

# OSTST 2023

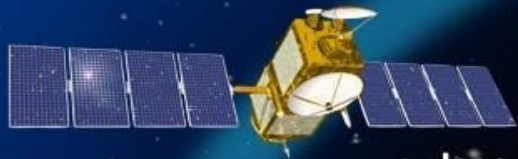
## Jason-3 Project Status



**Jason 3**  
2016



**OSTM/Jason 2**  
2008 -- 2019



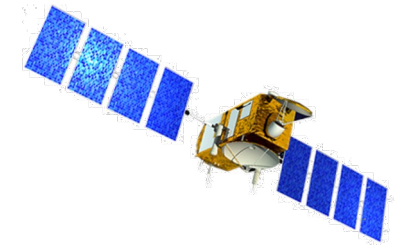
**Jason 1**  
2001 -- 2013



**TOPEX/Poseidon**  
1992 -- 2006

**Christophe FERRIER, CNES**  
on behalf Jason-3 Project Managers

# Platform status



AOCS & Propulsion



Electrical & Power



Thermal



Data handling – TT&C



No SHM occurrences since the 2020/06/15<sup>th</sup>

JASON-2 lessons learnt:

- ✓ Patch EDAC\_INVESTIGATION to monitor EDAC in RAM (currently on PMA): no recurrent error detected so far
- ✓ Gyro swap strategy to prevent JA2-like gyro anomalies: next swap (GYR2 ↔ GYR1) foreseen in March 2022
- ✓ PCE sections swap strategy to prevent JA2-like PCE anomalies: Next swap (S1 – S7 ↔ S2 – S8) foreseen in January 2025

After more than 7 years in orbit :

- Both half satellites available
  - all sub-systems **operational** with **nominal performances**
  - all **subsystems available**
- ✓ No limitation of **mission duration** involved

# Payload Status

- **Core Payload**

- POSEIDON3 **OK**
- DORIS **OK**
- AMR **OK**
- GPSP-A **OK**

- **Passengers**

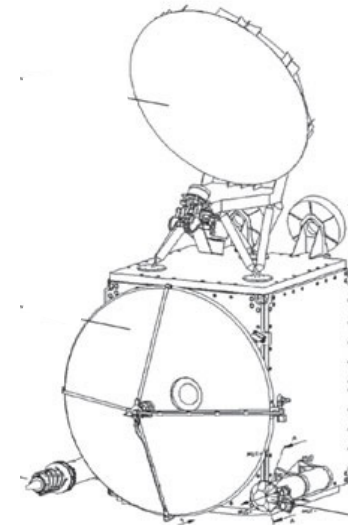
- CARMEN / AMBRE **OK**
- LPT **OK (degraded TM patched on ground)**

- **Exceptional activities :**

- GPSP-B swapped with GPSP-A November 25<sup>th</sup> 2022 **OK**
- Carmen OFF/ON Operations December 14<sup>th</sup> 2022 **OK**

➔ **Fully OPERATIONAL with redundancy available for POS-3, DORIS & AMR**

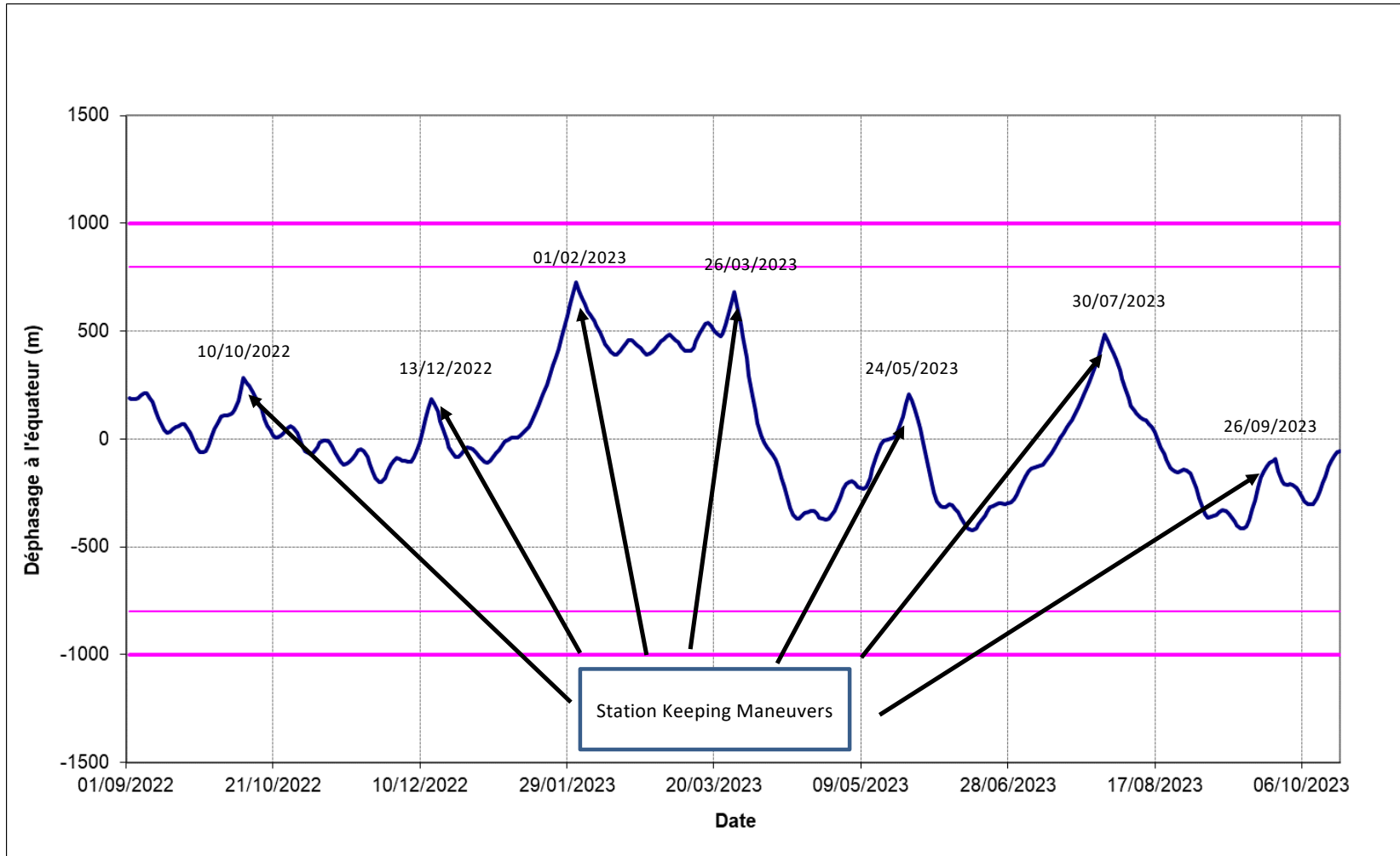
➔ **Passengers fully operationnal**



## Ground & Operations Status

- Earth terminals :
  - Usingen – USG2 pointing limited to 5°, USG1 **OK**
  - Wallops, Fairbanks and Barrow (CDAS) **OK**
- Control Centers :
  - JCCC CNES Control center **OK**
    - all the elements are OK
  - SOCC NOAA Control center **OK**
    - all the elements are OK
- Instrument Commanding and Monitoring Centers :
  - SSALTO for CNES instruments **OK**
  - JPL Mission facility for NASA/JPL instruments **OK**
  - Passengers Mission centers **OK**

# Routine navigation and guidance

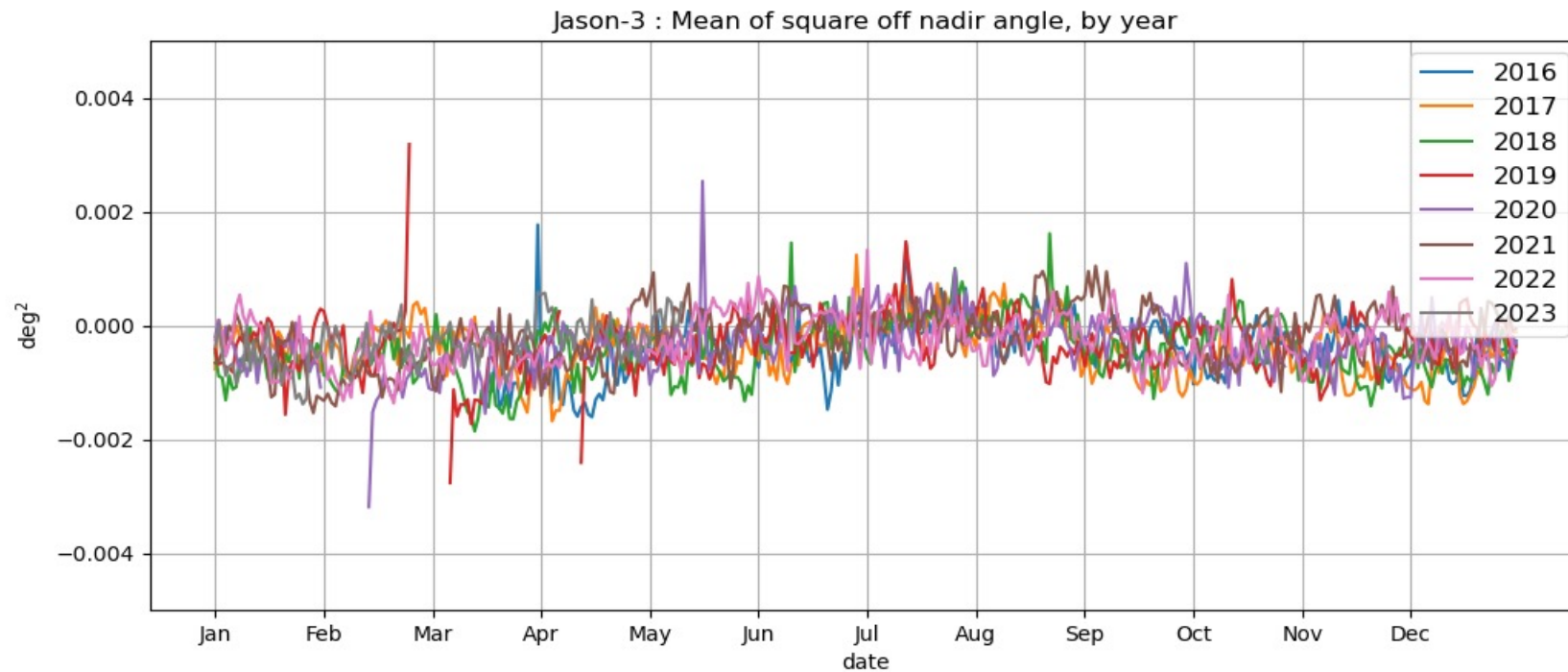


# System Requirements and Performances

Altimeter Antenna Pointing : **typical value below 0.005°**

(Requirement < 0.2°)

pointing performance stable

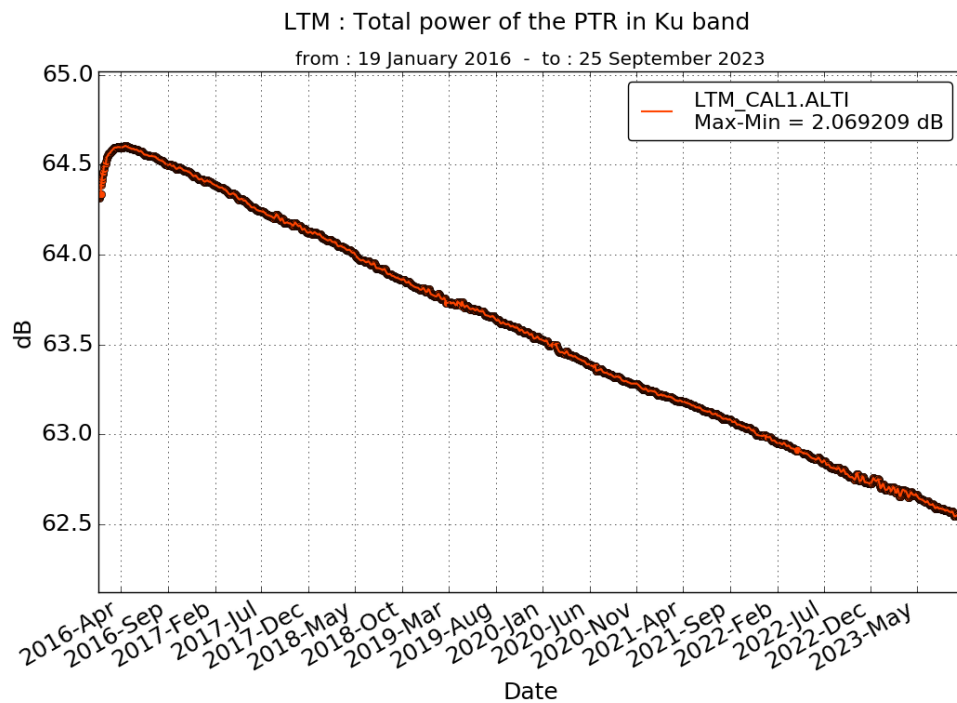




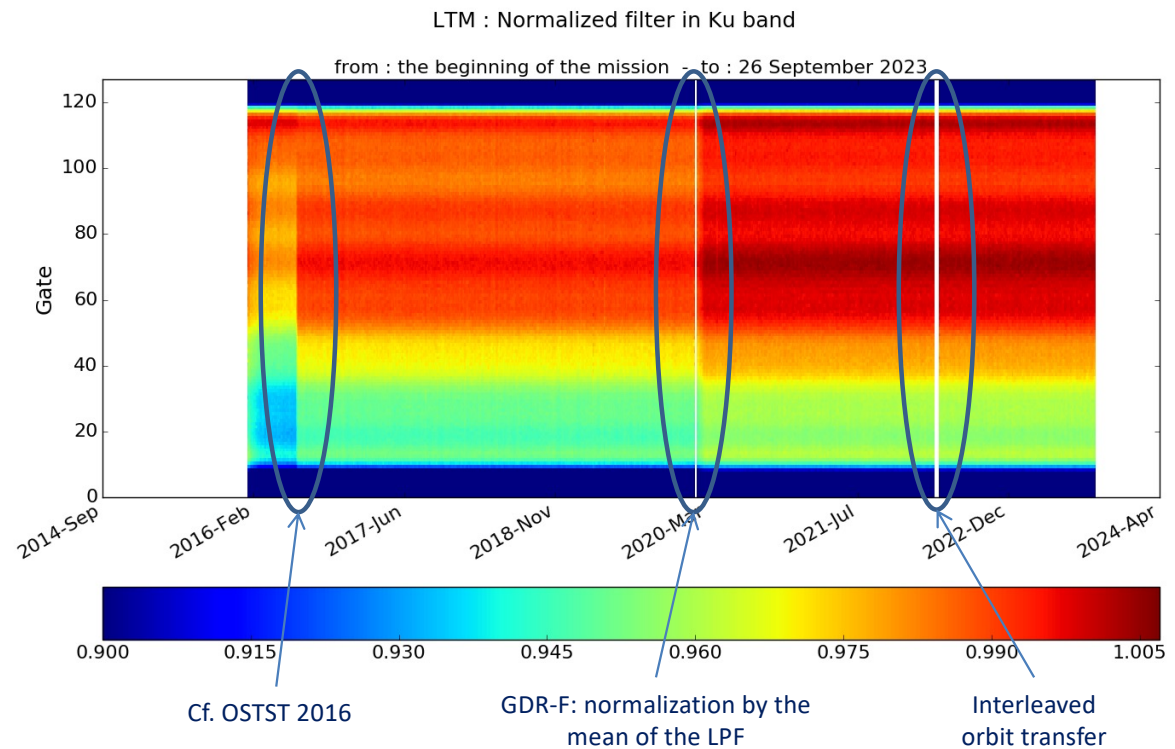
# POSEIDON-3B – Routine calibrations

- Routine/Exceptional calibrations are OK
- Excellent Measurement Stability (short and long term)

○ CAL1 Ku-band PTR power



○ CAL2 Ku-band LPF

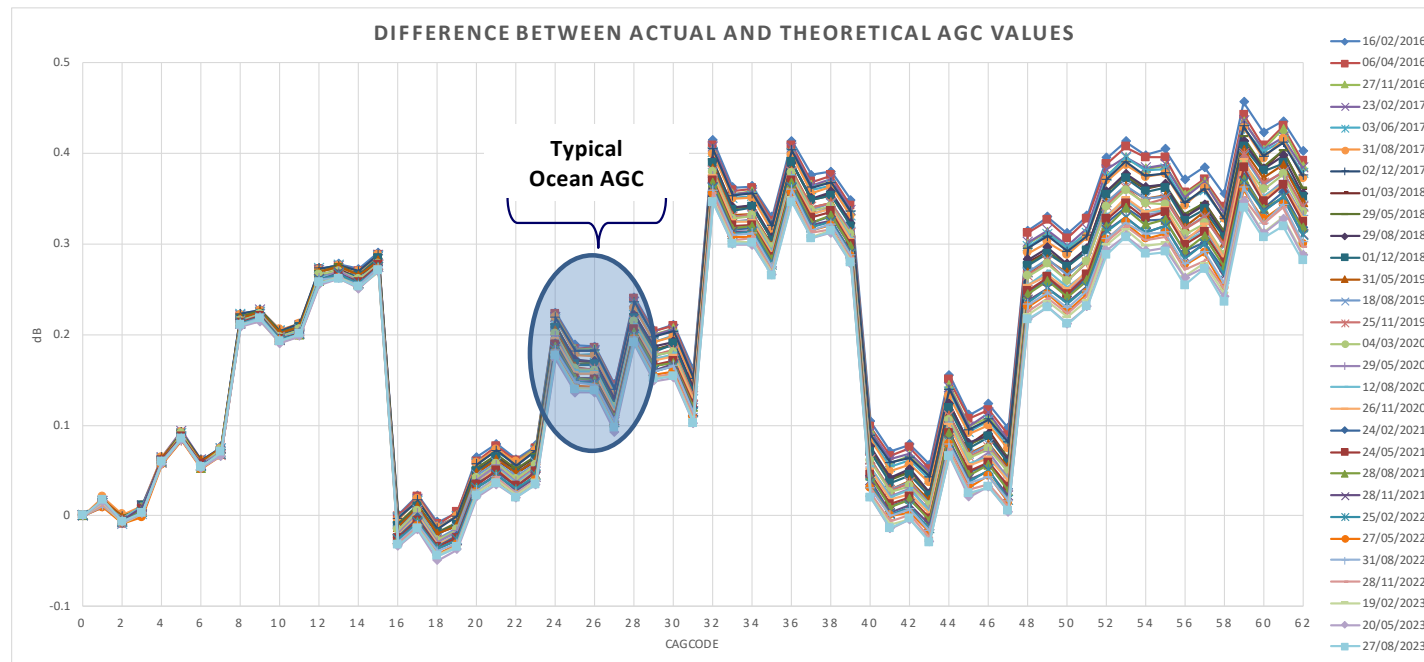
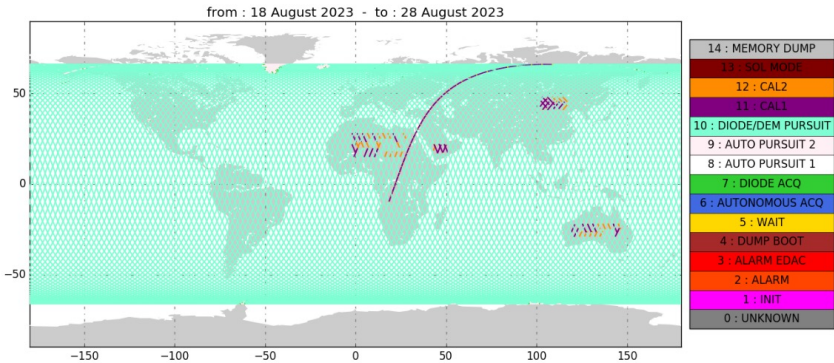


# POSEIDON-3B – Exceptional calibrations

- AGC calibrations

- Last processed : 27/08/2023
- Low trend variation in the typical AGC range
- Impact on  $\sigma_0 < 0.06$  dB
- Will be taken into account in **GDR-G (2024)**

Jason 3 Altimeter Mode





# POSEIDON-3B – New On-board DEM

- DEM v5.0 for the interleaved orbit

- Contents :

- Over oceans, consistent with other altimetry missions
- Over inland waters (rivers, lakes, reservoirs): **31,200 targets**
- Same number of targets monitored on the interleaved orbit wrt reference orbit



→ **DEM performance is nominal** : presence flag **>93%**

Cf. OSTST Forum Presentation in Science IV:

*“Nadir altimetry over land: achievements using the Open-Loop Tracking Command (OLTC) and benefits for inland waters users”*

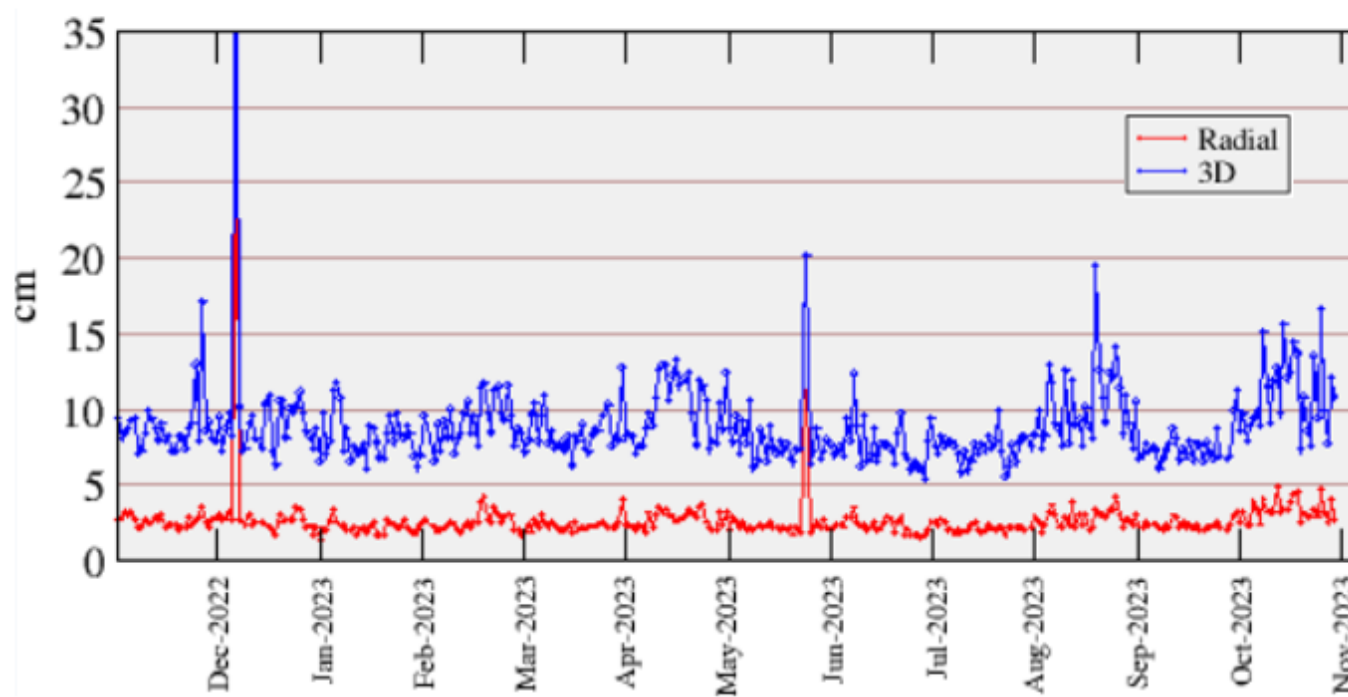
**Sophie Le Gac (CNES)**

Availability = 100% over the period

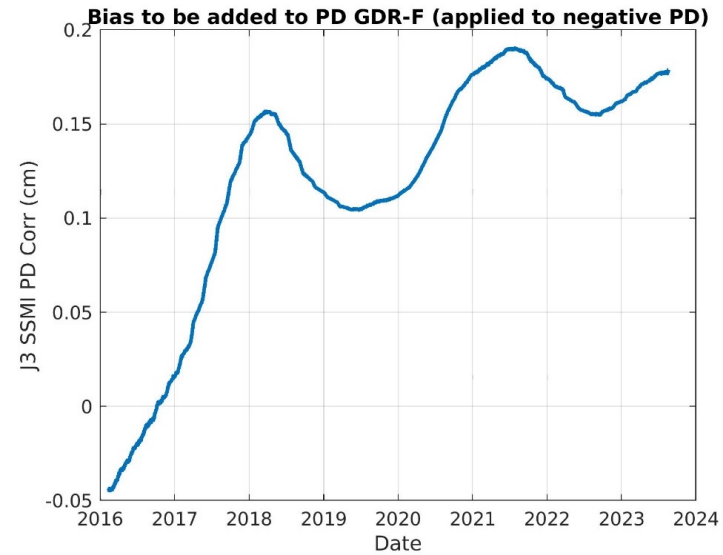
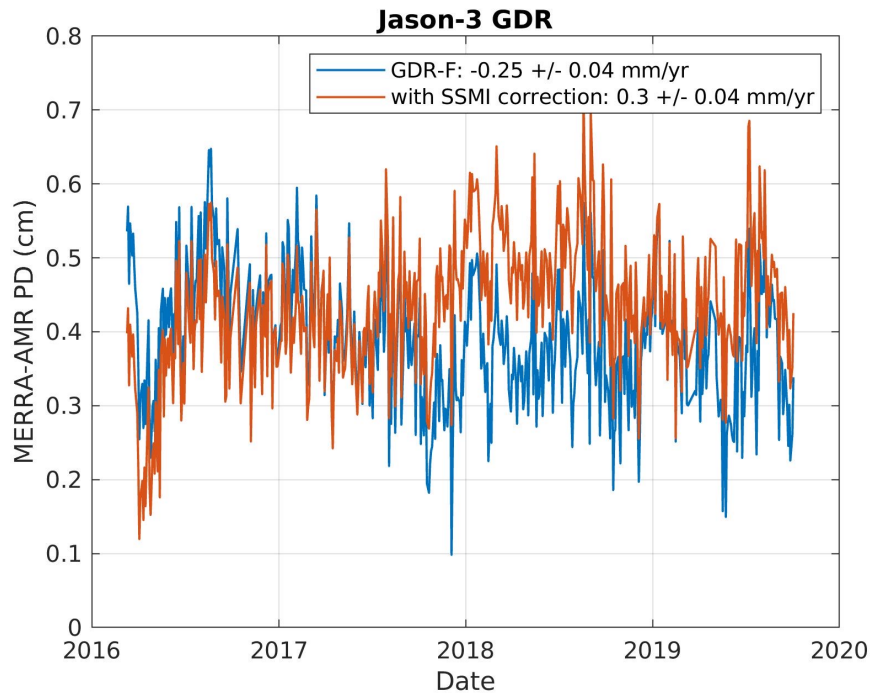
**DORIS**

### DIODE – MOE differences for Jason-3

Daily RMS, maneuvers excluded



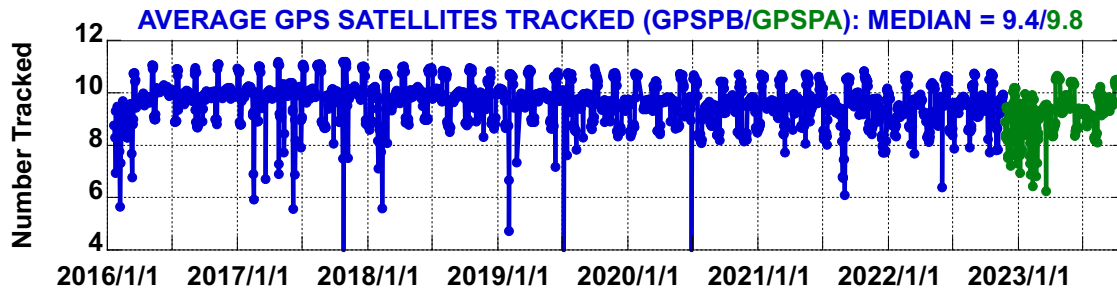
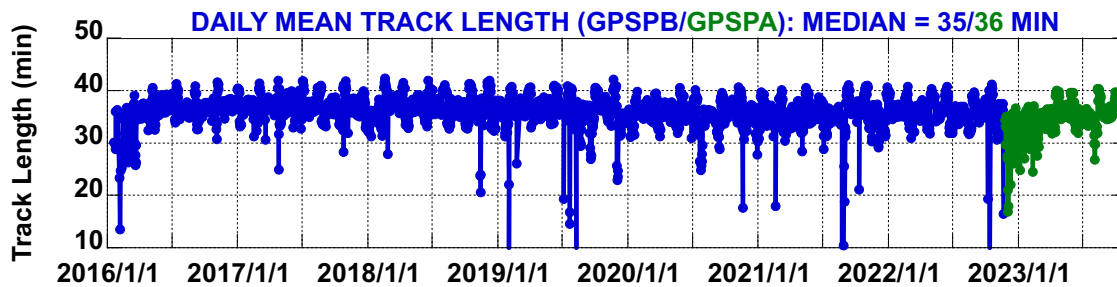
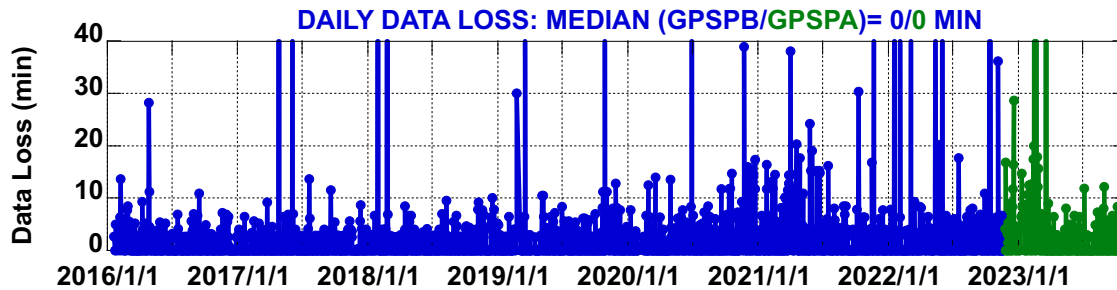
# Jason-3 AMR Performance



AMR performs nominally since launch

- **98.60% availability**
- Cold sky calibration are critical to stabilize Jason-3 at the mm-level
- Average Path Delays (PD) stable to within  $\sim +1$ mm of the MERRA model PD over mission
- Long-term calibration recently updated based on TB inter-calibration with SSMI sensor to account for minor residual offset drift (not removed by cold sky)
- Correction is about 2mm over 8 years ( $0.25$ mm/yr), correction made available to OSTST

# Jason-3 GPSP Receiver Performance

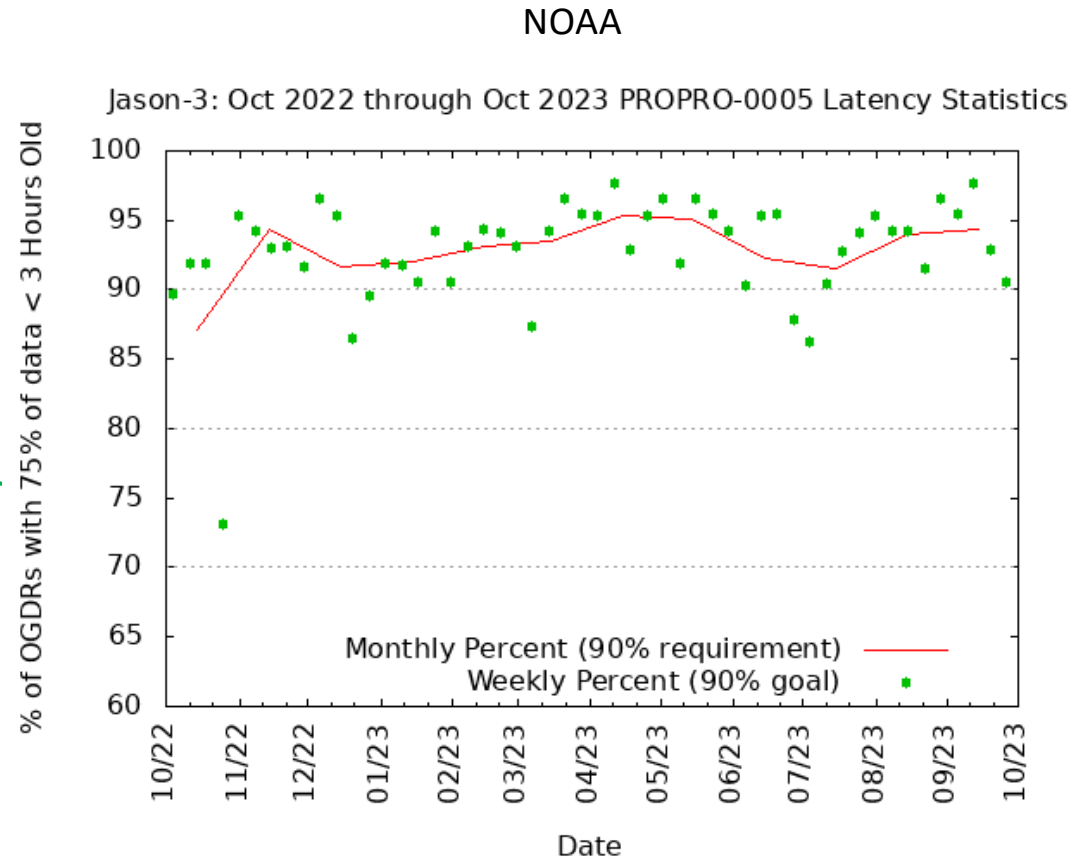


## GPSP

- Transitioned from primary (GPSP-B) to redundant (GPSP-A) on 26 November 2022.
- 98.2% availability since launch,  
• 99.7% availability since Mar 2023 after GPSP-A scrubbing turn-on.
- Tracking metrics are consistent since launch.
  - Metrics based upon data up to 7 October, 2023.

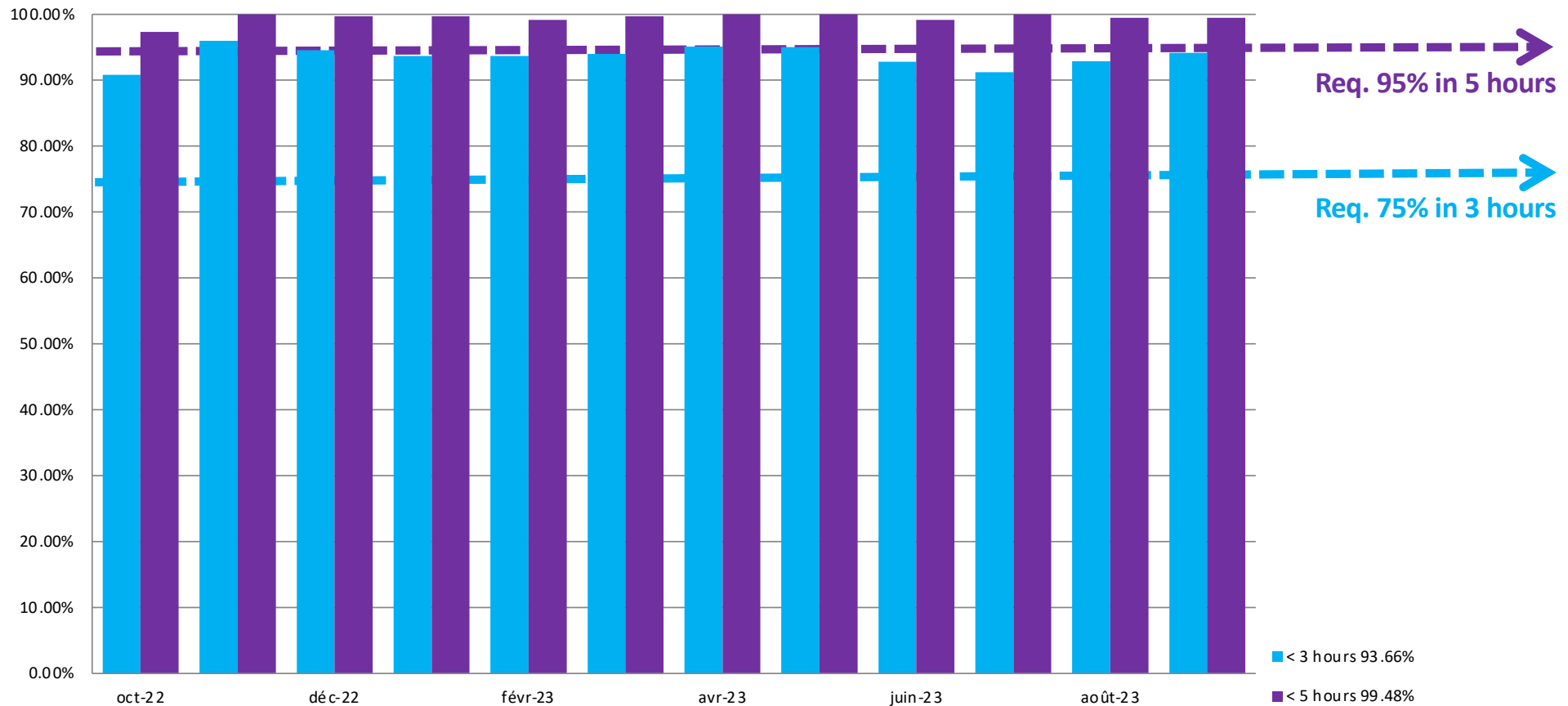
# OGDR products Status and performances

- NRT products made by **EUMETSAT** and **NOAA/ESPC** Mission Center
- No major changes in the period
- EUMPC : ~100% OGDR successful for PLTM1 acquired at USG
- NOAA ESPC : ~100% OGDR successful for PLTM1 acquired at CDAs
- 100 % OGDR products archived, all disseminated via EUMETCast and via NOAA dissemination services



# Jason-3 OGDR Latency at EUMETCast

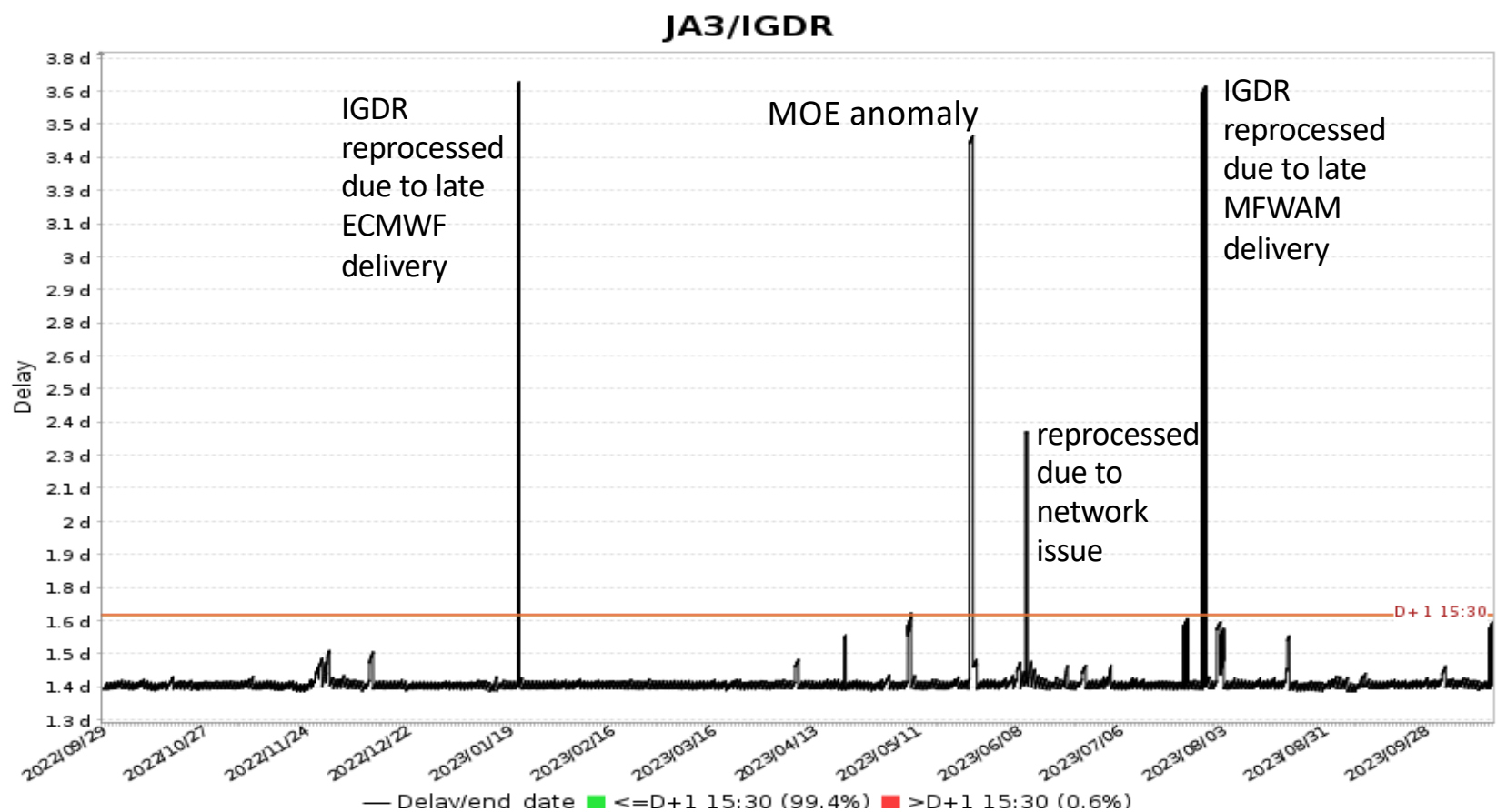
OGDR Latency at End User's EUMETCast Reception Station





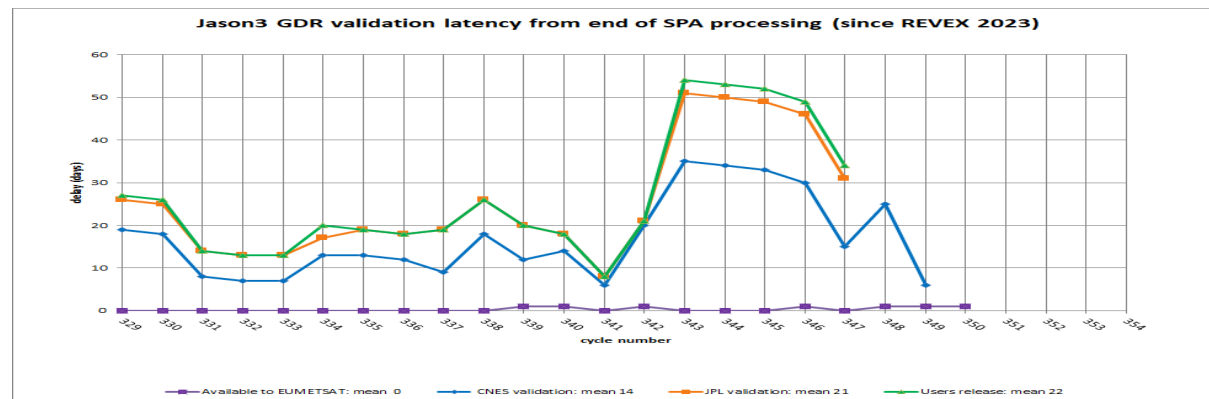
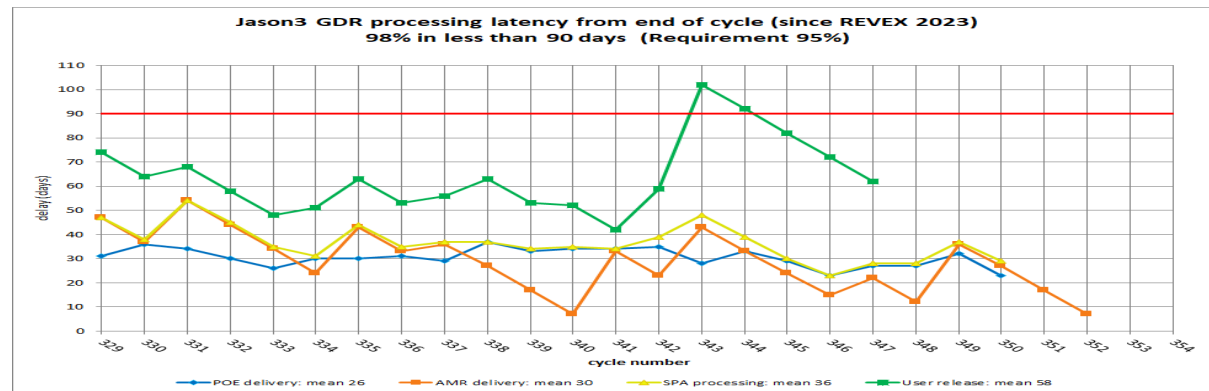
# IGDR - status and performances

- Jason-3 IGDR processing is OK (CNES : 100% IGDR successful)
- 100% IGDR products archived
- All disseminated via CNES AVISO+ and NOAA dissemination services

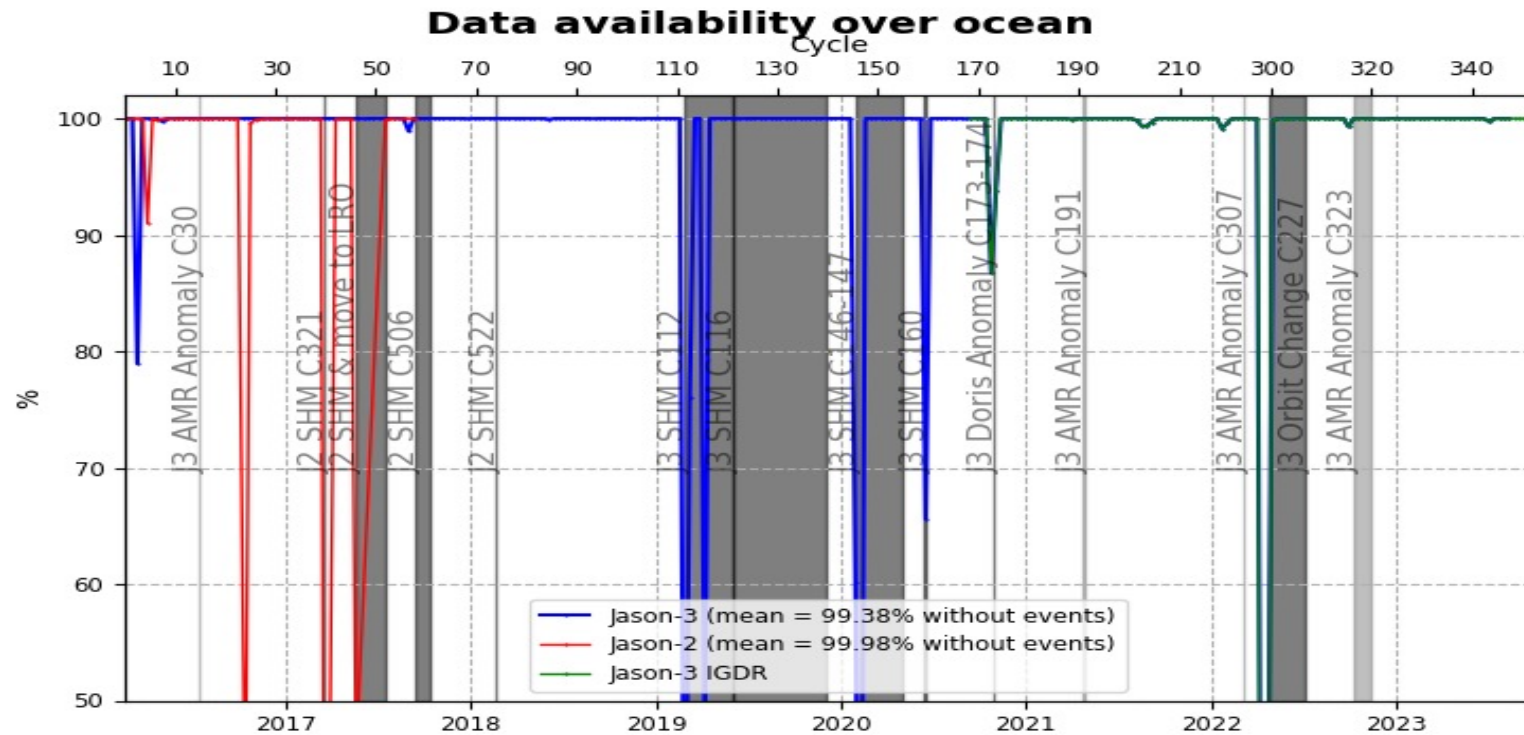


# GDR - status and performances

- Jason-3 GDR processing is OK
  - Cycle per cycle (and yearly) validation reports available on AVISO+ <http://www.aviso.altimetry.fr/en/data/calval/systematic-calval.html>
  - Systematic cross checked validation by CNES and JPL
  - Data availability & latency OK
- GDR produced by CNES/SSALTO
  - Currently GDR-F
- 100% GDR products archived
- All disseminated via CNES AVISO+ and NOAA dissemination services



# Performances – data availability



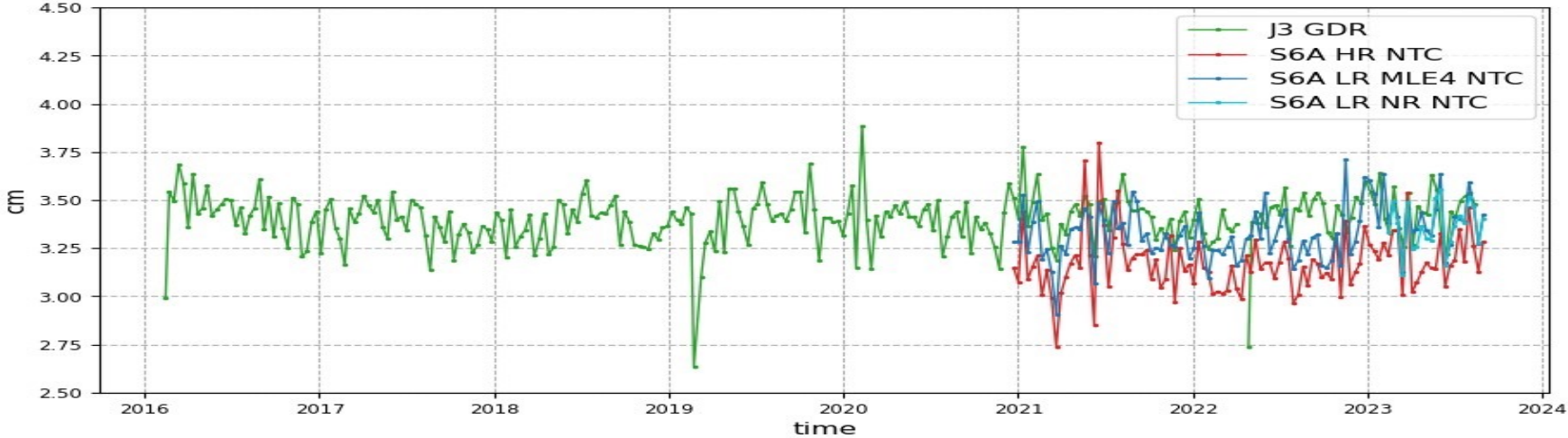
- Very good data availability over ocean : 99.98% calibrations included, without SHM and DEM patch uploads

# Performances – Sea Level

SSH error is deduced from crossovers analyses using radiometer data : **3,4cm**  
 ->selecting |latitudes| < 60°, bathy<-1000m, oceanic variability < 20 cm

**SSH difference at crossover (cm) - Error per cycle  
 (sel. |lat| < 60°, bathy. < -1000m, ocean var < 0.2m)**

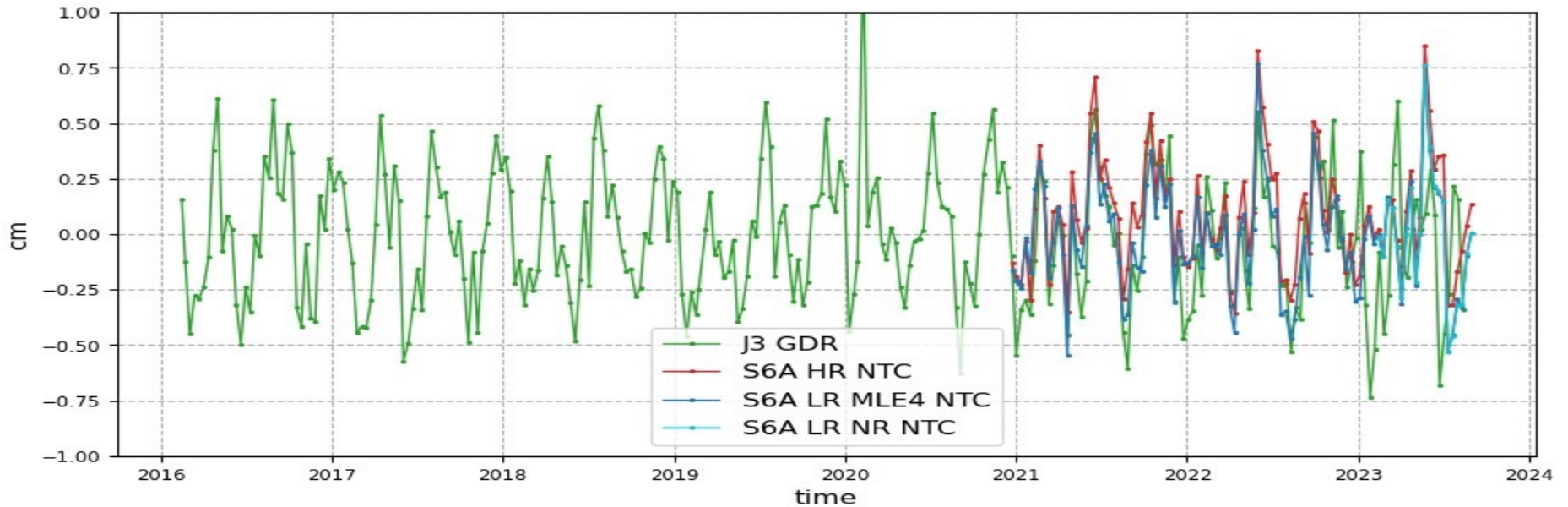
	nbr	min	mean	med	max	std
J3 GDR	276	2.636	3.4	3.415	3.883	0.1319
S6A HR NTC	100	2.737	3.175	3.16	3.799	0.1554
S6A LR MLE4 NTC	100	2.905	3.329	3.314	3.709	0.1376
S6A LR NR NTC	21	3.11	3.362	3.366	3.553	0.1164



# Performances – Xover

**SSH difference at crossover (cm) - Mean per cycle  
(sel.  $|\text{lat}| < 60^\circ$ , bathy.  $< -1000\text{m}$ , ocean var  $< 0.2\text{m}$ )**

	nbr	min	mean	med	max	std
J3 GDR	276	-0.7342	-0.01385	-0.03035	1.272	0.2998
S6A HR NTC	100	-0.3571	0.08105	0.07296	0.8514	0.2568
S6A LR MLE4 NTC	100	-0.5446	-0.0138	-0.01524	0.7688	0.2521
S6A LR NR NTC	21	-0.5288	-0.008804	-0.002845	0.7631	0.2902



# System Requirements and Performances

- Data availability :
  - Requirement : The GDR shall contain 95% of all possible over-ocean data (acquisition and archive) during any 12 month period, with no systematic gaps.
- from October 2022 until November 2023
  - no SHMs (0.0%)
  - ⇒ **satellite unavailability**                      **~0.07 %**
    - bus : 0%                      altimeter : 0.0%                      Doris : 0.05%                      AMR : 0%
  - ⇒ **ground unavailability**                      **~0.01 %**
    - (earth terminal issues on cycle 344)

➔ **Global Jason-3 system availability : 99.9%**

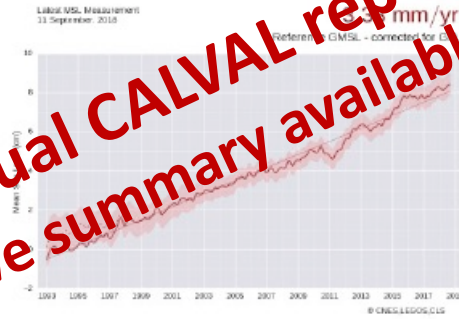
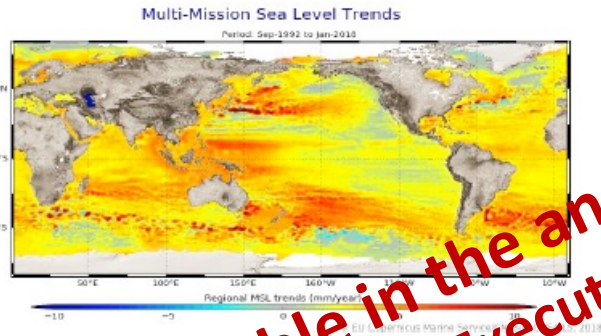
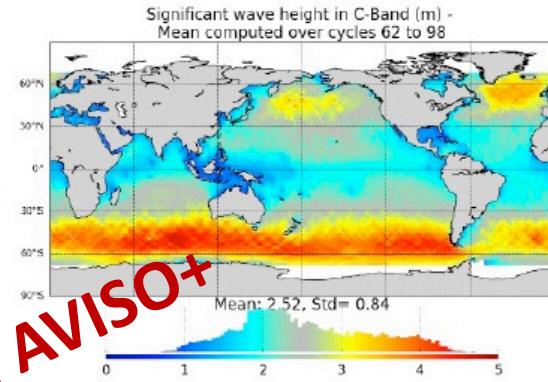
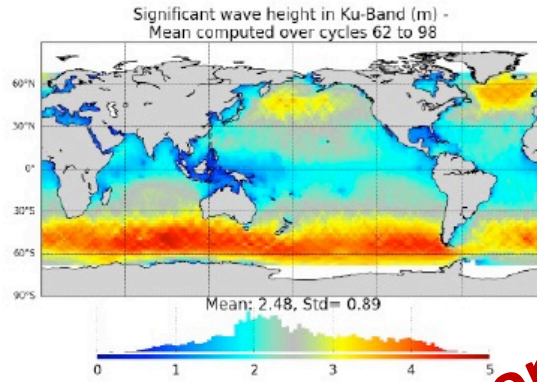
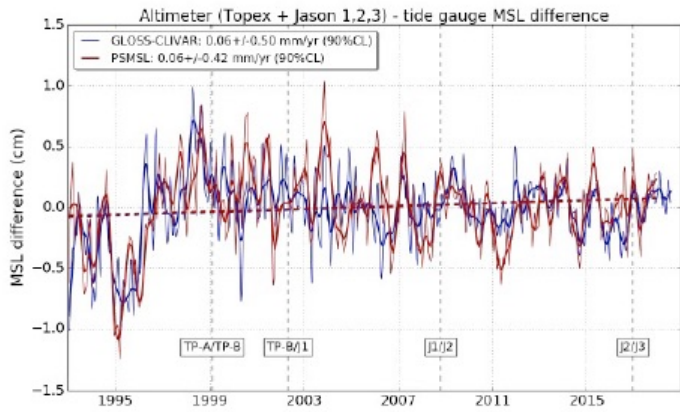




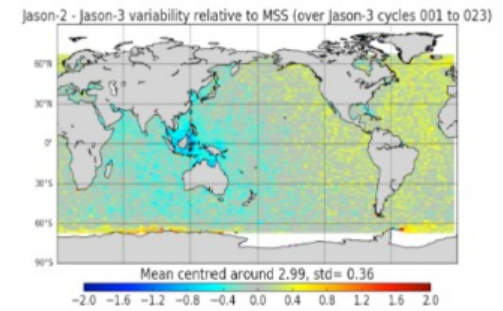
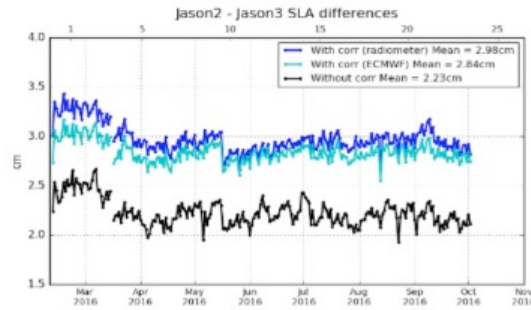
# Coming changes and operations (2/2)

- After the 2<sup>nd</sup> tandem phase, Jason-3 has several options:
  1. transfer to the “Jason-2 LRO” Altitude 1309 km / geodetic mission (complementary with SWOT?)
  2. Return to interleave orbit (1 year, S6 MF arriving?)
  3. Orbit 1 day?
  4. ...

➔ To be discussed with scientific community
- As soon as the Jason-3 status becomes degraded (missing redundancy), Jason-3 will be transferred to a geodetic + graveyard orbit
  - Necessary due to French law on space operations.
  - Altitude 1282.9km
- At any time, in case of emergency, Jason-3 can be transferred to an emergency disposal orbit, 4km under the current orbit.



Available in the annual CALVAL report on AVISO+ Executive summary available



## **Conclusion – Jason-3 at a glance**

- Platform and instrument still in perfect conditions
- Jason-3 is still on interleaved orbit since April 2022
- Jason-3 is ready to keep on supporting 2nd intercalibration with Sentinel-6MF

**Thank you to all the teams from CNES, NOAA, EUMETSAT & NASA/JPL**