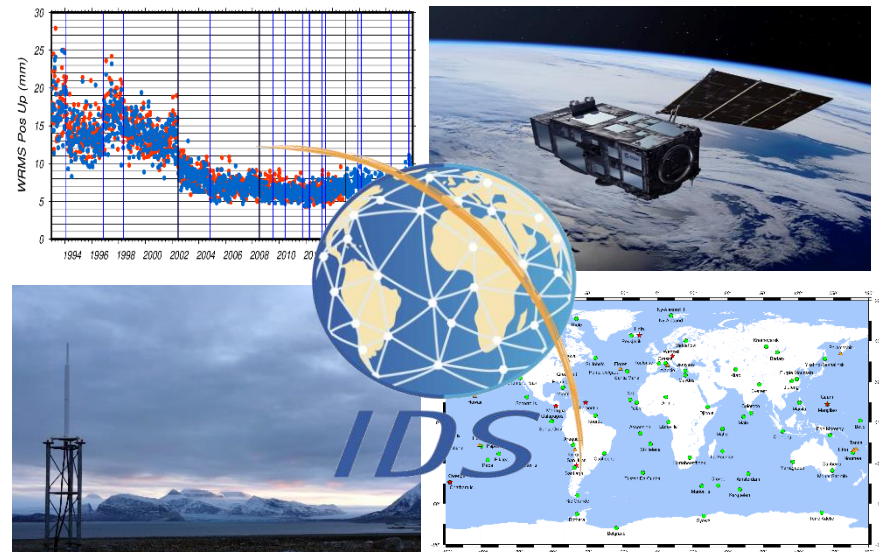# From and beyond the IDS CC processing for the ITRF2020
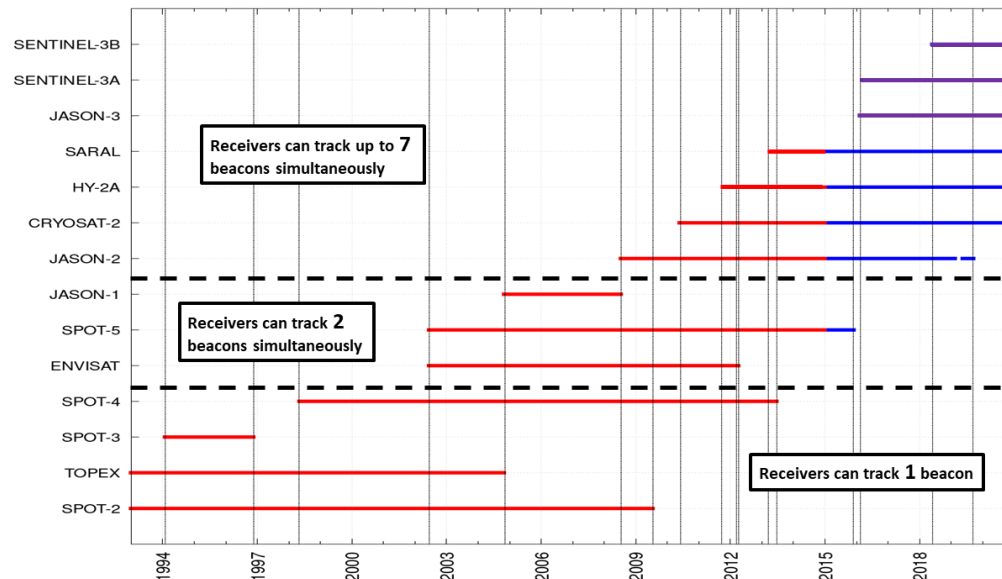
Guilhem Moreaux (CLS)
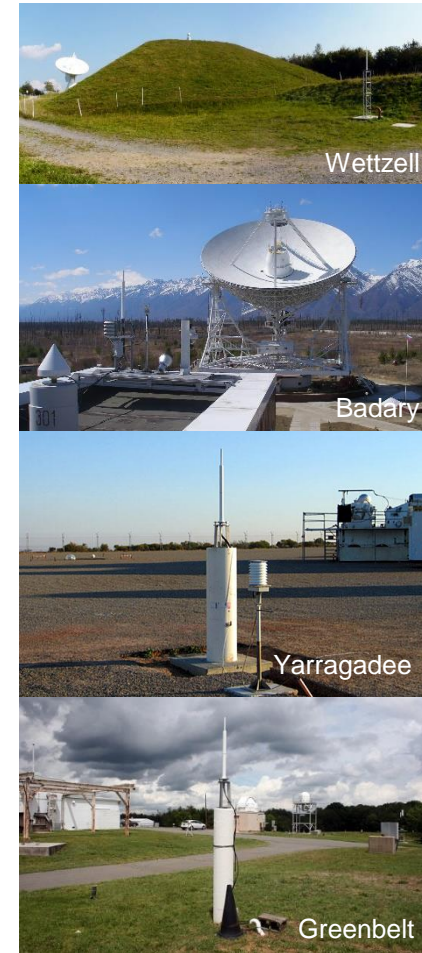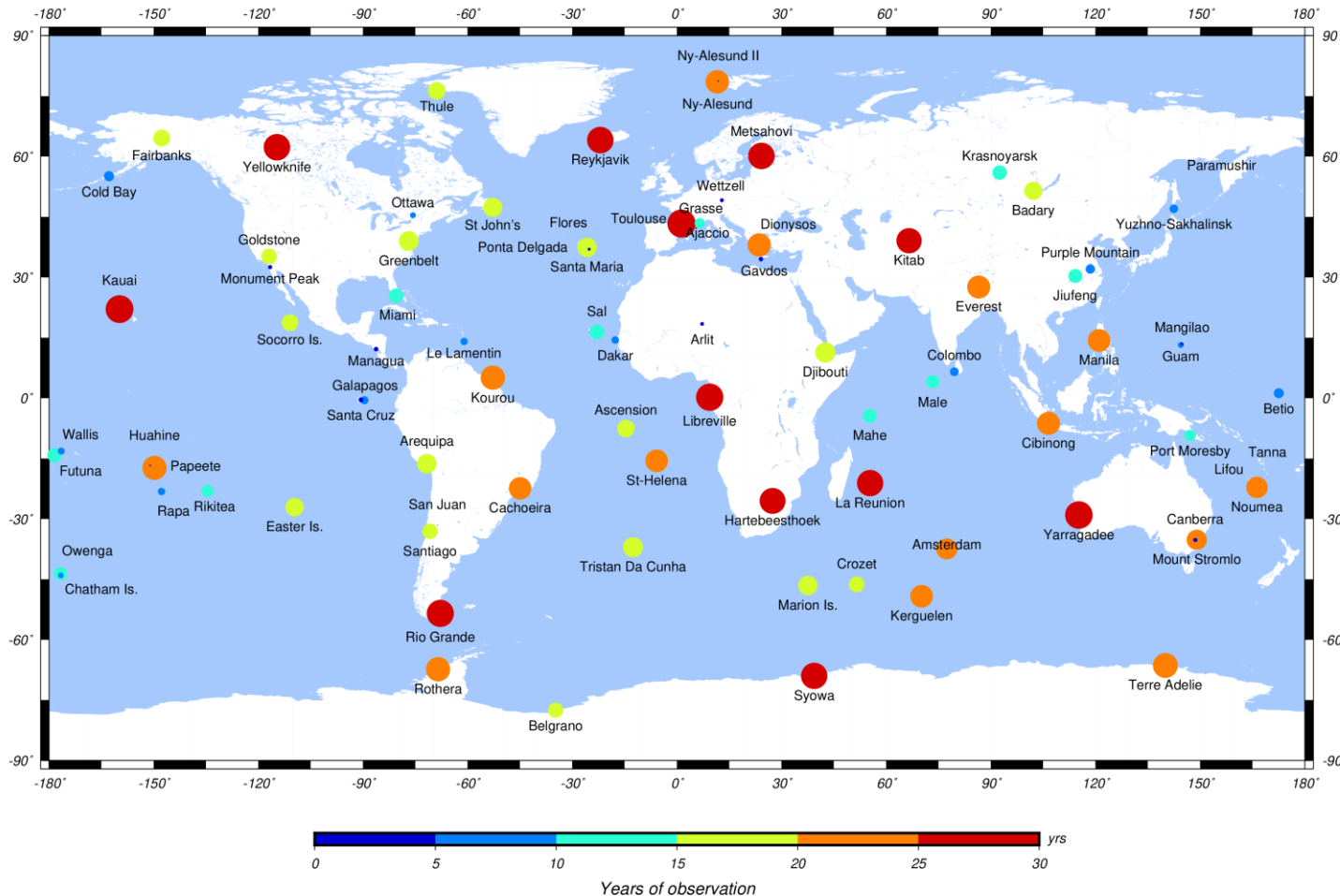
The IDS contribution to ITRF2020 is based on:
- **4 solutions from 4 different software packages**
- **a total of 14 DORIS missions since 1993.**

AC	Software	Series number	Nb of Files	Nb of Sites	Nb of stations	EOPs
ESA	NAPEOS	12 / 13	1447	87	199	(Motion+rate+LOD)
GOP	BERNESE	67	1456	85	196	Motion+rate
GRG	GINS-DYNAMO	43	1461	86	199	Motion
GSC	GEODYN	51	1457	88	200	Motion
IDS	CATREF	16	1456	87	201	Motion

Receivers can track up to **7** beacons simultaneously

Receivers can track **2** beacons simultaneously

Receivers can track **1** beacon

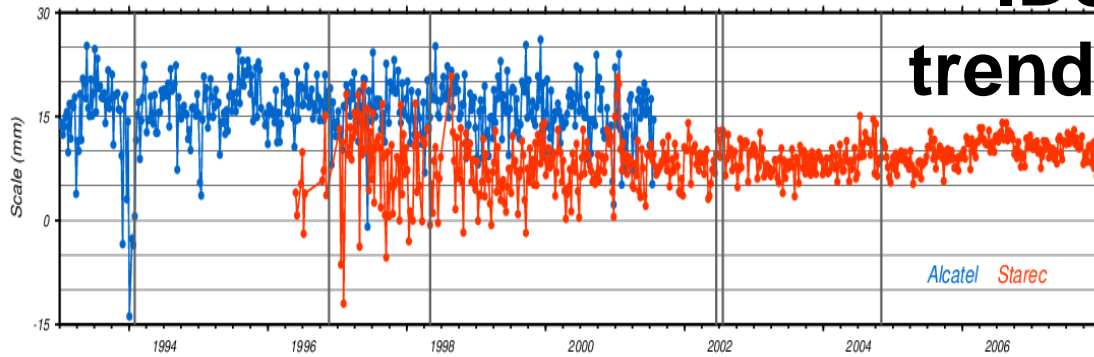Sentinel-3B

Jason-3

Sentinel-3A

The IDS ITRF2020 network

Contains 201 stations@87 sites including 4 4 Technique sites.
57 sites co-located with at least one other IERS technique.
Includes 26 sites (30%) with more than 20 years of observation.
Vs ITRF2014: + 16 sites (5 new sites).

IDS 16 ITRF2014 Helmert Parameters

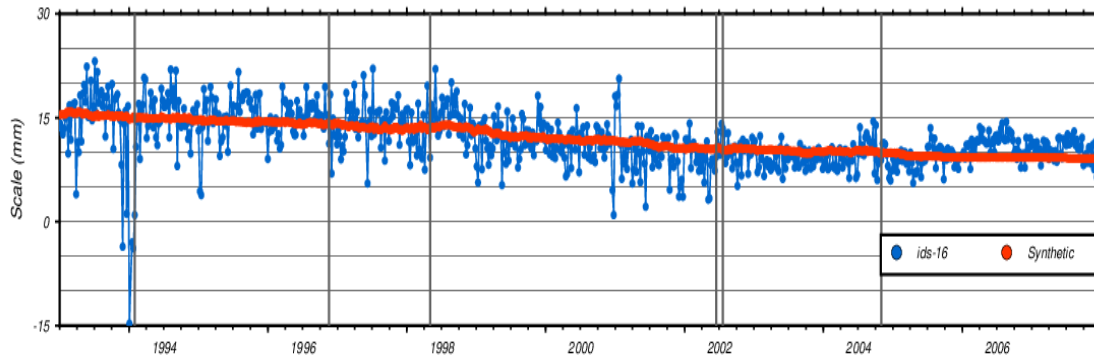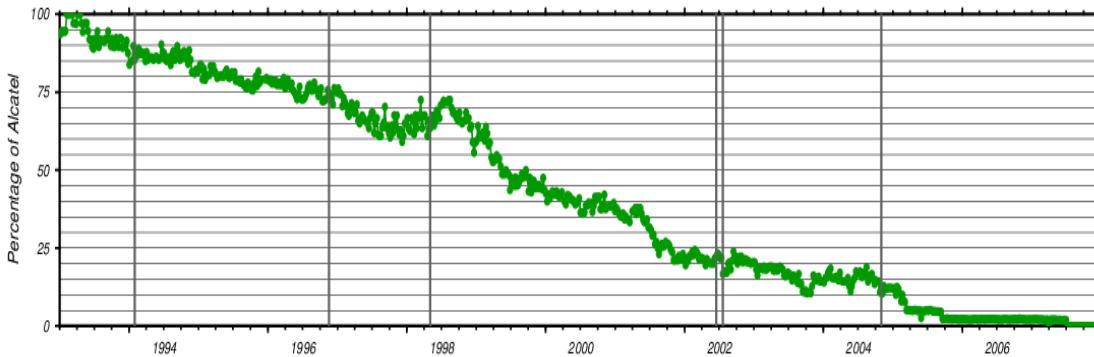
Negative trend from 1993.0 to 2002.5
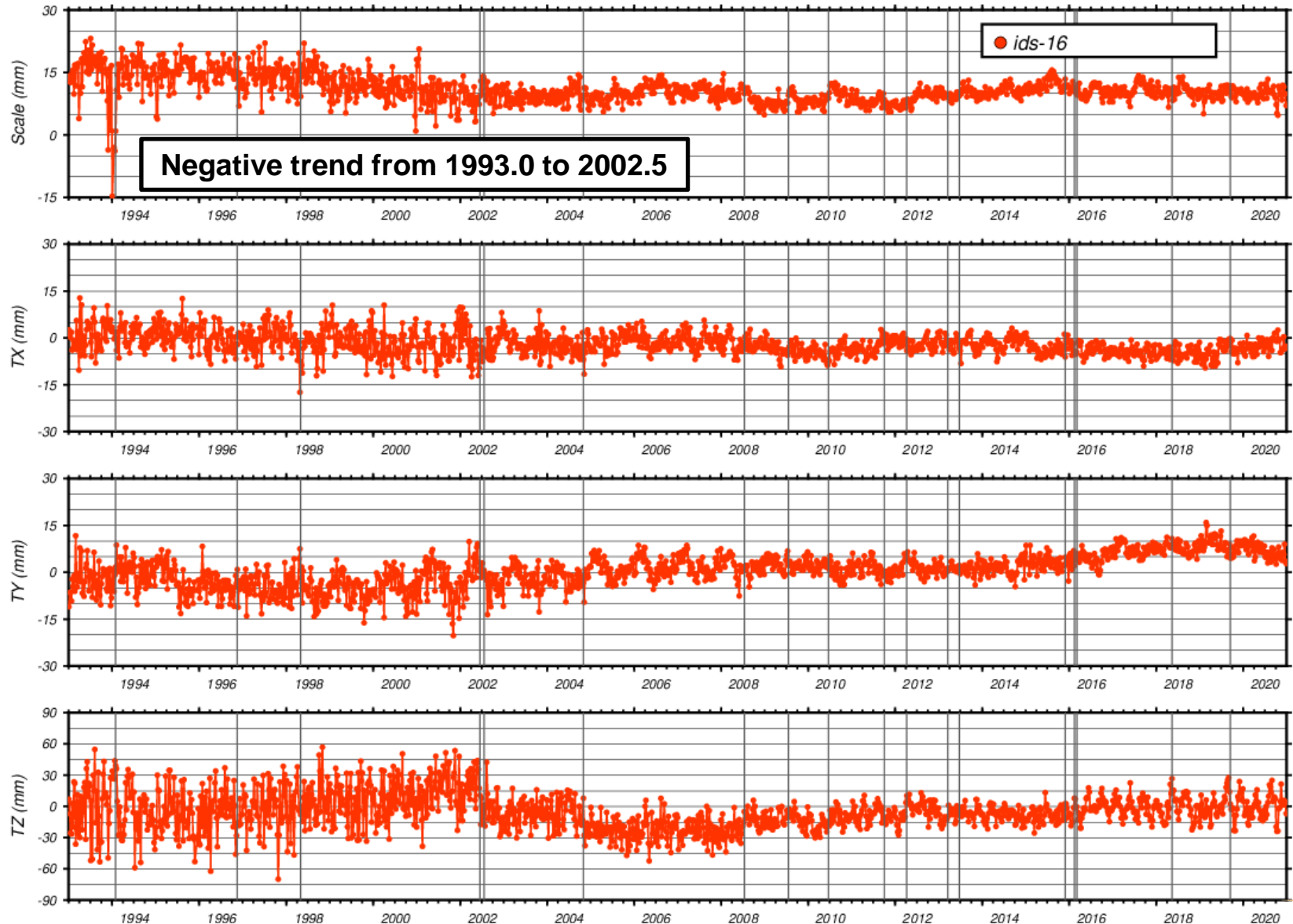
IDS 16 ITRF2014 scale trend from 1993.0 to 2002.5

Alcatel = IDS 16 with only Alcatel antennas
Starec = IDS 16 with only Starec antennas

Mean Alcatel scale = 15.85 mm
Mean Starec scale =   9.12 mm

Synthetic =
Alcatel scale x perc + Starec scale x (1 – perc)

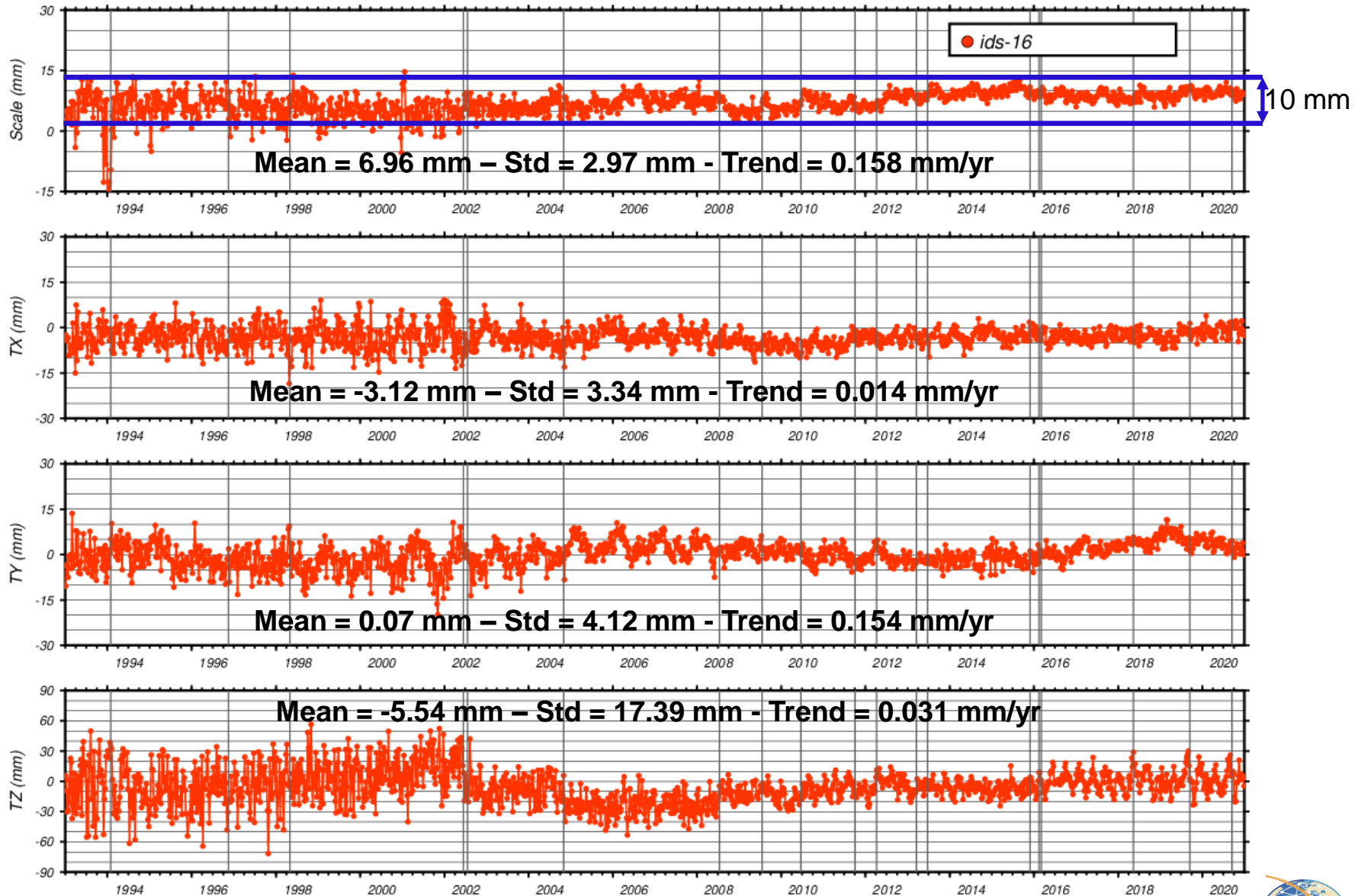**Good agreement between the true and synthetic IDS 16 scales**

➔ **IDS 16 ITRF2014 scale trend from 1993.0 to 2002.5 is the consequence of the new Alcatel PCV and gradual replacement with time of the Alcatel antennas.**
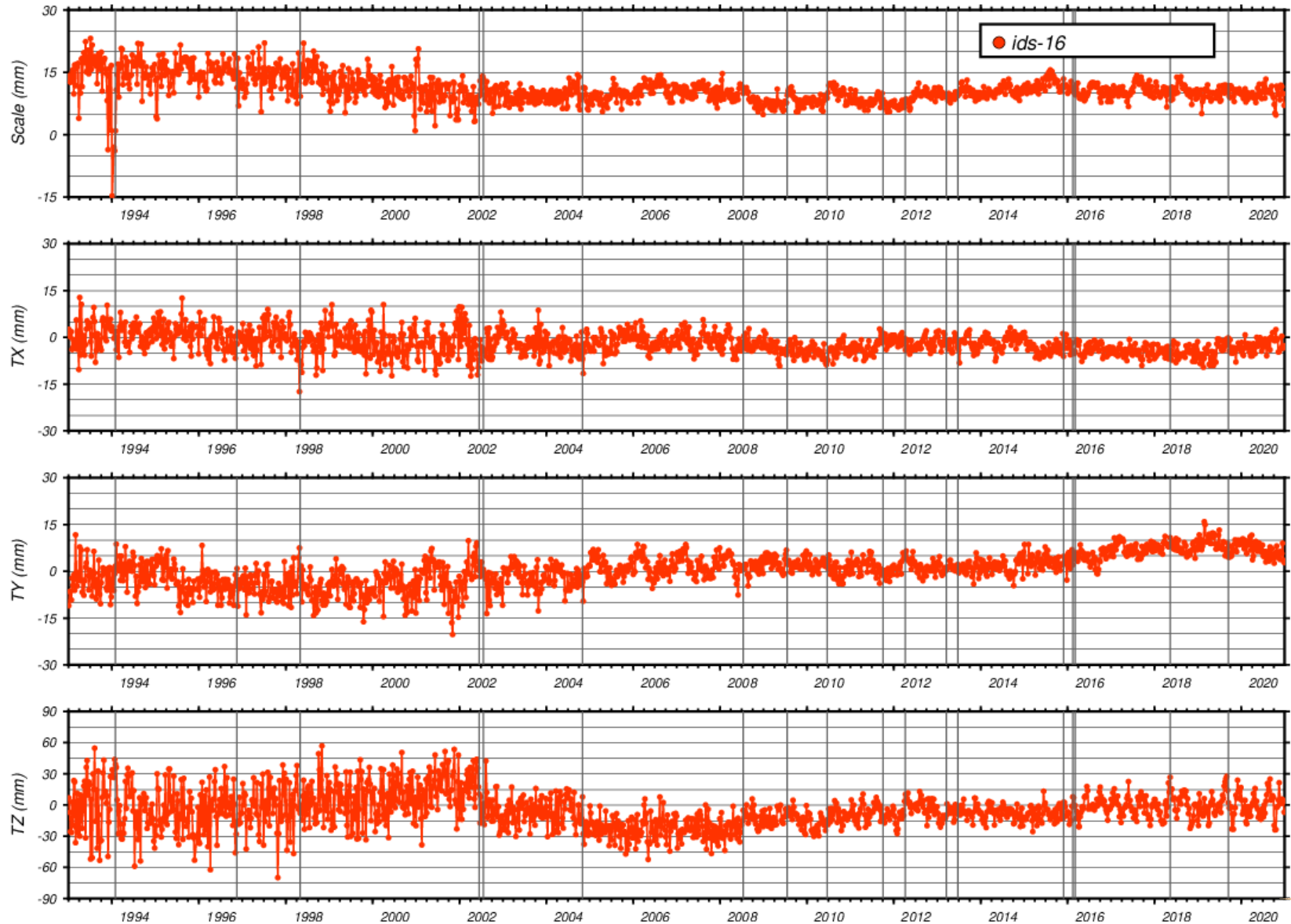
IDS 16 <u>ITRF2014</u> Helmert Parameters

IDS 16 <u>ITRF2020</u> Helmert Parameters

Mean = 6.96 mm – Std = 2.97 mm - Trend = 0.158 mm/yr

Mean = -3.12 mm – Std = 3.34 mm - Trend = 0.014 mm/yr

Mean = 0.07 mm – Std = 4.12 mm - Trend = 0.154 mm/yr

Mean = -5.54 mm – Std = 17.39 mm - Trend = 0.031 mm/yr

# IDS 16 <u>ITRF2020</u> Helmert Parameters
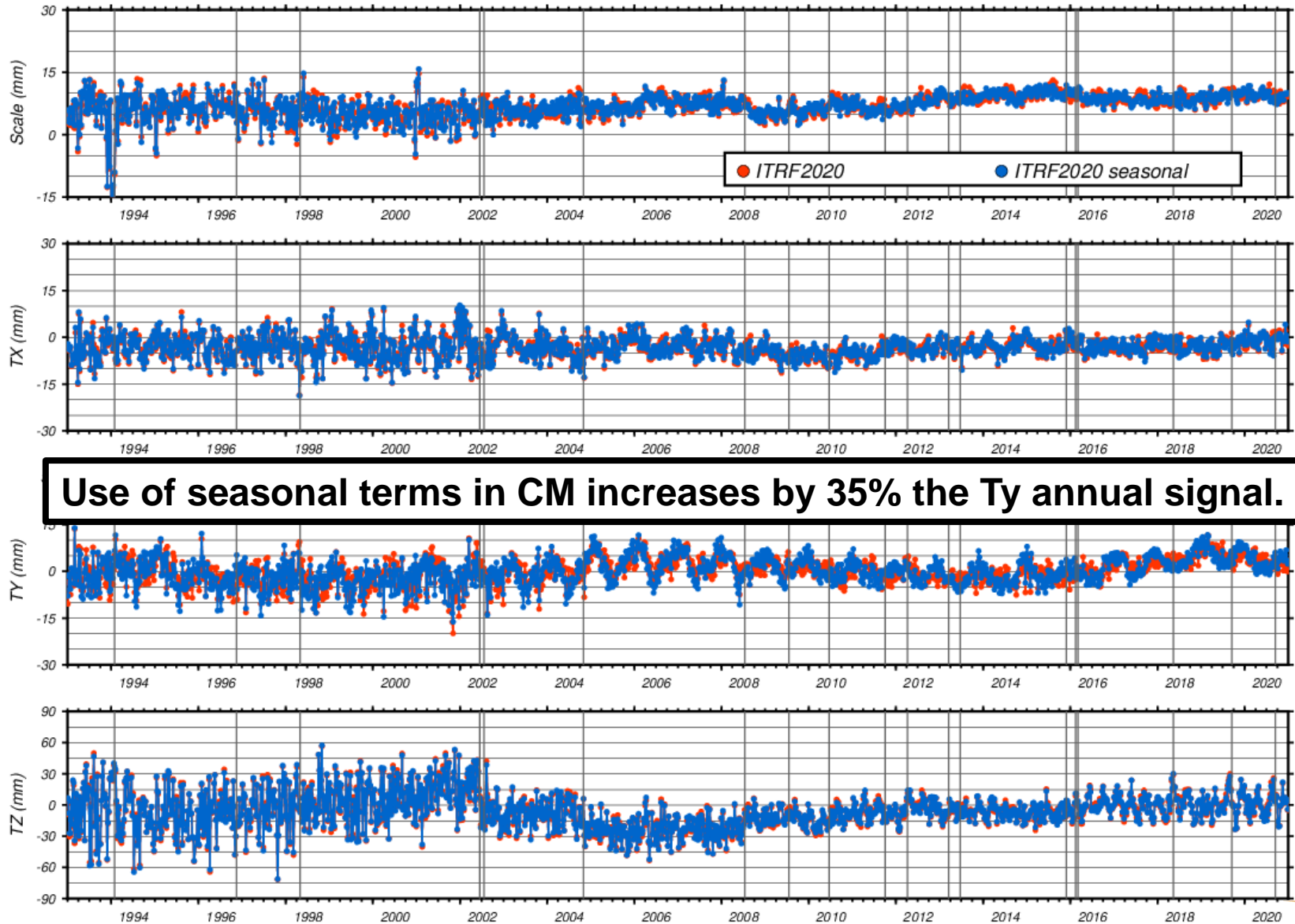
Use of seasonal terms in CM increases by 35% the Ty annual signal.

IDS contribution to the ITRF2020

- ## Lessons from the IDS contribution to the ITRF2020
    - New antenna PCV must be tested as soon as it is available.
    - Single satellite solutions, especially for new missions, are of great help.
    - DORIS scale:
        - Stability improved since ITRF2014.
        - Offset wrt ITRF2020 similar to the ILRS-IVS ITRF2014 scale offset.
        - Origin of the mean offset? Satellite antenna?

- ## Switch to ITRF2020:
    - With or without seasonal terms? In CM or CF?
    - Elaboration of first version of DPOD2020 is already on the way.

Jason-3 scale

wrt DPOD2014 v51 — gsc-j3, grg-j3, gop-j3

wrt ITRF2020P — gsc-j3, grg-j3
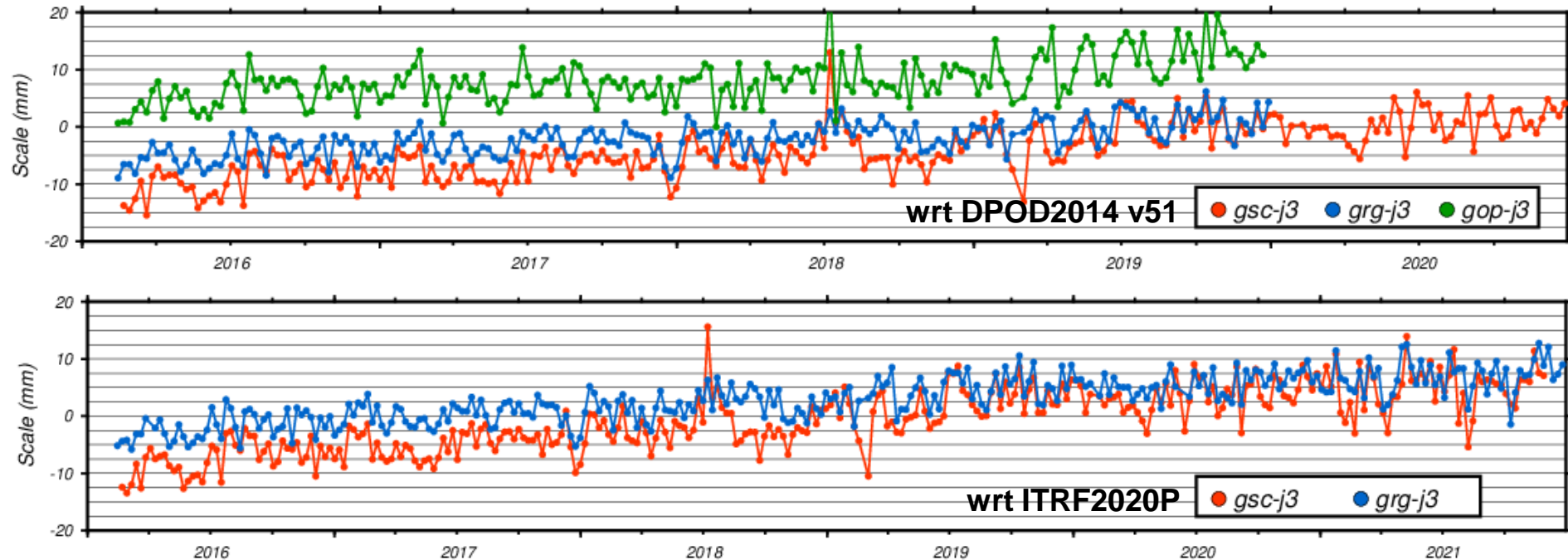
- **Scale increase since the begining.**
- **Origin? SAA?**
- **May be excluded from the multi-satellite solution scale?**

Unit: mm/yr	2016.0 2019.5
GOP	1.47
GRG	1.54
GSC	2.31

wrt DPOD2014v51

Unit: mm/yr	2016.0 2019.5	2019.5 2022.0
GRG	1.98	1.00
GSC	2.78	0.95

wrt ITRF2020P

Sentinel-3A/B
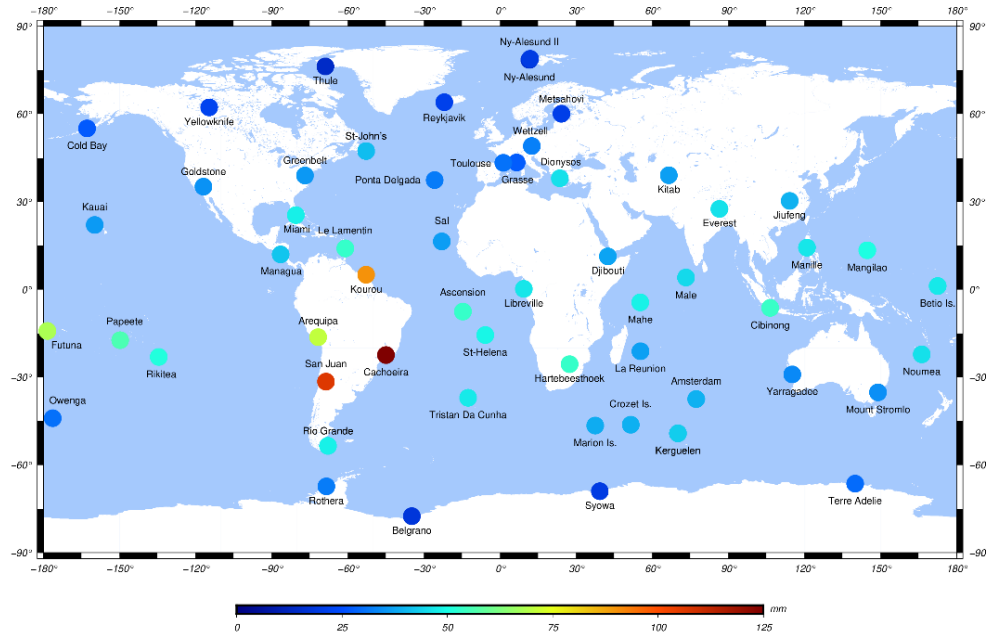
3D RMS of station position differences between Sentinel-3A and Saral GOP single-satellite solutions.

- **Sentinel-3A/B are SAA sensitive according to studies from Jalabert and Mercier (2018) and Štěpánek et al. (2020).**
- **What about testing the modelization of the DORIS USO frequency from GNSS obs for the multi-satellite solutions?**

Jalabert, E., and Mercier, F. Analysis of South Atlantic Anomaly perturbations on Sentinel-3A Ultra Stable Oscillator. Impact on DORIS phase measurement and DORIS station positioning. Adv. Space Res, 62(1), 174-190, doi:10.1016/j.asr.2018.04.005, 2018.

Štěpánek, P., Bingbing, D., Filler, V., et al. Inclusion of GPS clock estimates for satellites Sentinel-3A/3B in DORIS geodetic solutions. J. Geod, 94, 116, doi: 10.1007/s00190-020-01428-x, 2020.