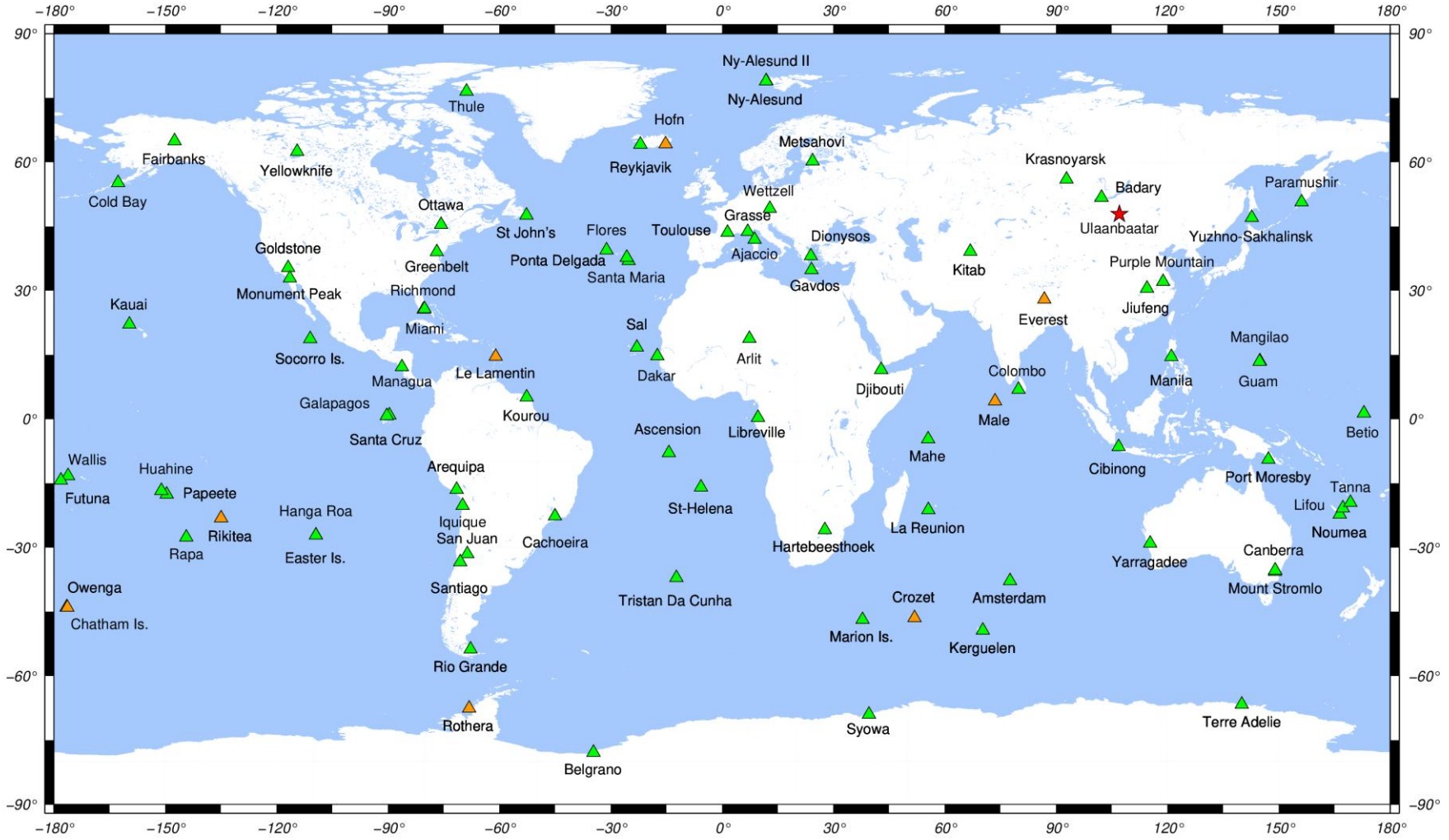
DPOD2020 v4.0 – Velocity Constraints

Site	DORIS station	Reference station	Technique	Source
Ajaccio	AJAB	AJAC	GNSS	ITRF2020
Gavdos	GAVC	DORIS mail 1367		
Hanga Roa	HROC	EISL	GNSS	ITRF2020
Huahine	HUAA	7123	Laser Ranging	ITRF2020
Ulaanbaatar	ULAC	ULAB	GNSS	ITRF2020

DPOD2020 v4.0 - Network

http://ids-doris.org

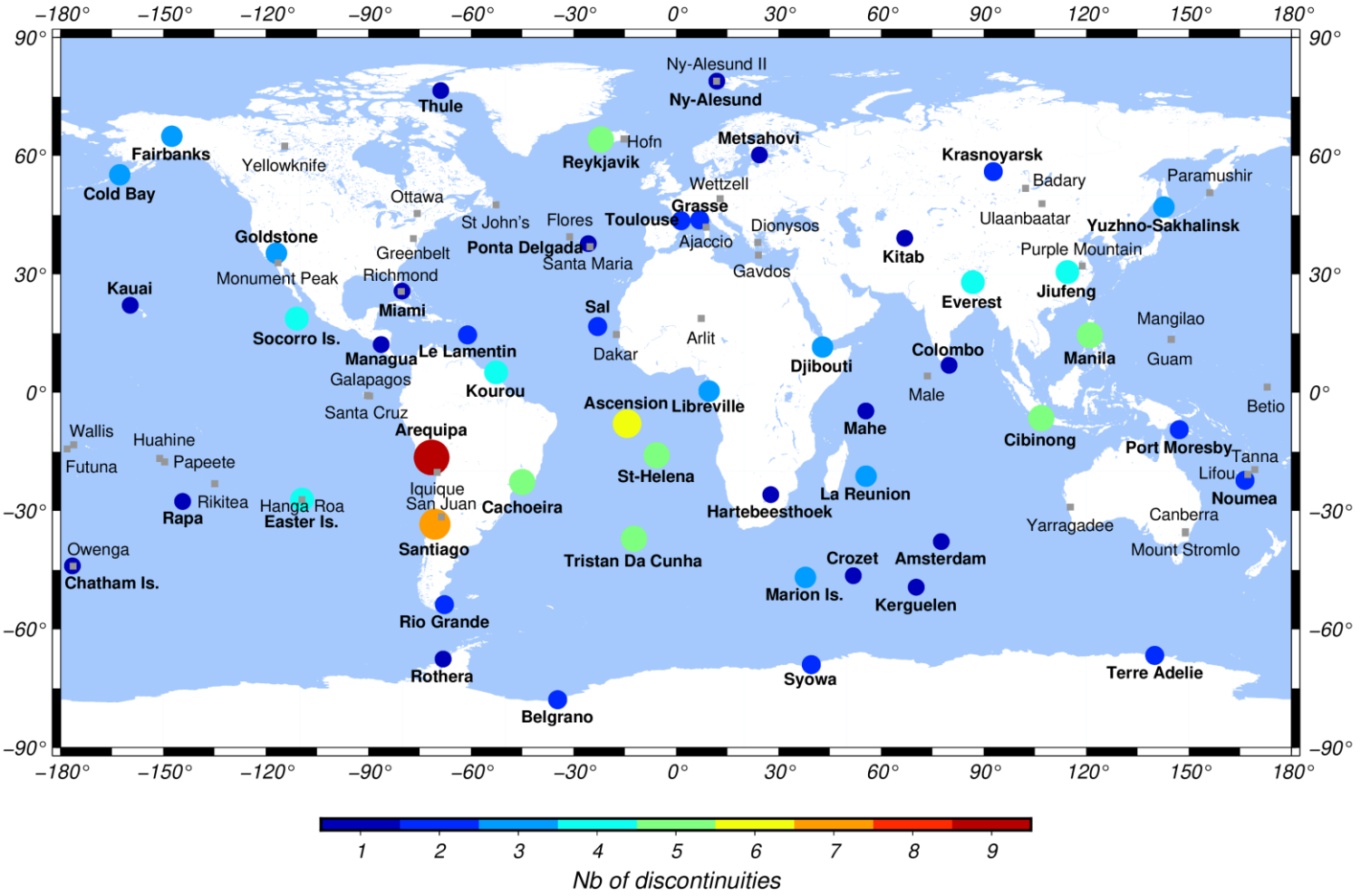
90 DORIS sites – 225 DORIS stations



Site(s) not included ITRF2020-u2023 (# 1 - Ulaanbaatar) – Site(s) with new station(s) since ITRF2020-u2023 (# 8)

DPOD2020 v4.0 – Position Discontinuities

Number of discontinuities by DORIS site. Sites with discontinuities are in boldface.
Sites with no discontinuity are indicated with grey squares.



DPOD2020 v4.0 – Position Discontinuities

	DPOD2020 v3.0	DPOD2020 v4.0
Nb of stations	**215**	**225**
Nb of sites	**89**	**90**
Discontinuities		
Overall number	**114**	**135**
Nb of affected sites	**45**	**50**
Nb of affected stations	**61**	**68**
With geophysical origin	**59**	**60**
With technical origin	**21**	**25**
With unknown origin	**34**	**40**

DPOD2020 v4.0 vs v3.0 – Position Discontinuities

- **CADB**
  - **New discontinuity on 2021/01/01 from unknown origin in East.**
- **CRQC**
  - **New discontinuity on 2020/12/05 from unknown origin in East.**
- **DJIB**
  - **New discontinuity on 2012/09/14 due to data gap.**
  - **New discontinuity on 2023/11/30 due to a beacon change.**
- **GONC**
  - **New discontinuity on 2021/02/04 due to beacon change**
- **GR4B**
  - **New discontinuity on 2022/10/02 from unknown origin in Up.**
- **HEMB**
  - **New discontinuity on 2016/02/14 from unknown origin in North.**
  - **New discontinuity on 2021/08/08 from unknown origin in North.**

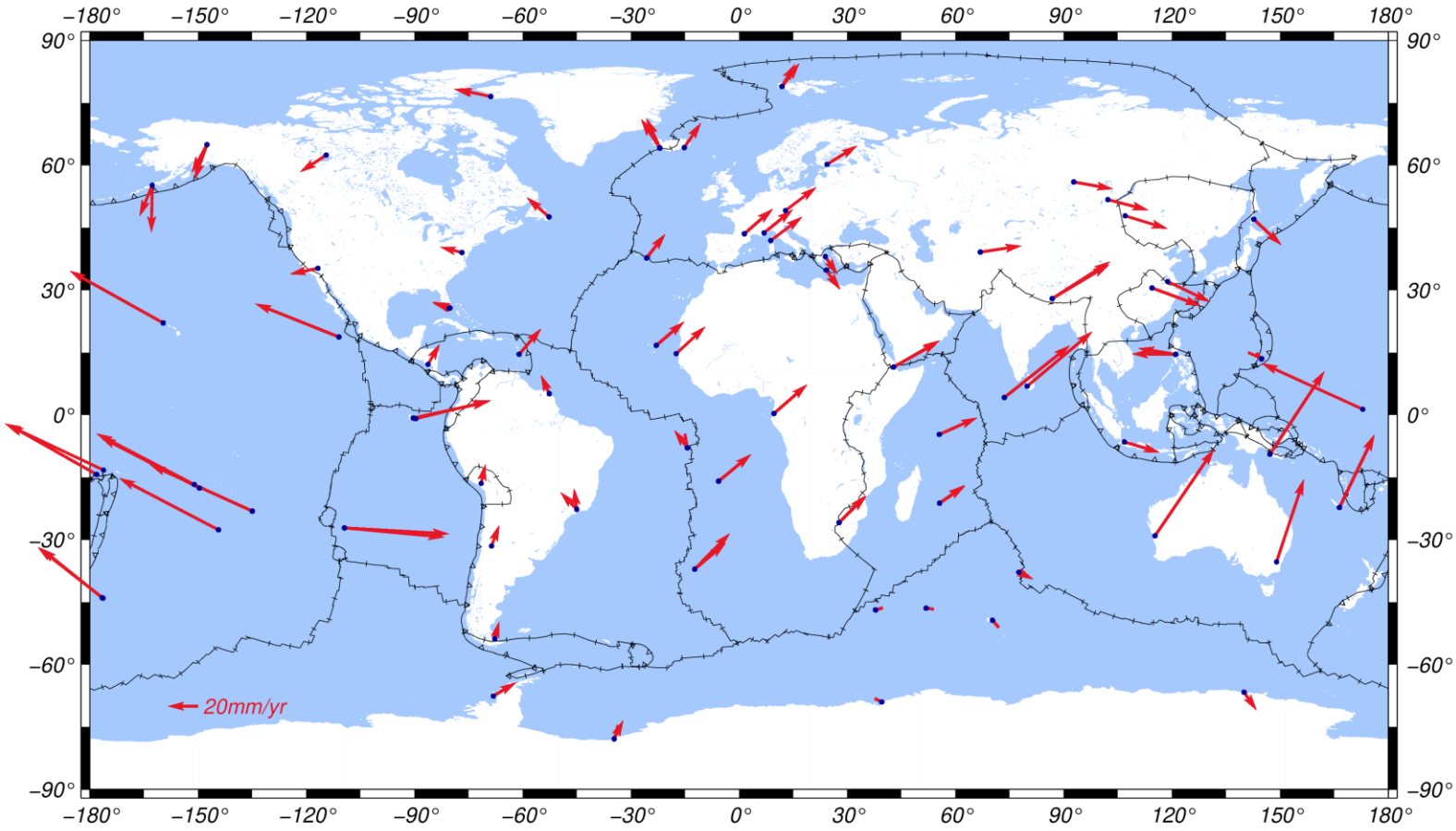
DPOD2020 v4.0 vs v3.0 – Position Discontinuities

- **JIWC**
  - **No more discontinuity on 2019/02/18 due to a beacon change**
  - **New discontinuity on 2019/09/08 from unknown origin in North, East and Up.**
  - **New discontinuity on 2020/09/20 from unknown origin in North, East and Up.**
  - **New discontinuity on 2021/08/08 from unknown origin in Up.**
  - **New discontinuity on 2024/01/01 from unknown origin in Up.**
- **KIVC**
  - **New discontinuity on 2021/04/13 due to a beacon change.**
- **LAOB**
  - **New discontinuity on 2016/02/14 from unknown origin in Up.**
  - **New discontinuity on 2021/01/01 from unknown origin in East and Up**
- **LICB**
  - **New discontinuity on 2021/08/08 from unknown origin in North.**
- **MEU**
  - **New discontinuity on 2020/11/25 from unknown origin in North.**

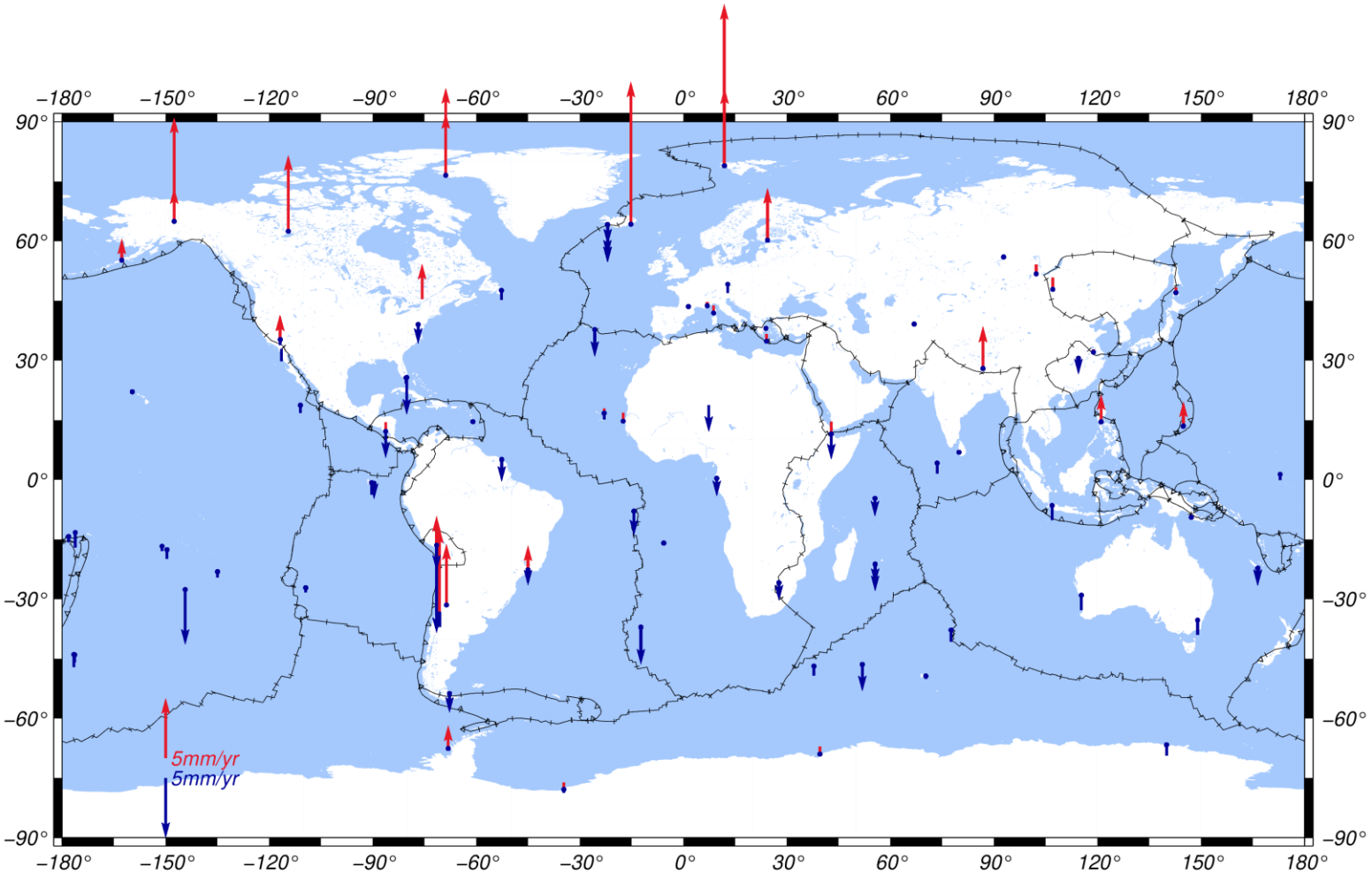
DPOD2020 v4.0 vs v3.0 – Position Discontinuities

- **MORB**
  - **New discontinuity on 2003/09/08 due to a beacon change**
- **RISC**
  - **New discontinuity on 2020/11/11 from unknown origin on East and Up.**
- **SALB**
  - **New discontinuity on 2008/06/30 from unknown origin on North.**
- **SARC**
  - **New discontinuity on 2021/11/10 from unknown origin on East.**
- **TLSB**
  - **New discontinuity on 2022/07/10 from unknown origin on North.**

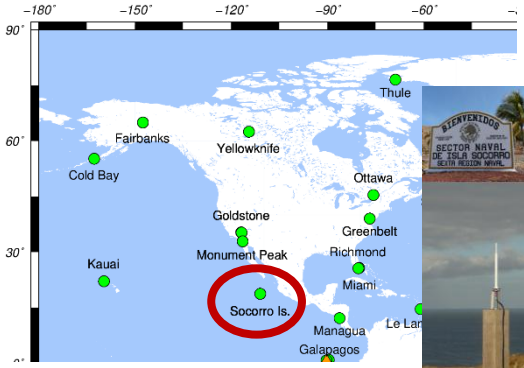
DPOD2020 v4.0 – Horizontal Velocities



DPOD2020 v4.0 – Vertical Velocities

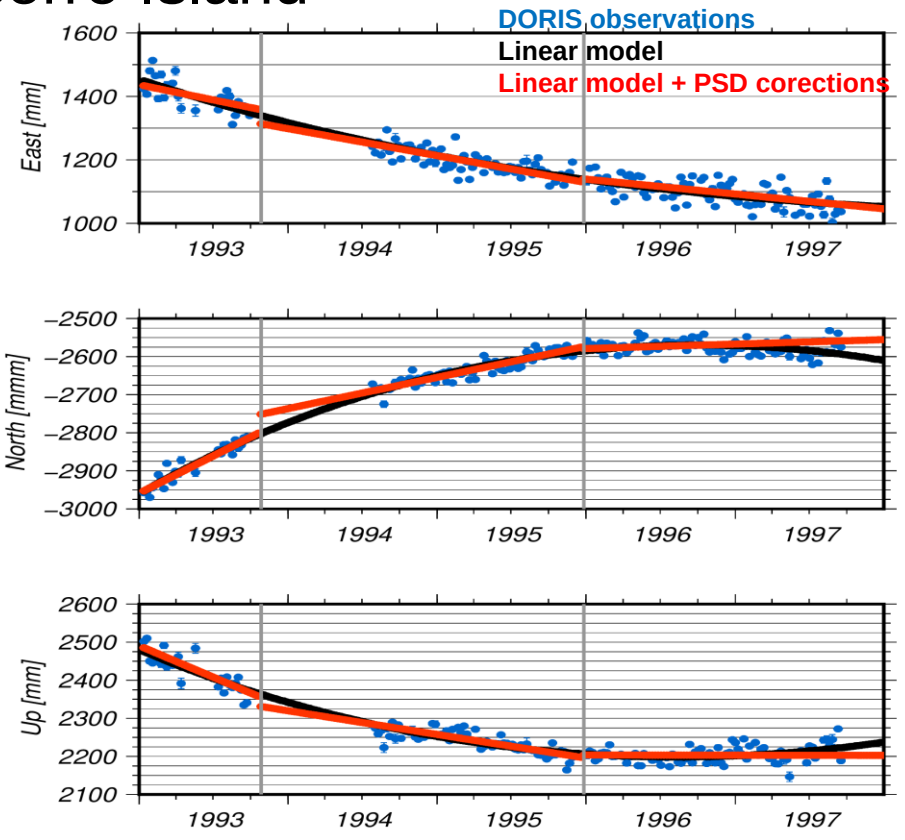


SODA – Socorro Island



DORIS is at Socorro since 1991/02/08.
Host agency: INEGI & Armada de Mexico.
Tide gauge (Gloss nb 162) @ 370m.
No GNSS, no SLR, no VLBI.

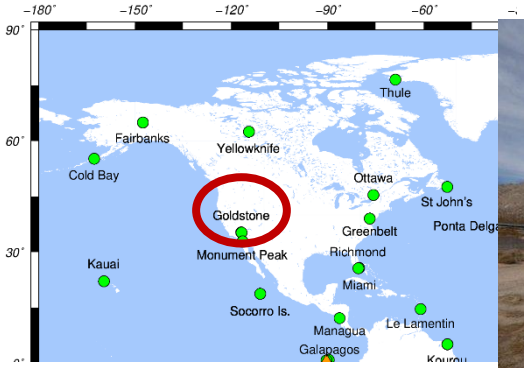
Submarine eruption on 1993/01/29 @ 4km.



PSD weekly corrections from 1993/01/13 to 1998/05/13.
PSD corrections are given in ASCII text file dpod2020_040_psd_corr.txt.

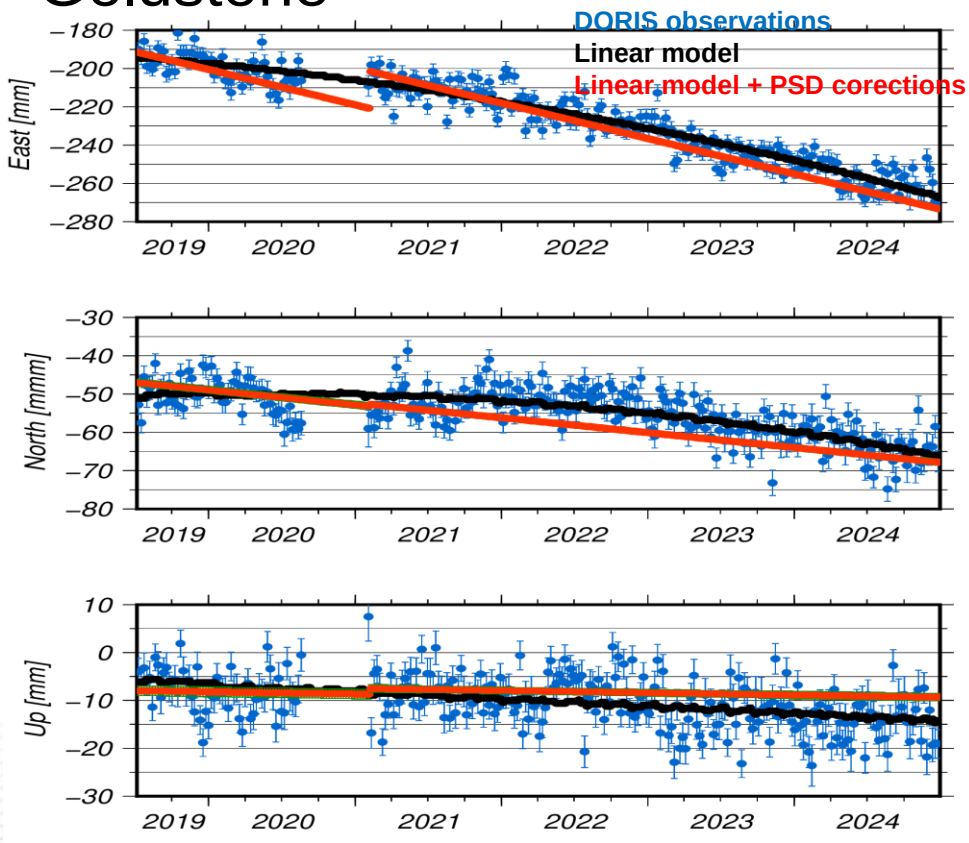
DPOD2020 v4.0 – Post-Seismic Deformation Corrections

GONC – Goldstone



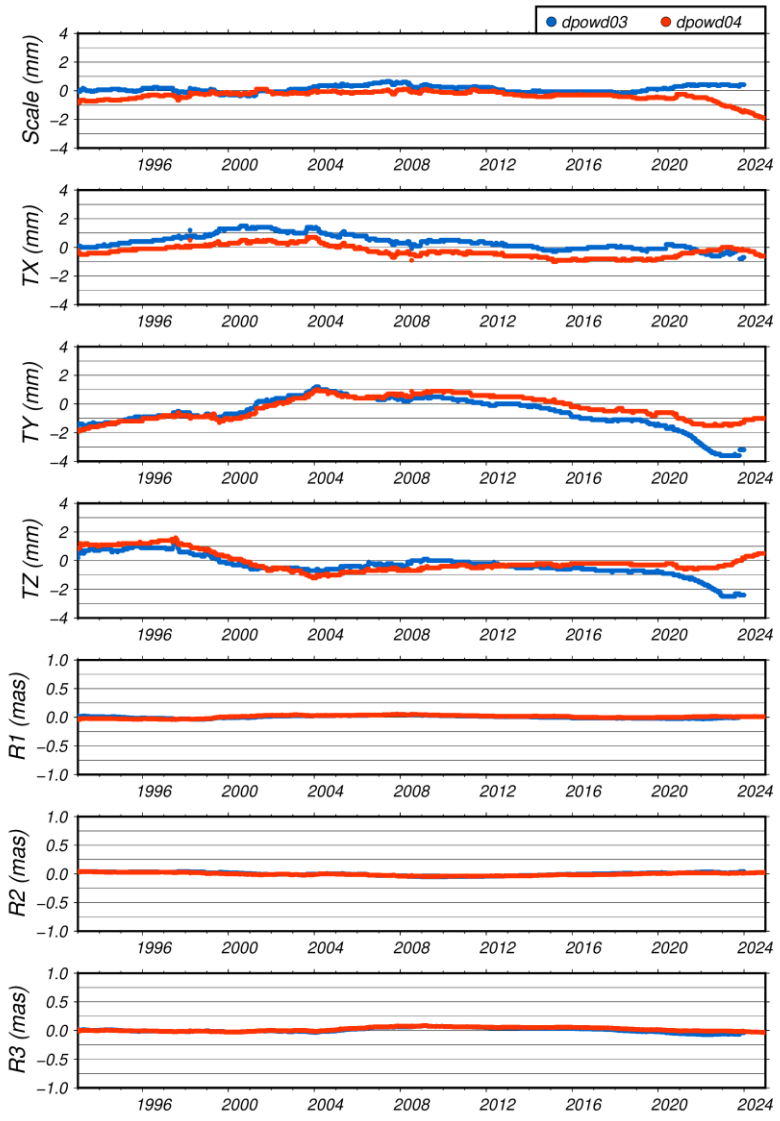
DORIS is at Socorro since 1988/01/21.
Host agency: NASA.
No colocation.

M7.1 Earthquake on 2019/07/06 @ 93km.



PSD weekly corrections from 2019/07/10 to 2025/12/31.
PSD corrections are given in ASCII text file dpod2020_040_psd_corr.txt.

DPOD2020 v4.0 vs ITRF2020-u2023

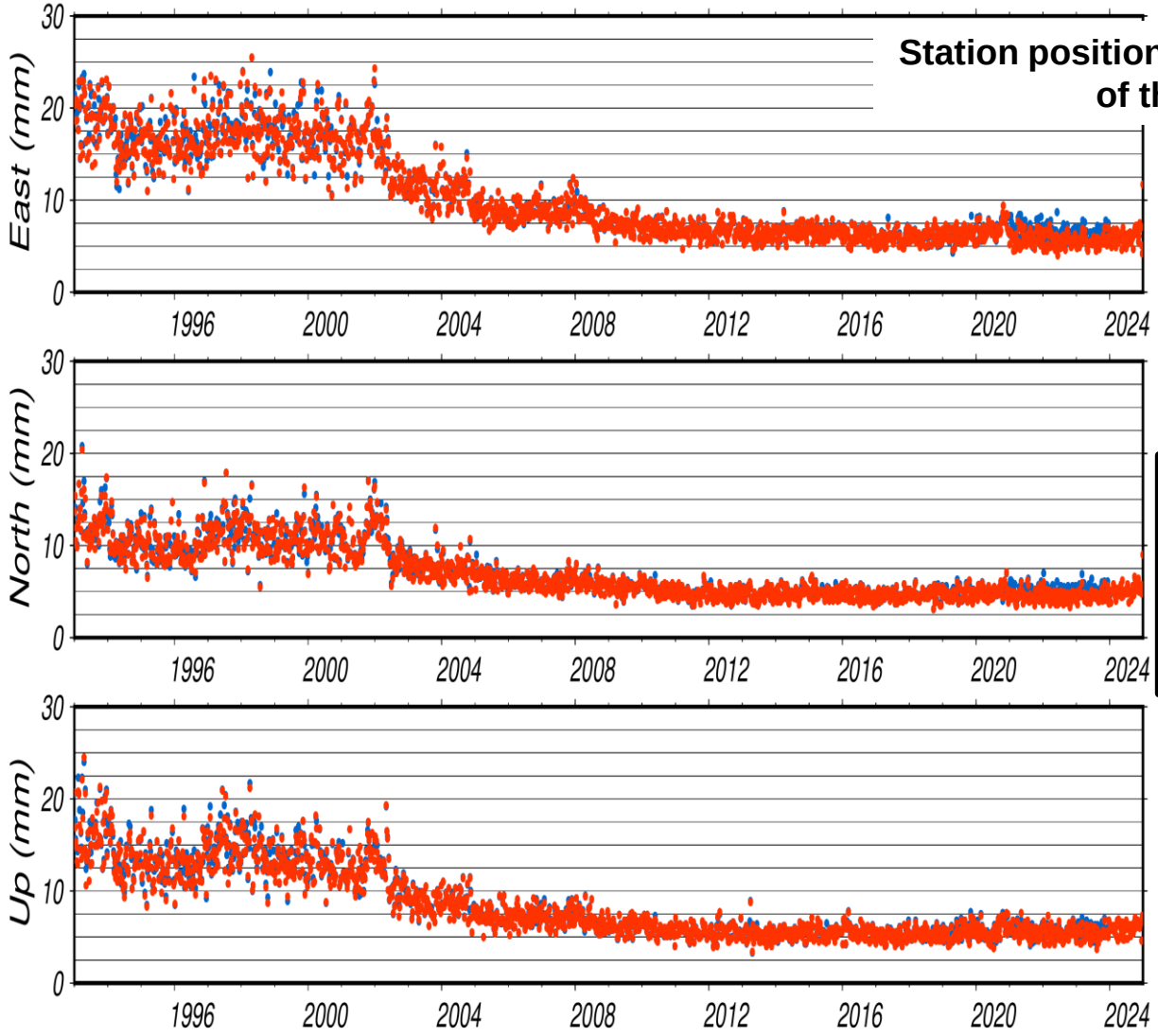


Helmert parameters of the weekly propagations of DPOD2020 v4.0 wrt ITRF2020-u2023 and DPDO2020 v3.0 wrt ITRF2020 without annual and semi-annual corrections.

	DPOD2020 v3.0 wrt ITRF2020			DPOD2020 v4.0 wrt ITRF2020-u2023		
	mean	std	rms	mean	Std	rms
Sc [mm]	**0.12**	**0.22**	**0.26**	**-0.35**	**0.36**	**0.50**
Tx [mm]	**0.38**	**0.52**	**0.64**	**-0.27**	**0.41**	**0.49**
Ty [mm]	**-0.61**	**1.08**	**1.24**	**-0.30**	**0.81**	**0.86**
Tz [mm]	**-0.34**	**0.74**	**0.82**	**-0.09**	**0.68**	**0.68**
R1 [mas]	**0.00**	**0.02**	**0.02**	**0.01**	**0.02**	**0.03**
R2 [mas]	**0.00**	**0.03**	**0.03**	**0.00**	**0.02**	**0.02**
R3 [mas]	**0.01**	**0.04**	**0.04**	**0.02**	**0.03**	**0.04**

Similar results for DPOD2020 v4.0 and v3.0.

DPOD2020 v4.0 Station Position Residuals

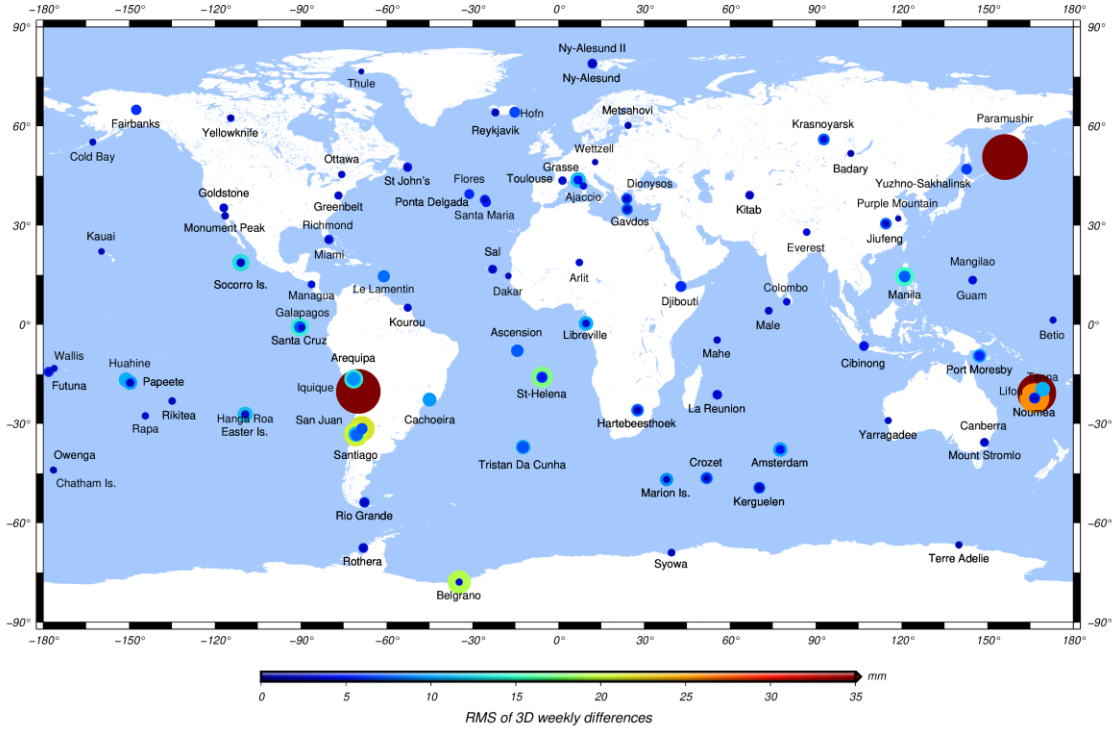


Station position residuals as output of the stacking of the IDS combined series.

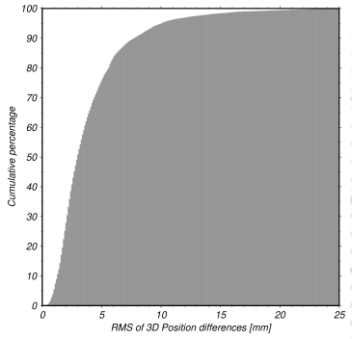
Slightly smaller residuals with DPOD2020 v4.0 than DPOD2020 v3.0 since 2021.0 in East and North.

DPOD2020 v4.0 vs ITRF2020-u2023

Weekly station coordinate differences between DPOD2020 v4.0 and ITRF2020-2023 from 1993.0 to 2025.0.
Without annual and semi-annual corrections.



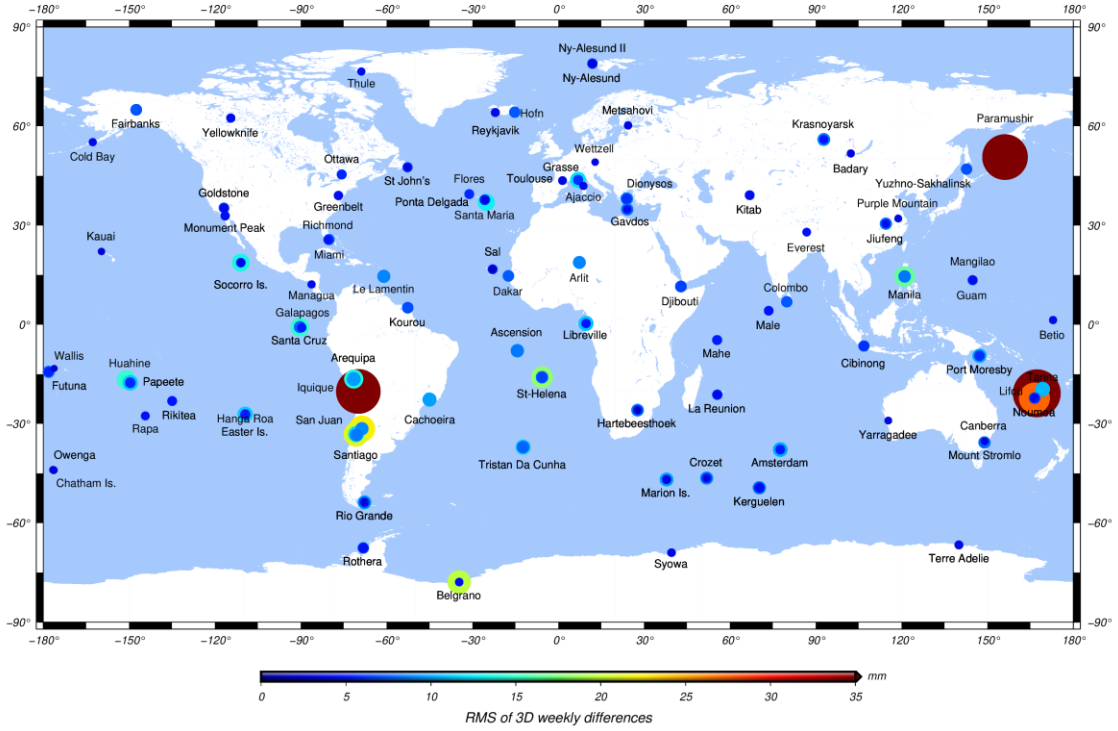
	[mm]
Max	72.9
Median	3.0
RMS	5.7
Mean	4.1
STD	4.0



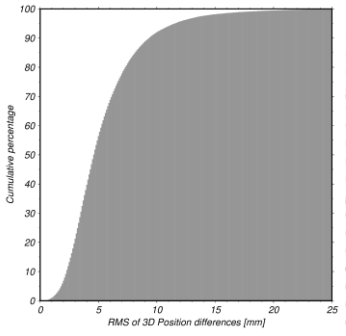
95% of the weekly 3D differences are smaller than 10 mm.
Largest differences are due to very short time spans (Paramushir, Iquique, Lifou, Noumea-NOWB).
Differences @ Belgrano (BEMB) are due to different discontinuities.

DPOD2020 v4.0 vs ITRF2020-u2023

Weekly station coordinate differences between DPOD2020 v4.0 and ITRF2020-2023 from 1993.0 to 2025.0.
With annual and semi-annual corrections.



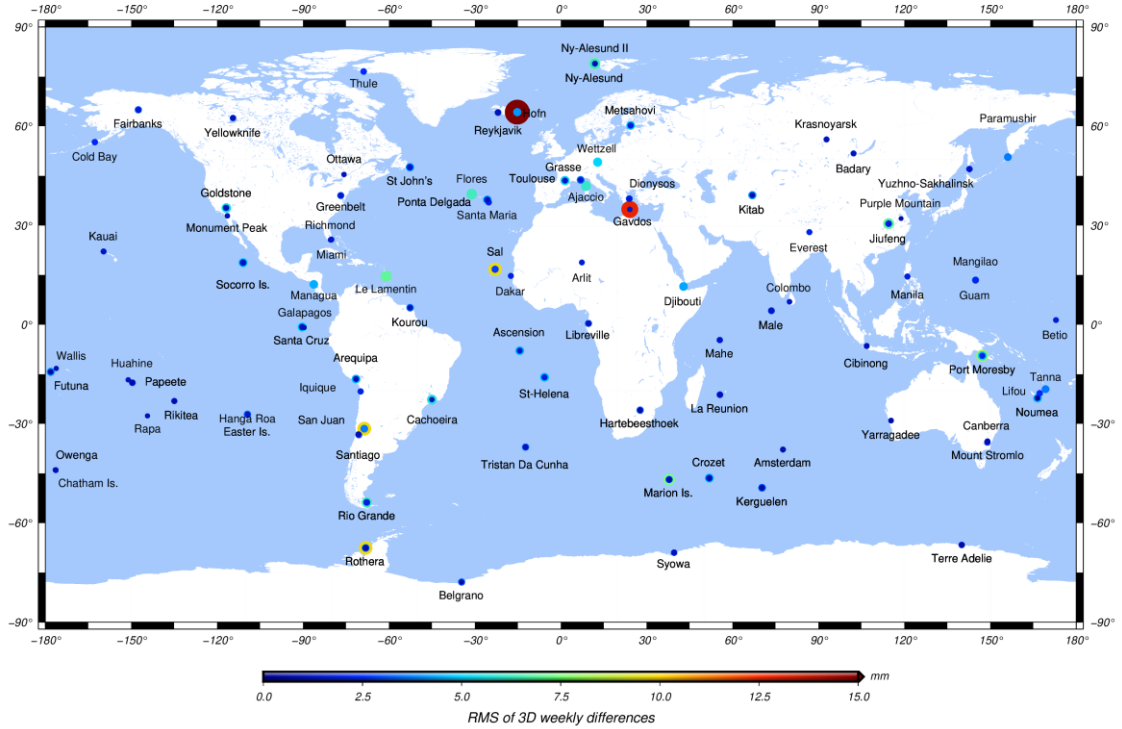
	[mm]
Max	94.2
Median	4.7
RMS	7.0
Mean	5.6
STD	4.2



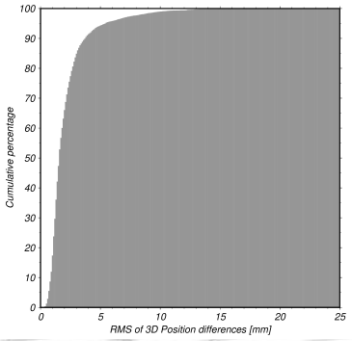
91% of the weekly 3D differences are smaller than 10 mm.
As without seasonal signals, larger differences occur at sites with short time spans.
In addition, differences are increased at Lifou since no seasonal signal in DPOD2020 v4.0 as site has observations before mid-2002 only.

DPOD2020 v4.0 vs DPOD2020 v3.0

Weekly station coordinate differences between DPOD2020 v4.0 and DPOD2020 v3.0 from 1993.0 to 2025.0.
Without annual and semi-annual corrections.



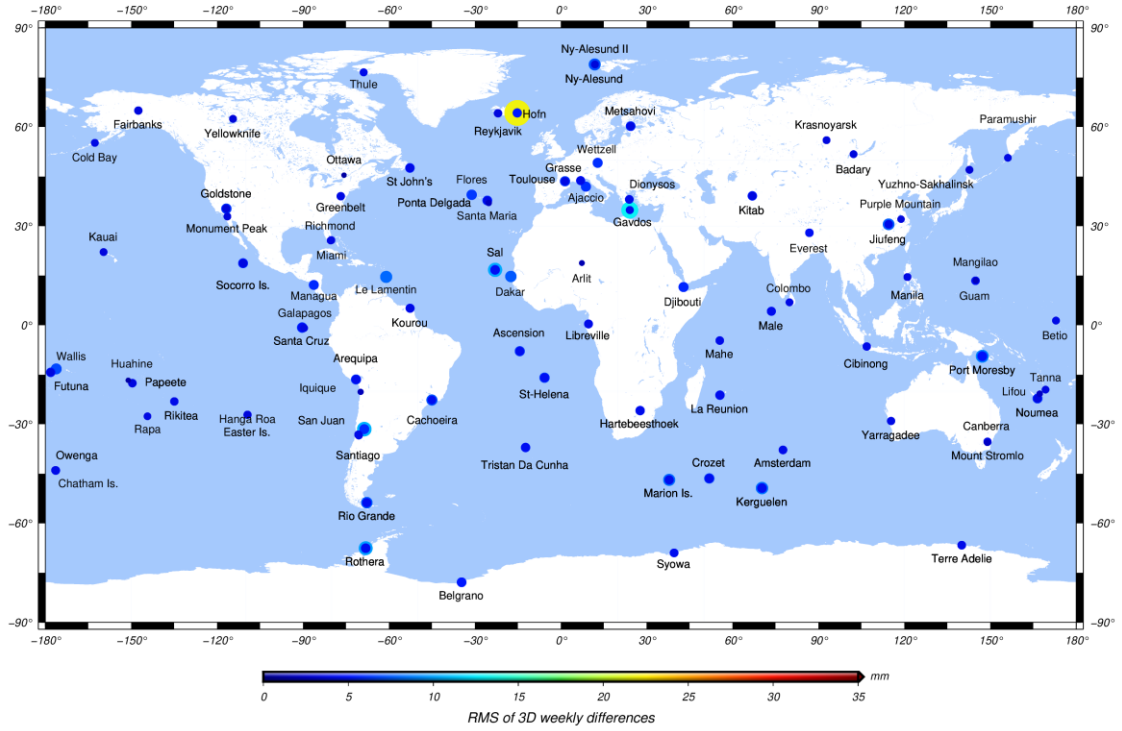
	[mm]
Max	65.6
Median	1.6
RMS	2.9
Mean	2.2
STD	1.9



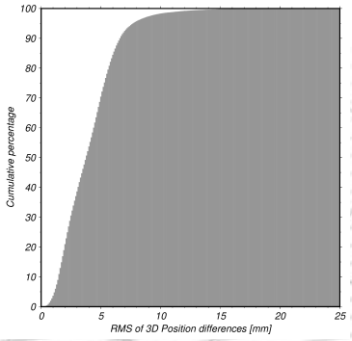
94% of the weekly 3D differences are smaller than 5 mm.
Largest differences are for stations HOGC (Höfn) and GAVC (Gavdos) which started after second half of 2023.

DPOD2020 v4.0 vs DPOD2020 v3.0

Weekly station coordinate differences between DPOD2020 v4.0 and DPOD2020 v3.0 from 1993.0 to 2025.0.
With annual and semi-annual corrections.



	[mm]
Max	65.4
Median	3.8
RMS	4.7
Mean	4.0
STD	2.3

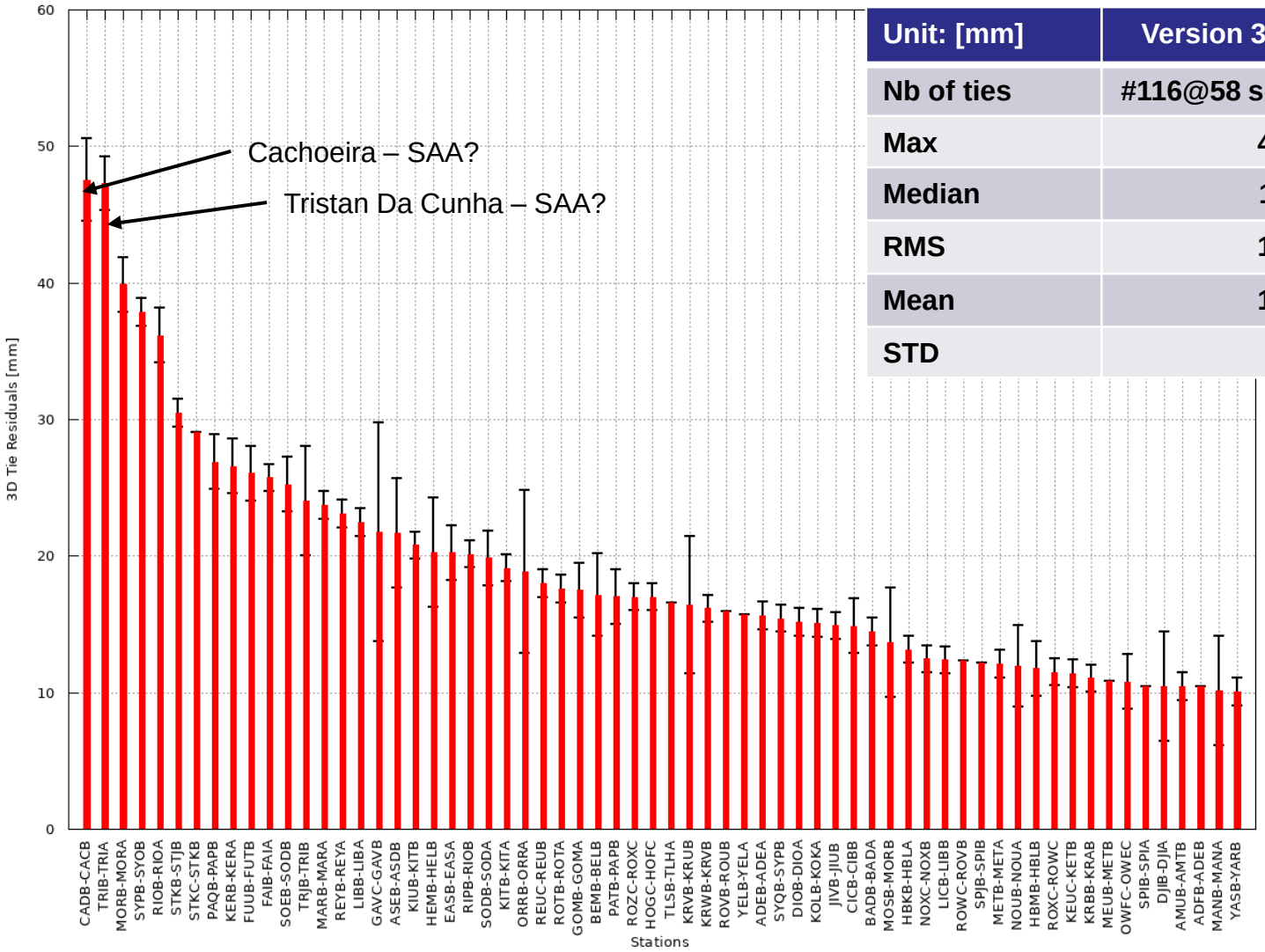


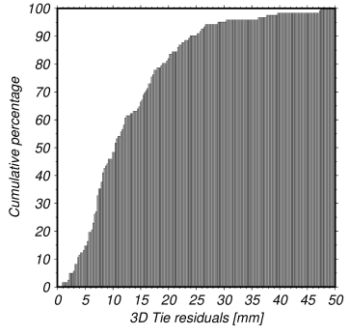
72% of the weekly 3D differences are smaller than 5 mm.
Largest differences are for stations HOGC (Höfn) and GAVC (Gavdos) which started after second half of 2023.

DPOD2020 v4.0 vs IGN DORIS-to-DORIS ties

Coordinate differences estimated at the date of the surveyed ties

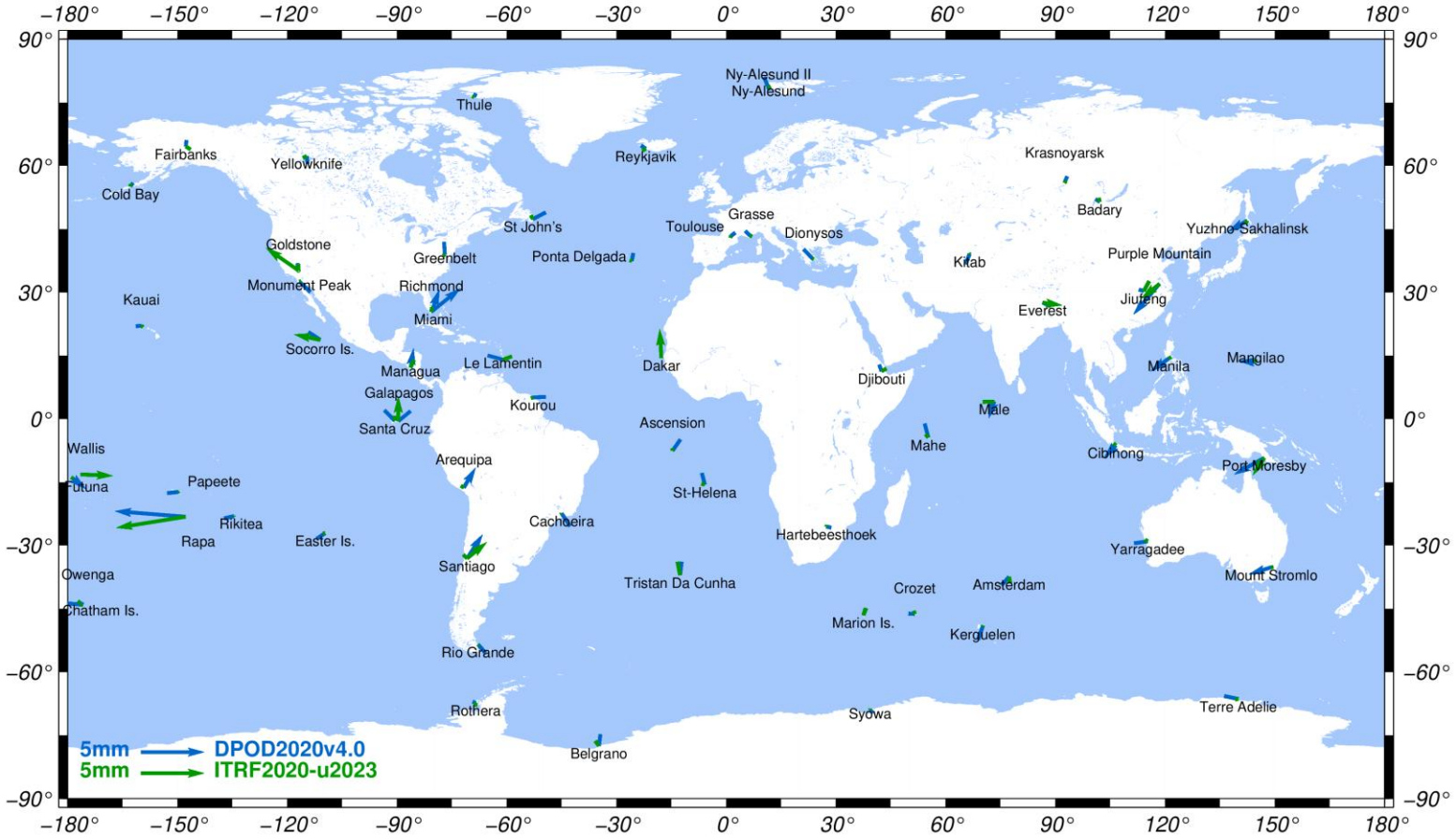
Unit: [mm]	Version 3.0	Version 4.0
Nb of ties	#116@58 sites	#121@61 sites
Max	48.1	47.6
Median	11.4	10.4
RMS	16.6	15.7
Mean	13.8	12.9
STD	9.2	9.1





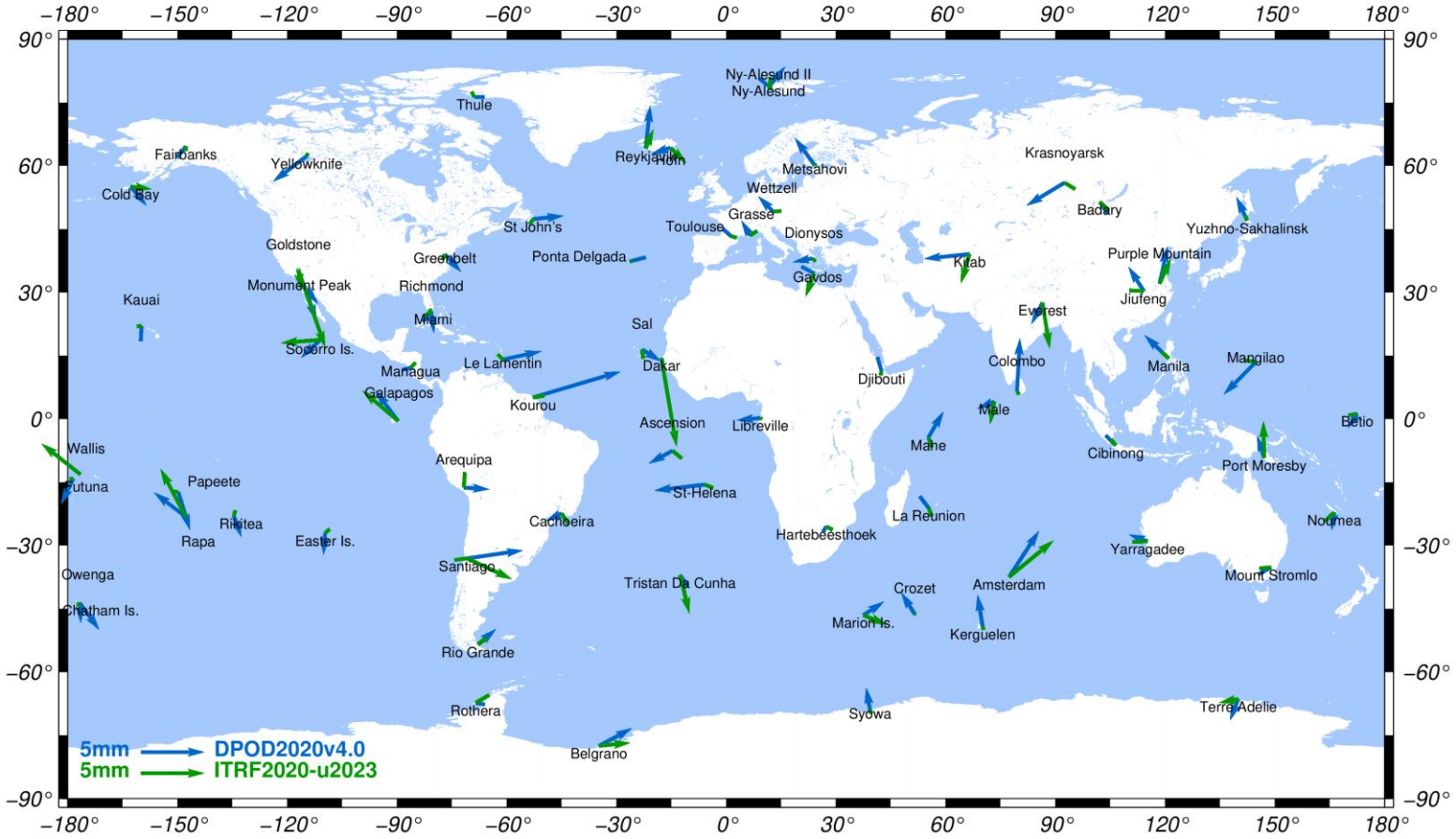
DPOD2020 v4.0 vs ITRF2020 CF Periodic Terms

East – Semi-annual terms



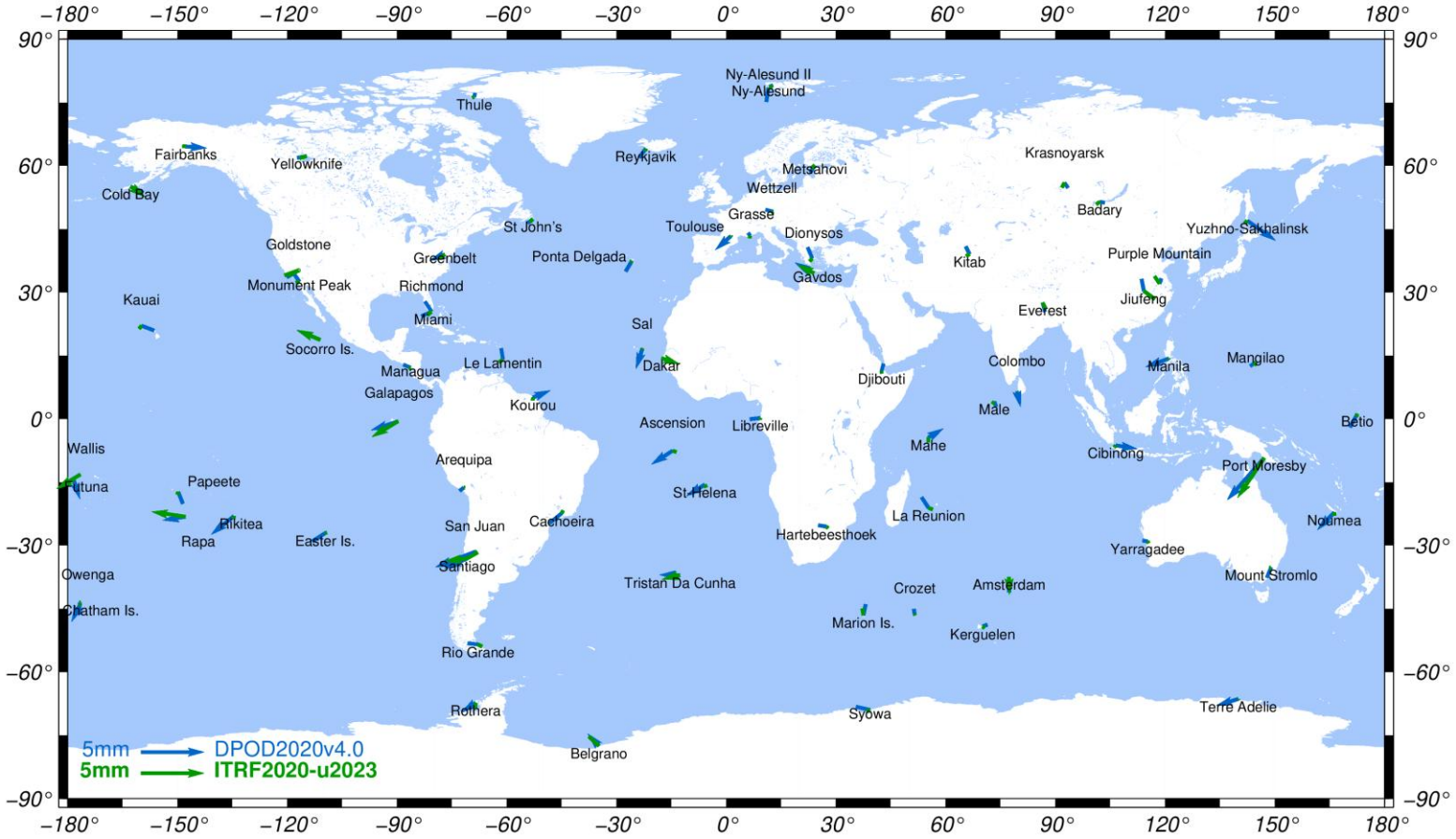
DPOD2020 v4.0 vs ITRF2020 CF Periodic Terms

East – Annual terms



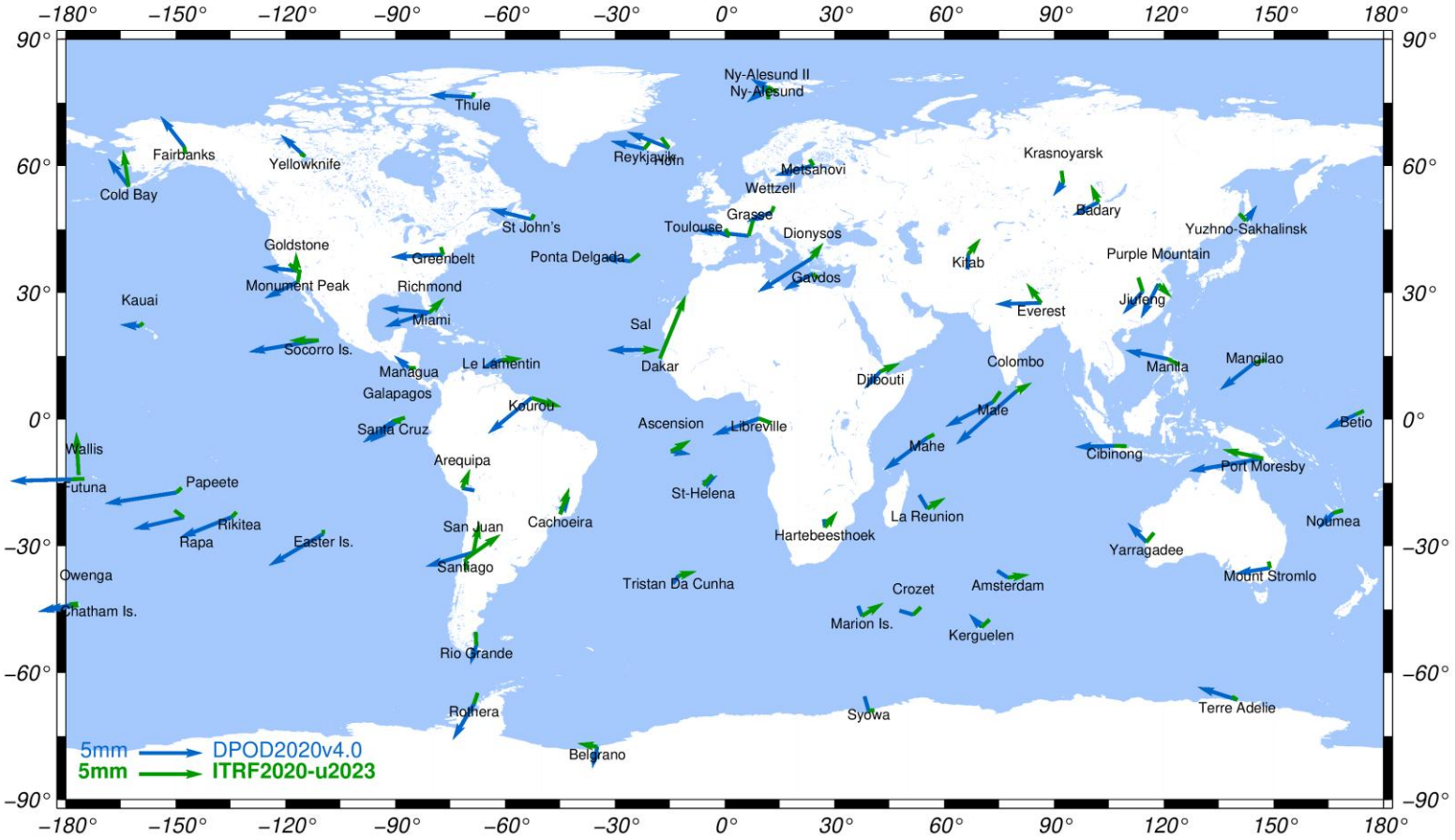
DPOD2020 v4.0 vs ITRF2020 CF Periodic Terms

North – Semi-annual terms



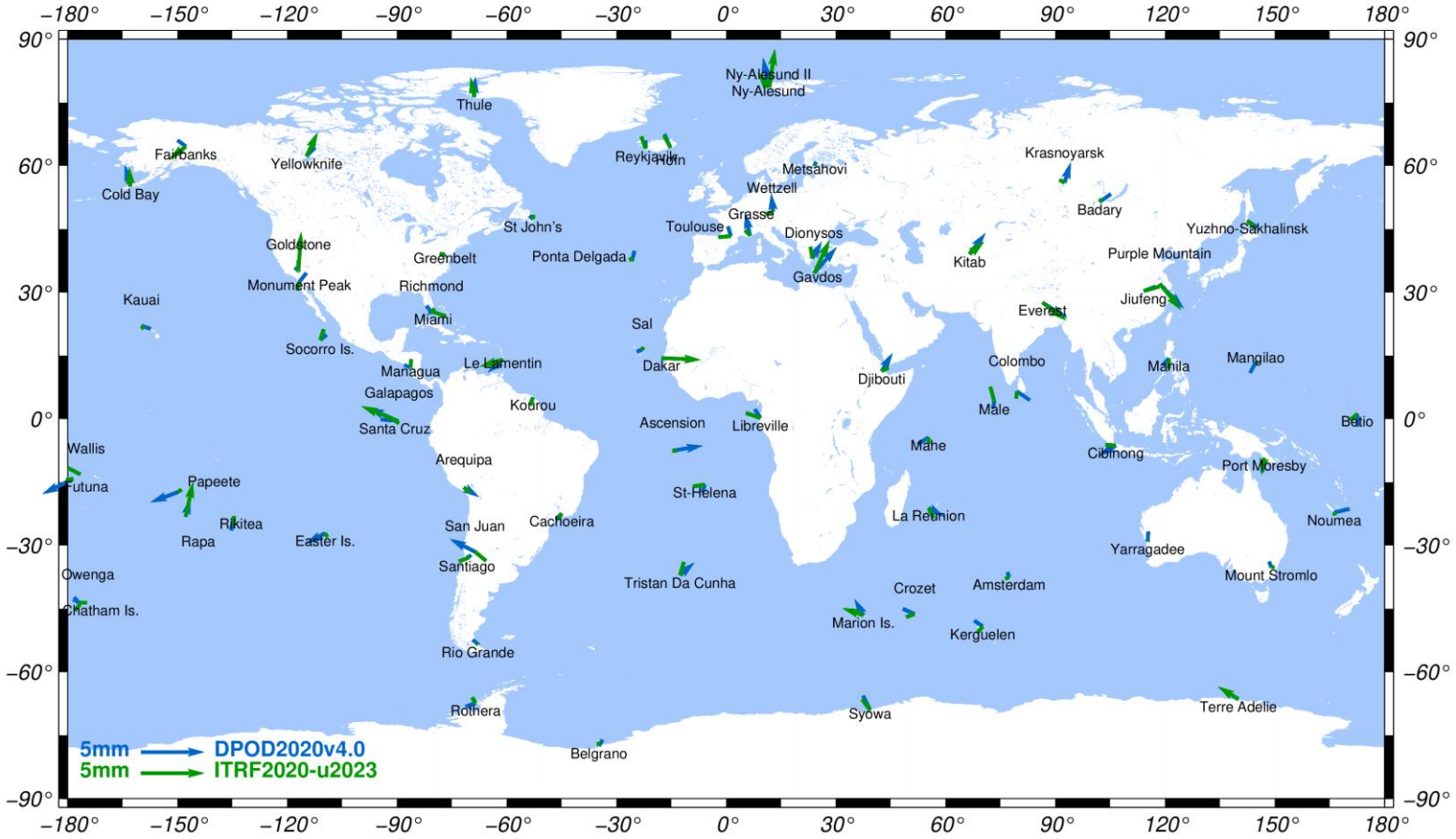
DPOD2020 v4.0 vs ITRF2020 CF Periodic Terms

North – Annual terms



DPOD2020 v4.0 vs ITRF2020 CF Periodic Terms

Up – Semi-annual terms



DPOD2020 v4.0 vs ITRF2020 CF Periodic Terms

Up – Annual terms