CNES/CLS (GRG) IDS Analysis Center report

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CNES/CLS AC (GRG)

Status of CNES/CLS AC

- **Status of the routine DORIS data processing**

We processed DORIS data until end March 2022 (Serie grgwd42, ITRF2020 configuration)
We provided Sentinel3-A&B and Sentinel-6A orbits to CPOD QWG until end March 2022
Last addition:
• Introduction of Sentinel-6A in the GRG DORIS processing and in the multi-satellite solution
    Macromodel available at: https://ids-doris.org/documents/BC/satellites/DORISSatelliteModels.pdf
    Attitude: Quaternions
    Radiation pressure coefficient strongly constrained to 1.05

- **In progress:**

Introduction of the DORIS data from HY-2C and HY-2D satellites in our processing chain
    Macromodel available at: https://ids-doris.org/documents/BC/satellites/DORISSatelliteModels.pdf
    Attitude: nominal attitude law implemented

# Introduction of Sentinel-6A, HY-2C and HY-2D

☐ **POD summary** DORIS RMS of fit and OPR Acceleration Amplitude / Radiation pressure coefficient

SATELLITE	DORIS RMS (mm/s)	OPR amplitude average $(10^{-9}$ m/s$^2)$		Solar radiation coefficient
		Along-track	Cross-track	
Cryosat-2	0.356	2.6	2.4	1.00
Saral	0.340	1.4	2.0	1.00
Jason-3	0.363	2.5	1.6	0.99
Sentinel-3A	0.373	2.5	1.6	1.00
Sentinel-3B	0.387	1.5	1.9	1.00
Sentinel-6A	0.362	1.9	2.7	1.05
HY-2C	0.403	1.3	2.5	1.00
HY-2D	0.368	0.6	2.1	1.00

▪*For the two directions, Along-track and Cross-track, the mean amplitudes are lower than 4x10^{-9} m/s^2, reflecting a satisfying level in the modeling of the satellite macromodels and the attitude law*

Status of POD for Sentinel-6A

❑ **DORIS RMS of fit**

Sentinel-6A
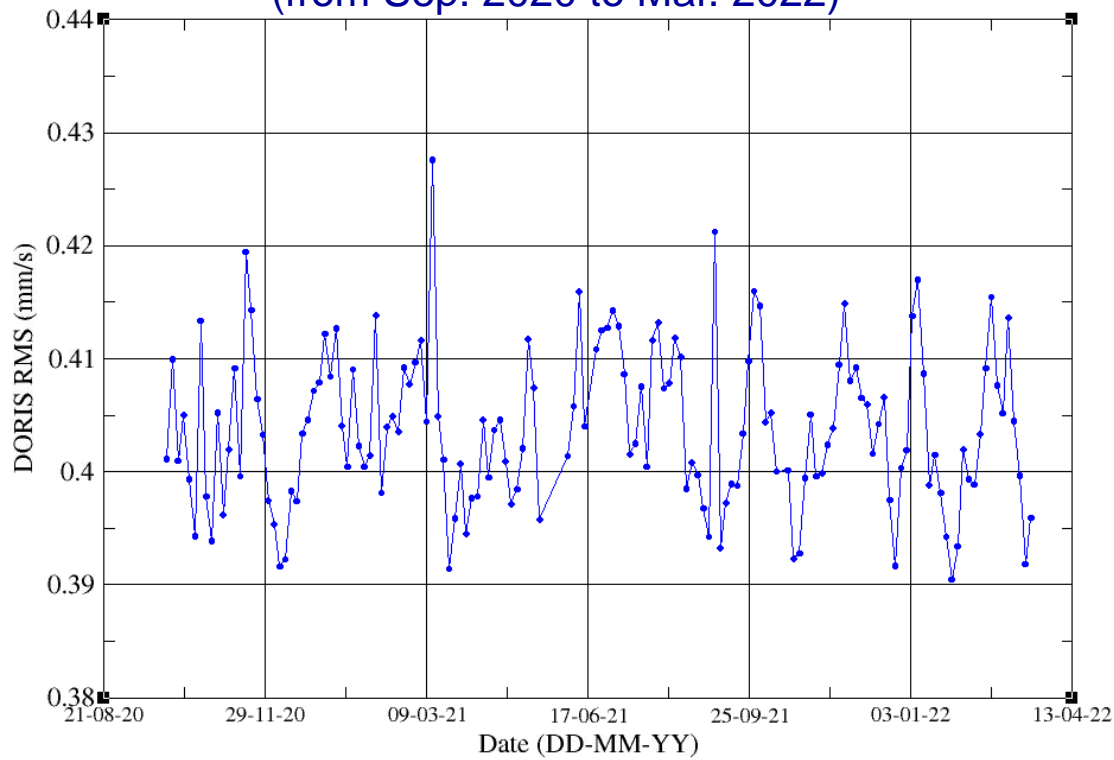(from Dec. 2020 to Mar. 2022)
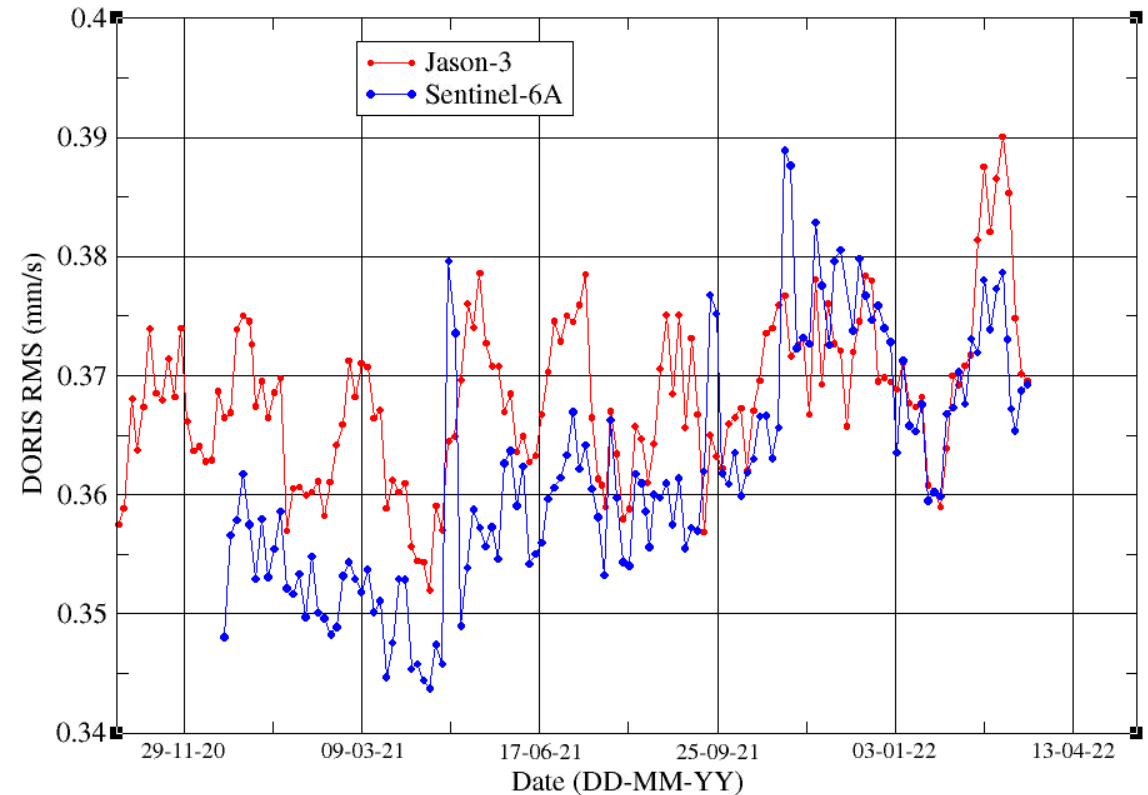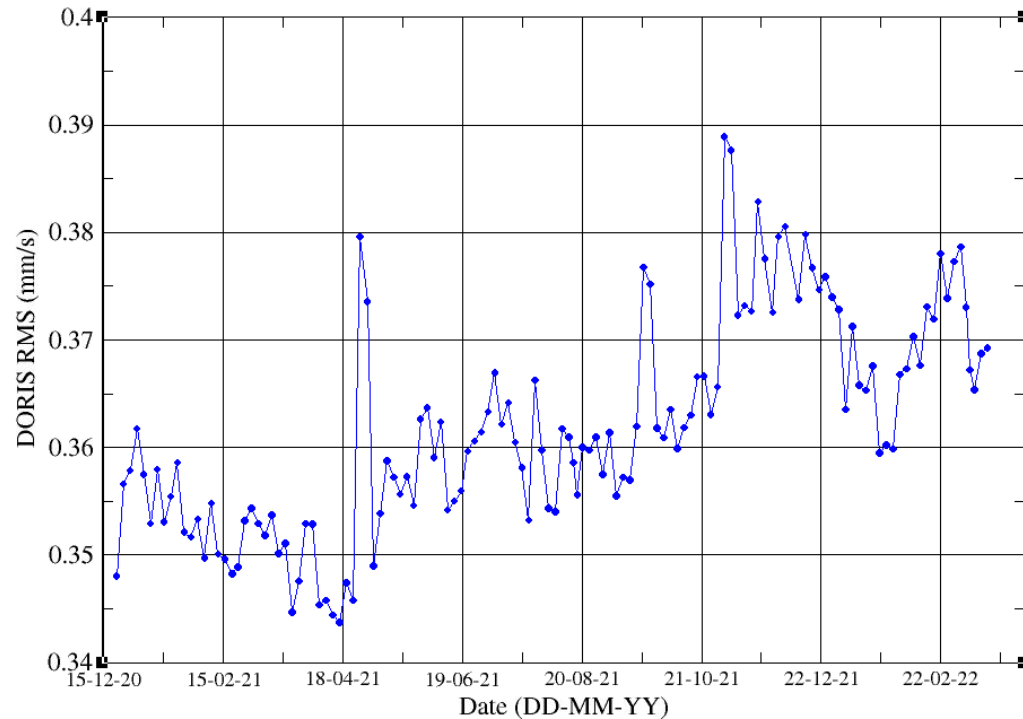
- *The level of DORIS RMS residuals for Sentinel-6A and Jason-3 are at the same level.*
- *There is a ~59 days periodic signal for Jason-3 satellite, even when we use quaternions for attitude satellite.*
- *There is also a signature in the Sentinel-6A DORIS RMS residuals.*

Status of POD for HY-2C and HY-2D
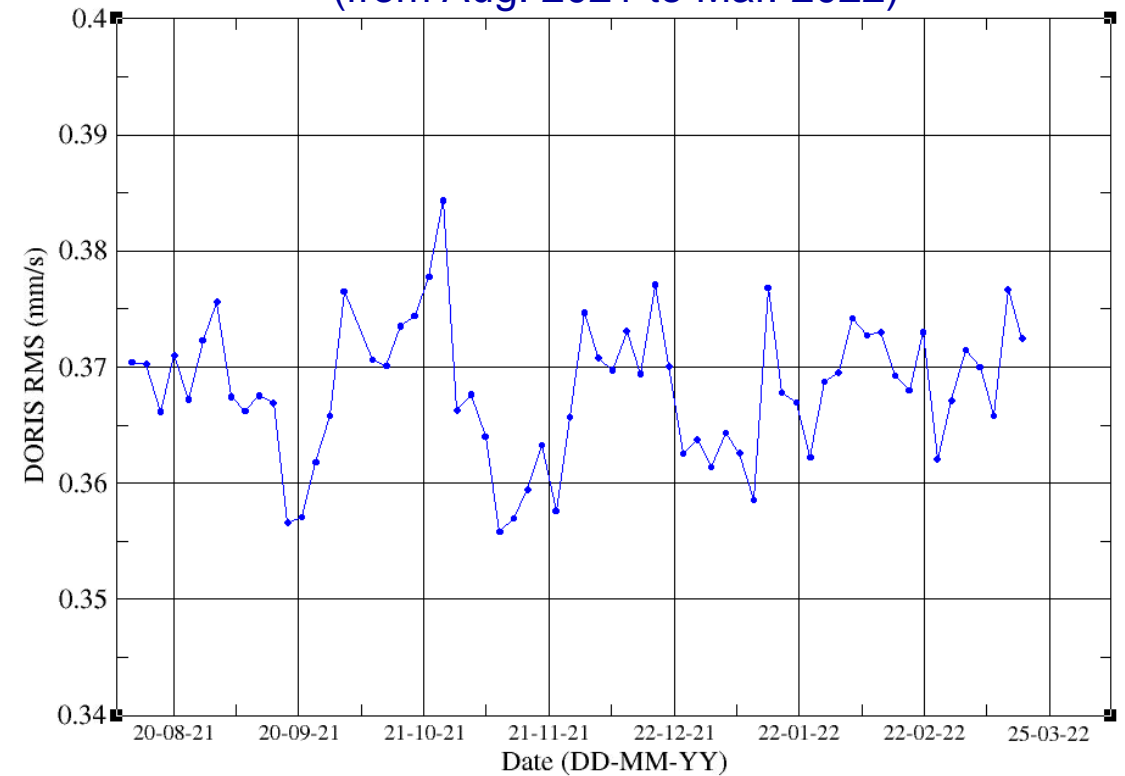
☐ **DORIS RMS of fit**

HY-2C
(from Sep. 2020 to Mar. 2022)

HY-2D
(from Aug. 2021 to Mar. 2022)

▪ *For HY-2C and HY-2D, the discrepancy is similar but the level of DORIS RMS residuals is higher for HY2C (not yet explained).*
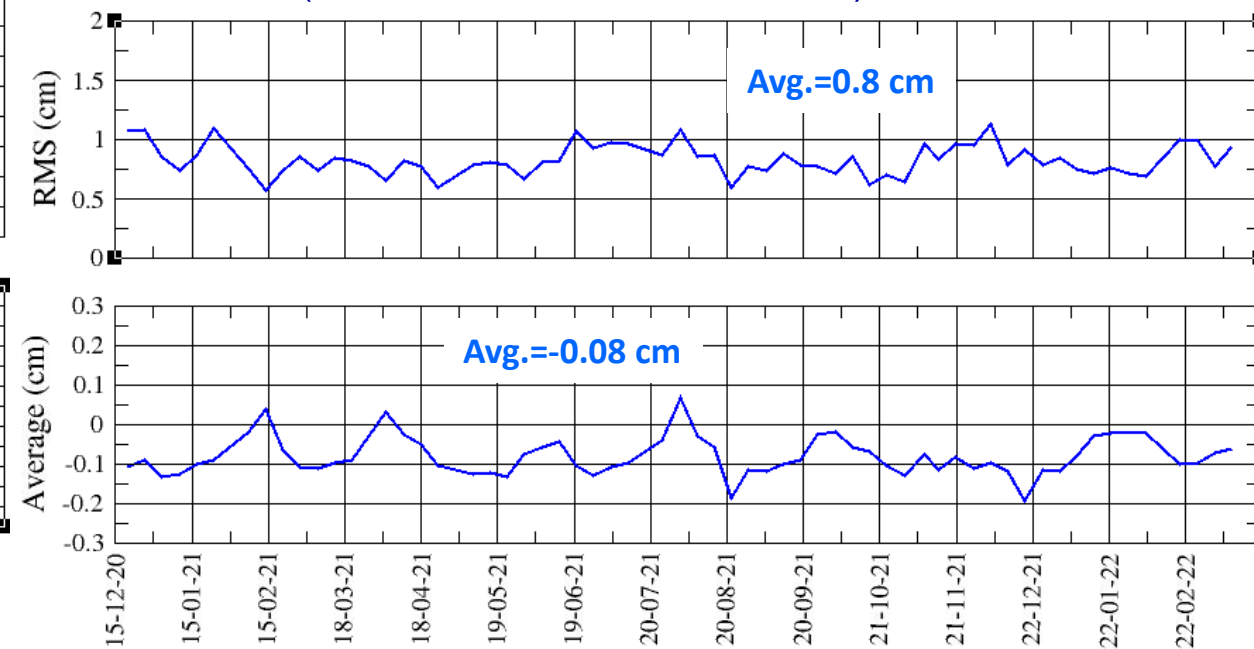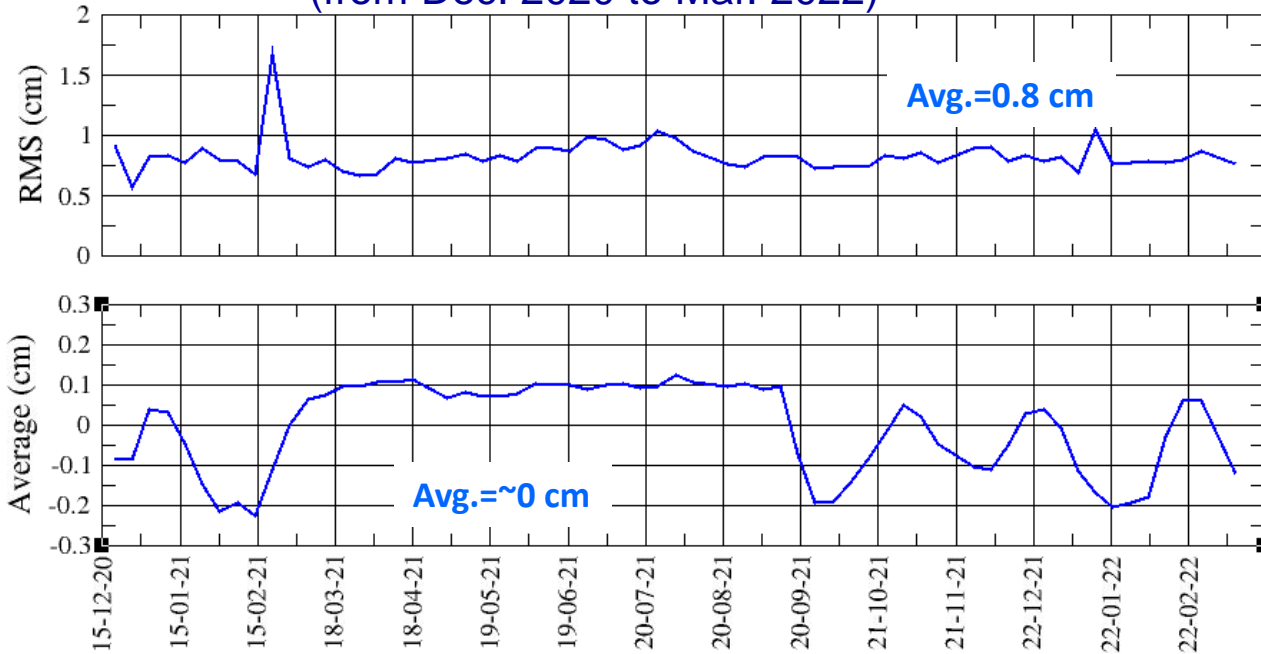
Status of POD for Sentinel-6A

❑ **Comparison to CNES (POE-F) orbit**

RMS and Avg. Radial orbit differences (in cm)

Sentinel-6A
(from Dec. 2020 to Mar. 2022)

Reference orbit = GRG orbit

Jason-3
(from Dec. 2020 to Mar. 2022)

- *There is a good agreement between GRG orbit and external orbit CNES POE-F (~0.8 cm RMS).*
- *For Jason-3, there is a 59 days periodic signal in the radial component.*
- *For Sentinel-6A, there is a signature which remains to be understood.*
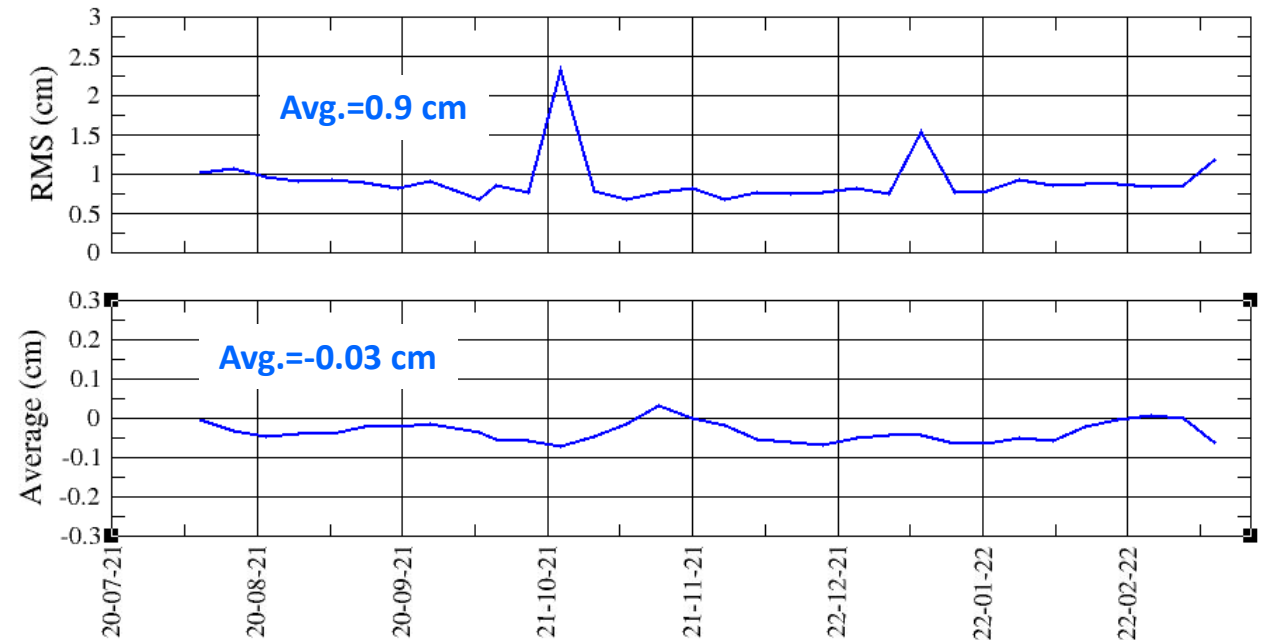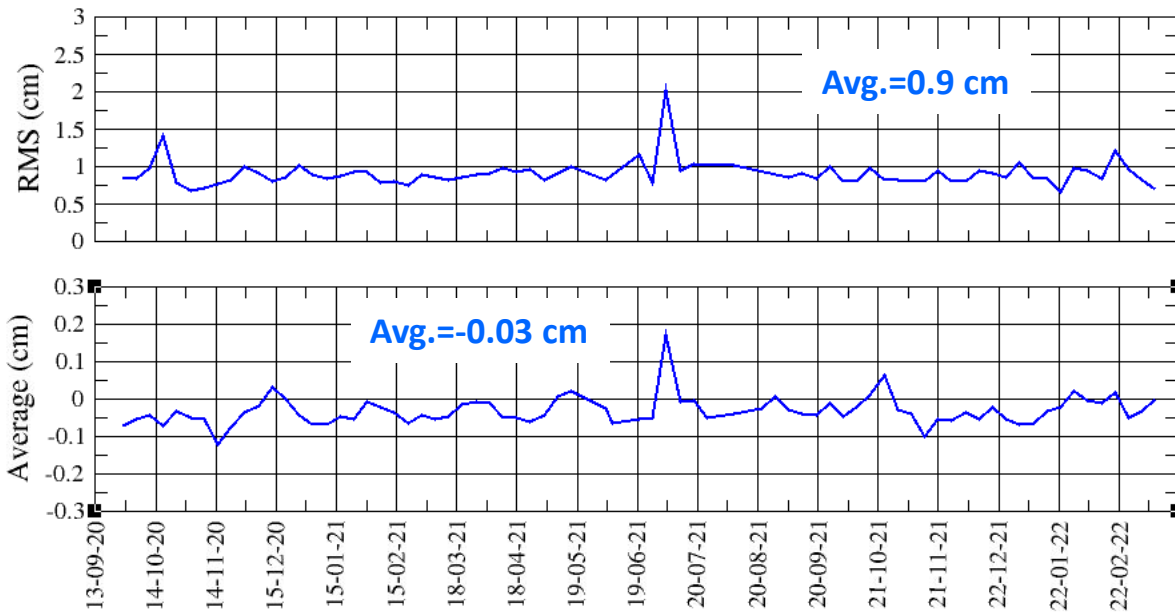
Status of POD for HY-2C and HY-2D

❑ **Comparison to CNES (POE-F) orbit**

RMS and Avg. Radial orbit differences (in cm)

HY-2C
(from Sep. 2020 to Mar. 2022)
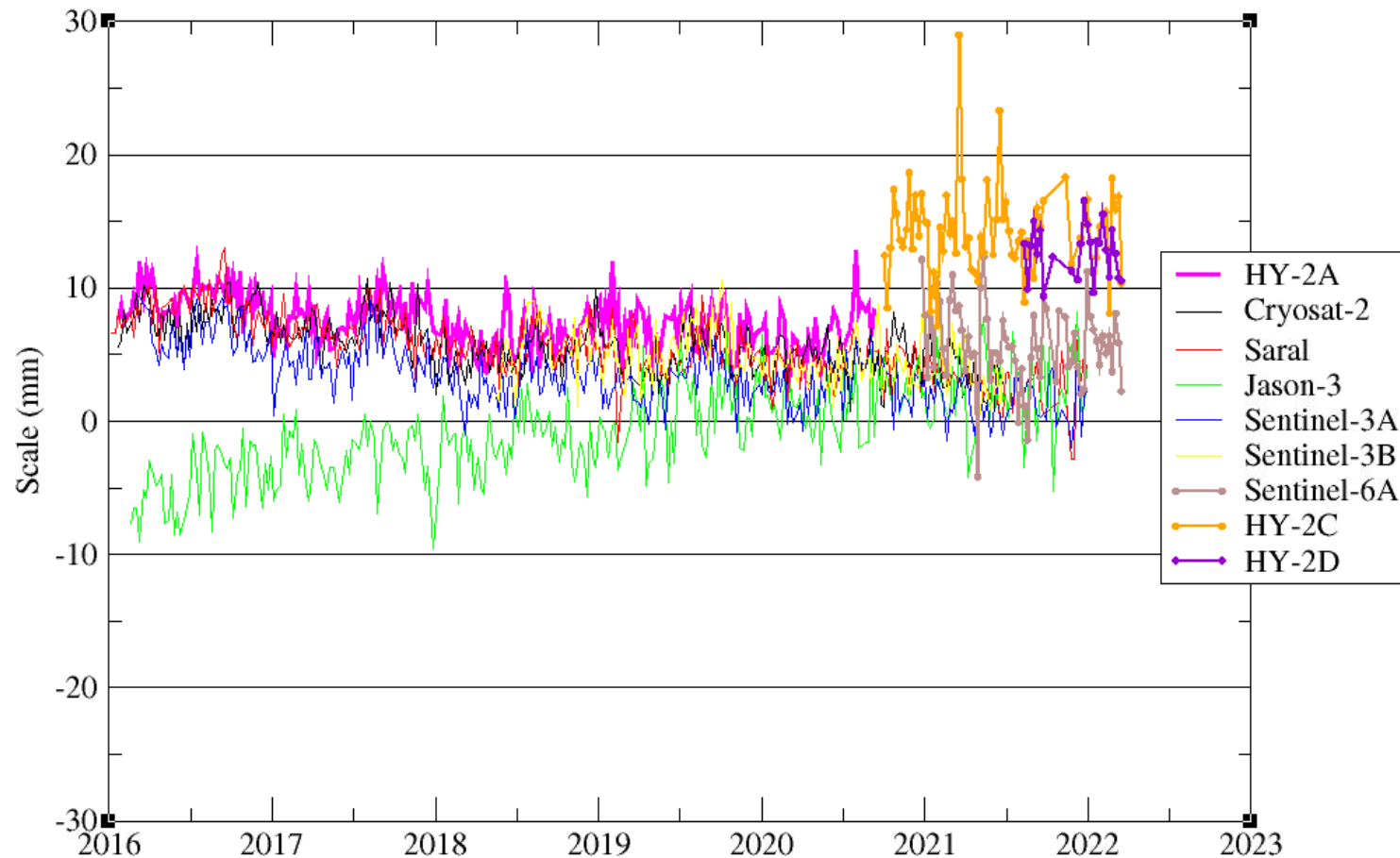
Reference orbit = GRG orbit

HY-2D
(from Aug. 2021 to Mar. 2022)

▪ *There is a good agreement between GRG orbit and external orbit CNES POE-F (~0.9 cm RMS) and no bias.*
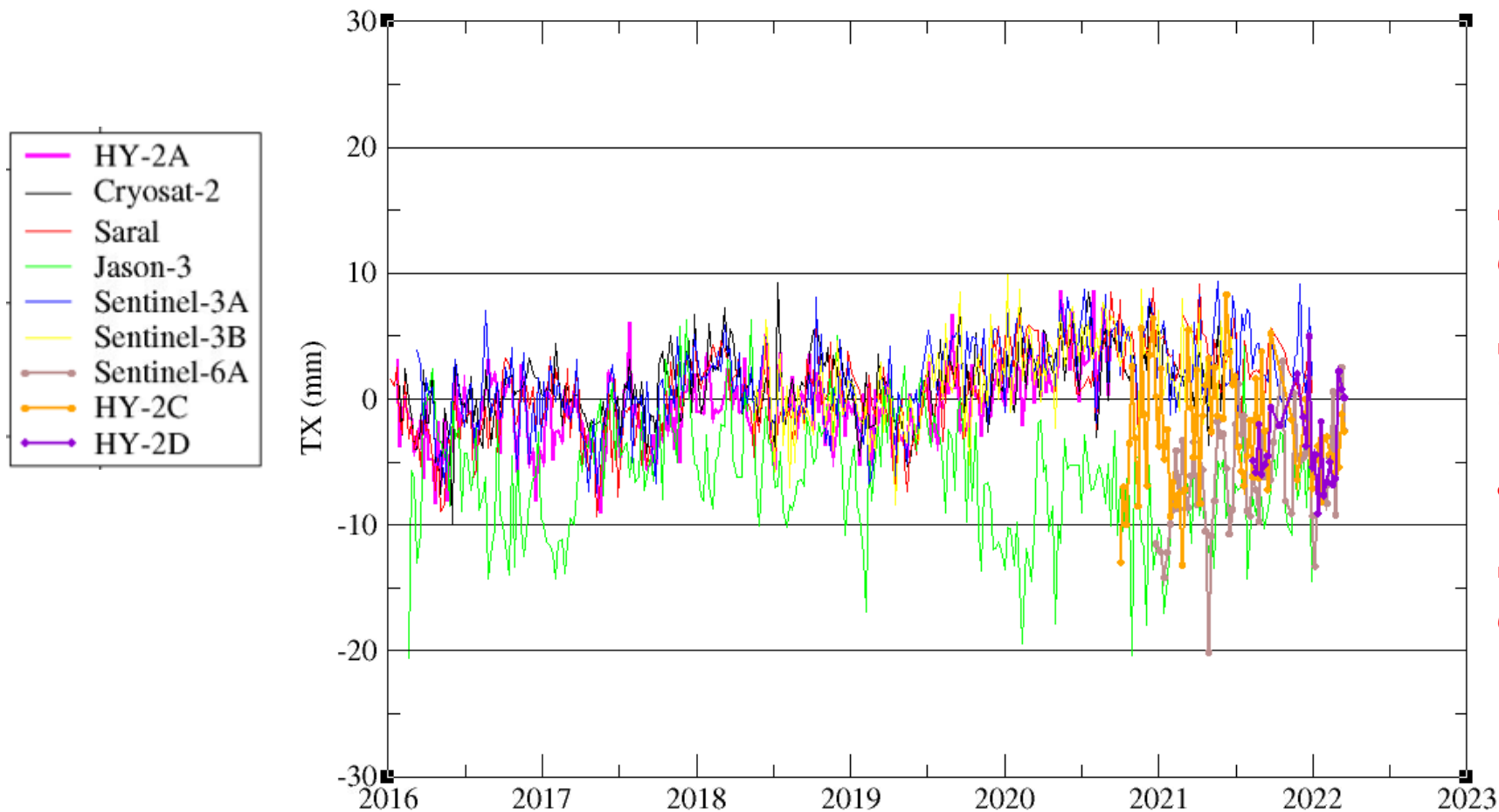
Single satellite solutions

Comparison of each solution to DPOD2014 (computed by CATREF)
Scale Factor from single satellite solutions

- *Sentinel-6A scale at the same level*

- *HY-2C and HY-2D scale higher*

- *Jason-3A scale: increases since the beginning but seems to be stabilizing*

Single satellite solutions

Comparison of each solution to DPOD2014 (computed by CATREF)
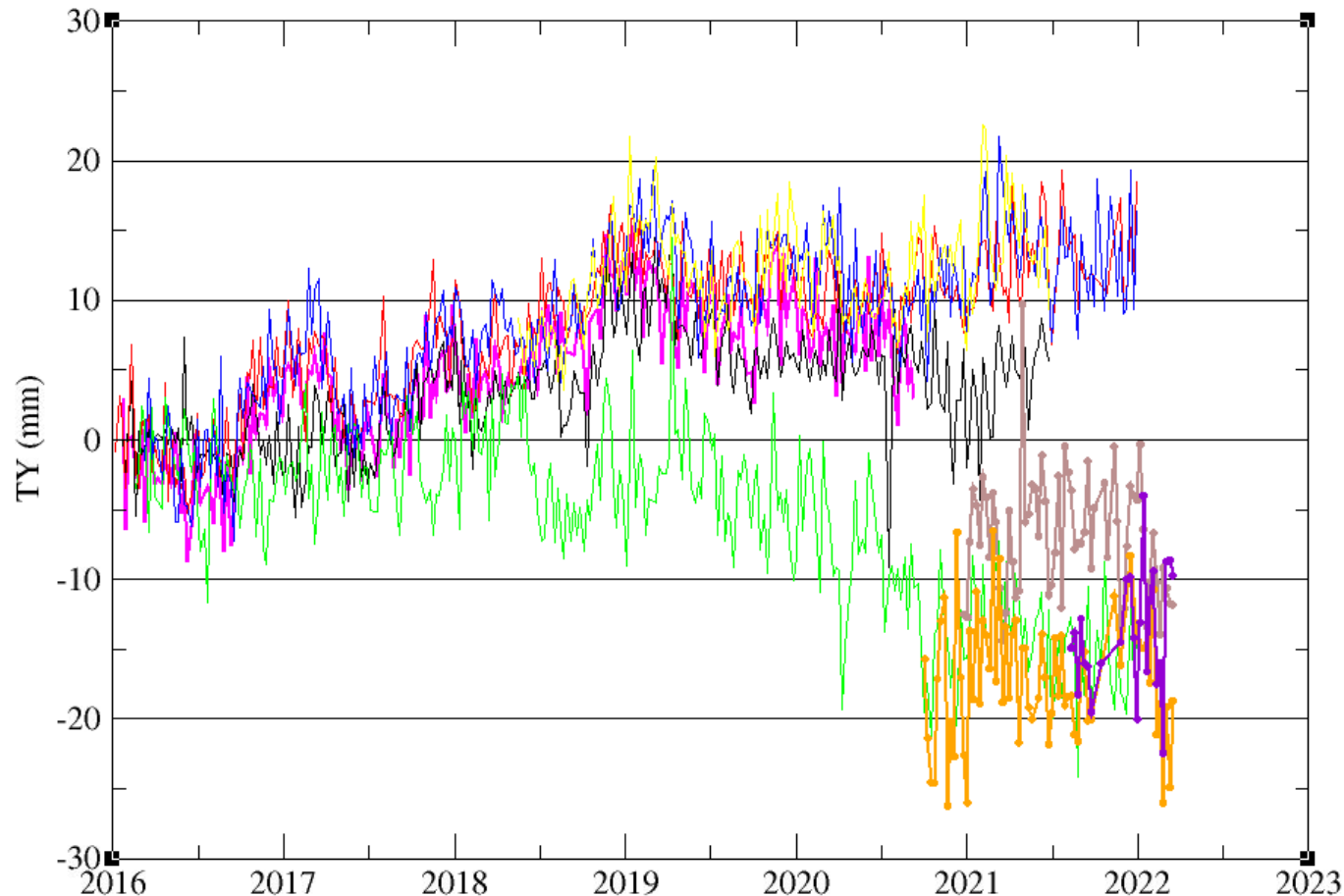**TX from single satellite solutions**

- *Jason-3 TX has a behavior different compared to other satellites.*

- *The TX for Sentinel-6A is close to that of Jason-3.*
  They are the same inclination and altitude.

- *HY-2C and HY-2D seems to be closer than that of Jason-3*
  They are same inclination.

Single satellite solutions

Comparison of each solution to DPOD2014 (computed by CATREF)
TY from single satellite solutions

- *Jason-3 TY has a behavior different compared to other satellites.*

- *The TY for Sentinel-6A, for HY-2C and HY-2D are close to that of Jason-3.*
They are same inclination.

Single satellite solutions comparisons

Comparison of each solution to DPOD2014 (computed by CATREF)
TZ from single satellite solutions
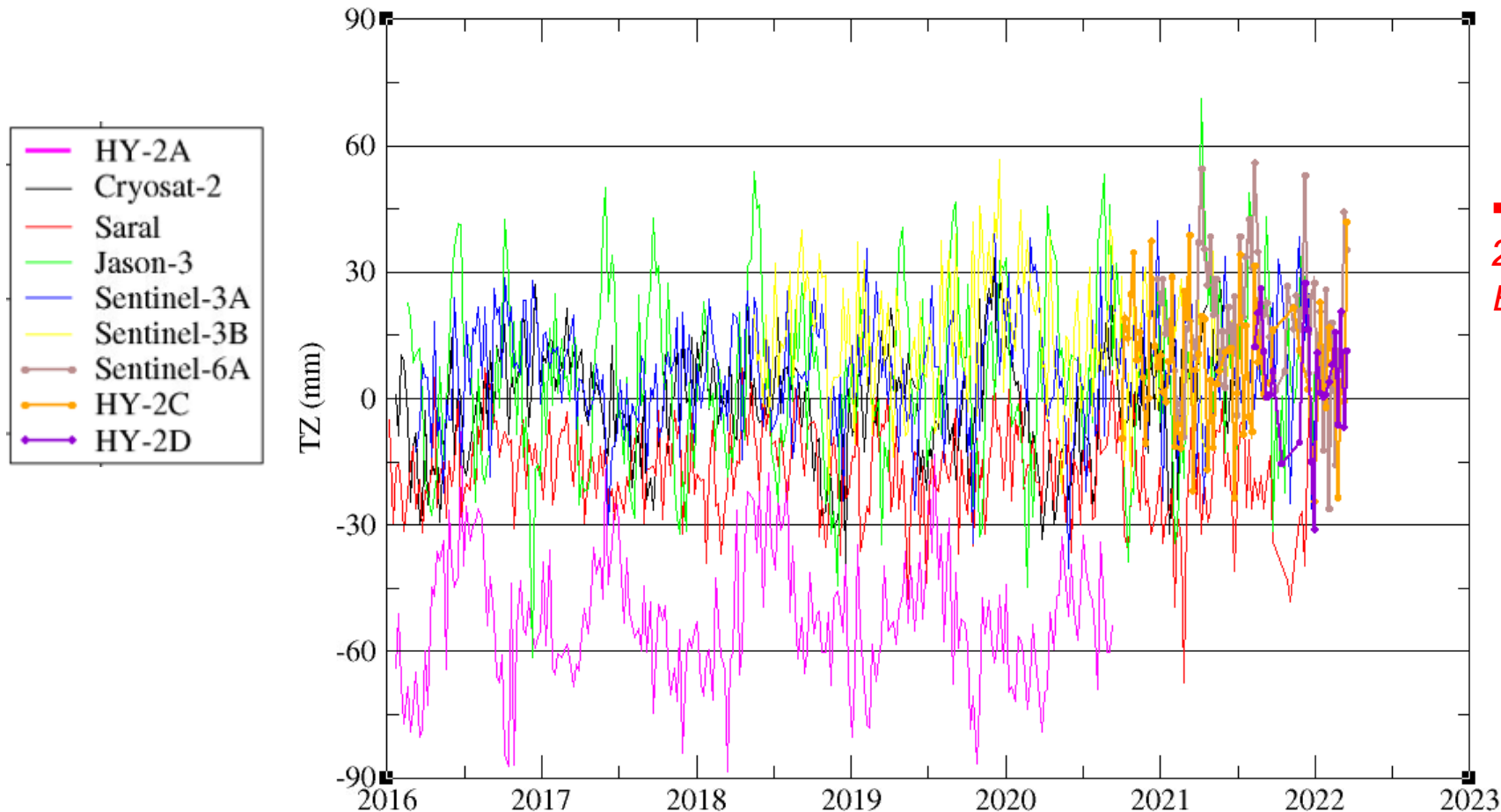
- *TZ for Sentinel-6A, HY-2C and HY-2D is similar to others*
Except for the HY-2A who has a bias

On going and future work

We plan to
- *finalize the Implementation of the HY-2C and HY-2D in our processing chain*
- *There is good agreement between GRG orbit and external orbit of CNES POD team but there is still room for improvement (some signature remains to be understood)*
- *continue the evaluation of GRG orbits:*
  - *by comparisons to orbits internal with GNSS*
  - *by comparison to external orbits*
  - *by Independent SLR RMS of fit*
  - *by Altimeter crossover Cycles*
- *continue to analyze Geocenter and Scale factor from single satellite solutions*
- *finalize our paper on the ITRF2020 reprocessing*
- *…*