



OSTST 2019

Oct. 2019 – Chicago

Jason-3 Project Status



Christophe MARECHAL, CNES
on behalf Jason-3 Project Managers

Platform Status

- The Jason-3 satellite bus is **OK**
 - Command / control , RF on **PMB**
 - On-Board Software, Mass Memory, Telemetry & Telecommand system
 - Thermal aspects:
 - Active thermal control works successfully and is sized with significant margins to meet further worst case conditions
 - Electrical aspects :
 - Satellite power and consumption are within the power, consumption and energetic budgets
 - AOCS (attitude and orbit control system) :
- Exceptional activities :
 - Unused equipment destocking (gyro, STR)
 - STR monitoring, SADM expertise, PCE expertise
 - Gyro calibration

OK

OK

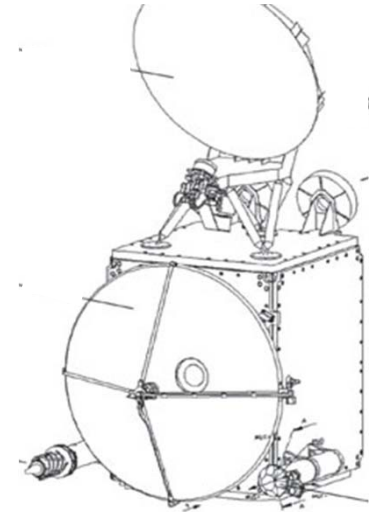
OK

OK

OK

OK

OK



Jason-3 bus is fully operational with all redundant systems available

Payload Status

- **Core Payload**

- POSEIDON3 (99,99%)
- DORIS (100%)
- AMR (99.6%)
- GPSP-B (100%)

OK

OK

OK

OK

- **Passengers**

- CARMEN / AMBRE
- LPT

OK

OK

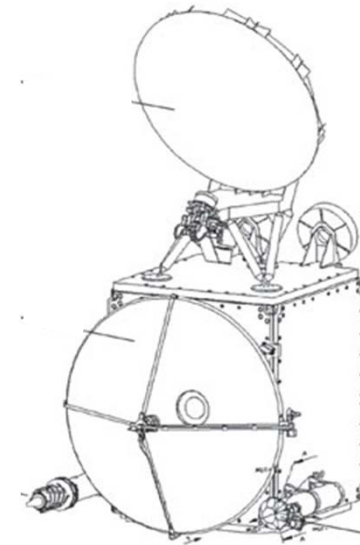
- **Exceptional activities :**

- POS3B DEM upload August 31st 2017

OK

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

➔ Passengers fully operation



Ground & Operations Status

- Earth terminals :
 - Usingen – USG2, + partial USG1 shadowing 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

Major events since last OSTST

SHM on **2019/02/24 09:57UTC**

- Summary of events
 - 2019/02/23 ~22:18: unexpected change of Gyro 1 measurements profile, which became incoherent
 - 2019/02/24 ~02:08 STR1 tracking loss for 575s but permanent invalidity due to Kalman filter innovation criteria
 - AOCS mistaken with Gyro measurements only + saturated gyro drift
 - Major uncontrolled mispointing, which put the AMR antenna to the sun
 - SHM triggered by thermal FDIR on AMR antenna
- Back to nominal operations on **2019/03/06 @08:40UTC** (cycle 113, pass 62)
- Analysis led to
 - Gyro 1 operational with no irreversible damage
 - No possible failure propagation to Gyro 2 & 3
 - Most probable Root cause : SEU on an analogic component in the Sensor Electronic Box

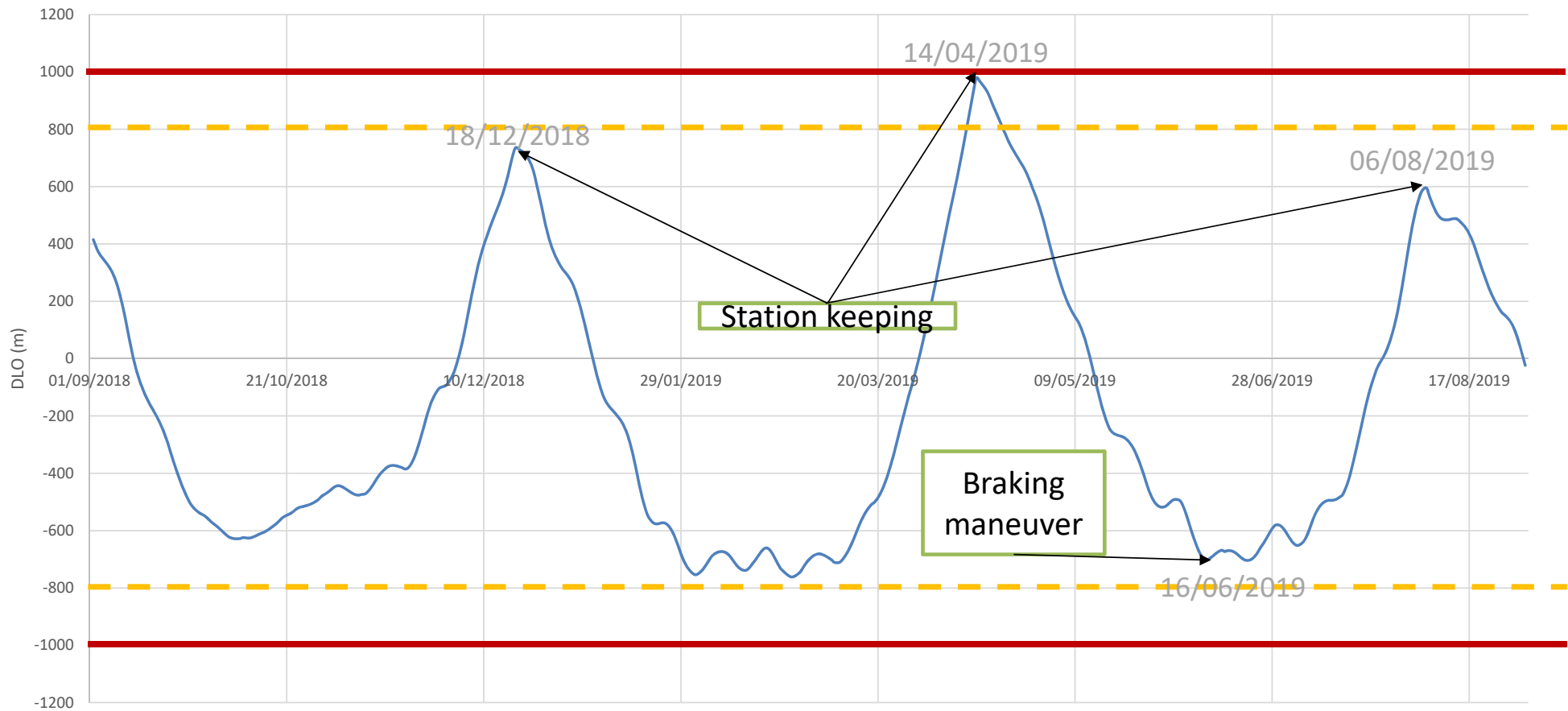
Major events since last OSTST

SHM on **2019/04/06 23:17UTC**

- Summary of events
 - **2019/04/06 23:17UTC** : SHM triggered by FDIR with no telemetry available
 - Impossible to determine the exact source of that SHM
 - Once SHM recovery started, check of the RAM EDAC status, performed RAMTEST
- Back to nominal operations on **2019/04/12 @07:16UTC** (cycle 116, pass 246)
- Most probable cause : EDAC in RAM
 - Satellite status is OK since then
 - Investigations still ongoing wrt possible cause of SHM with no telemetry available to analyse.

Routine navigation and guidance

JASON 3 equatorial drift



System Requirements and Performances

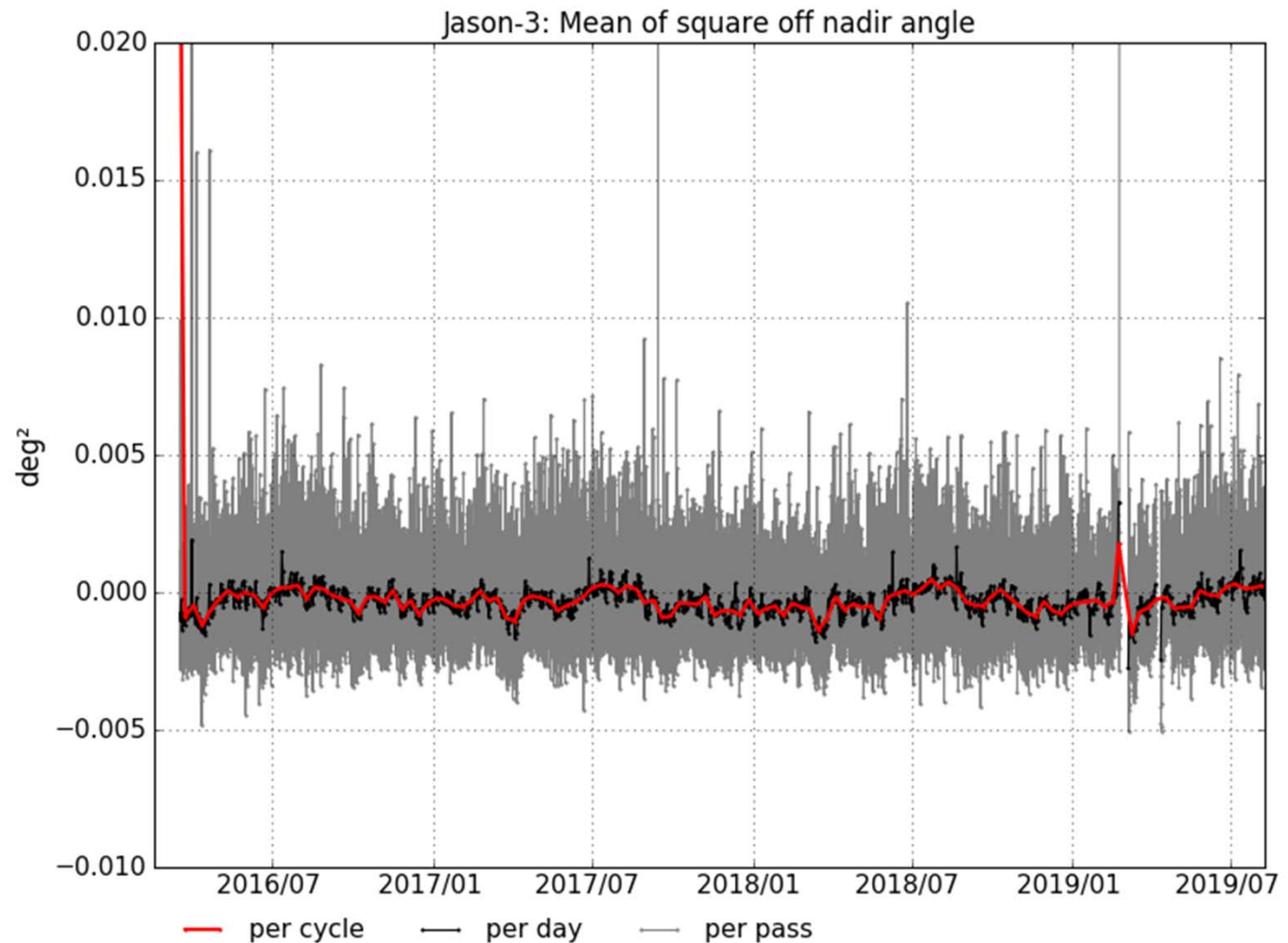
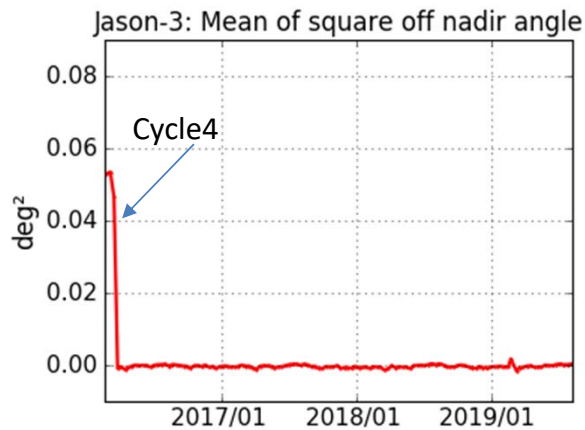
Altimeter Antenna

Pointing : **typical value**

below 0.005°

(Requirement $< 0.2^\circ$)

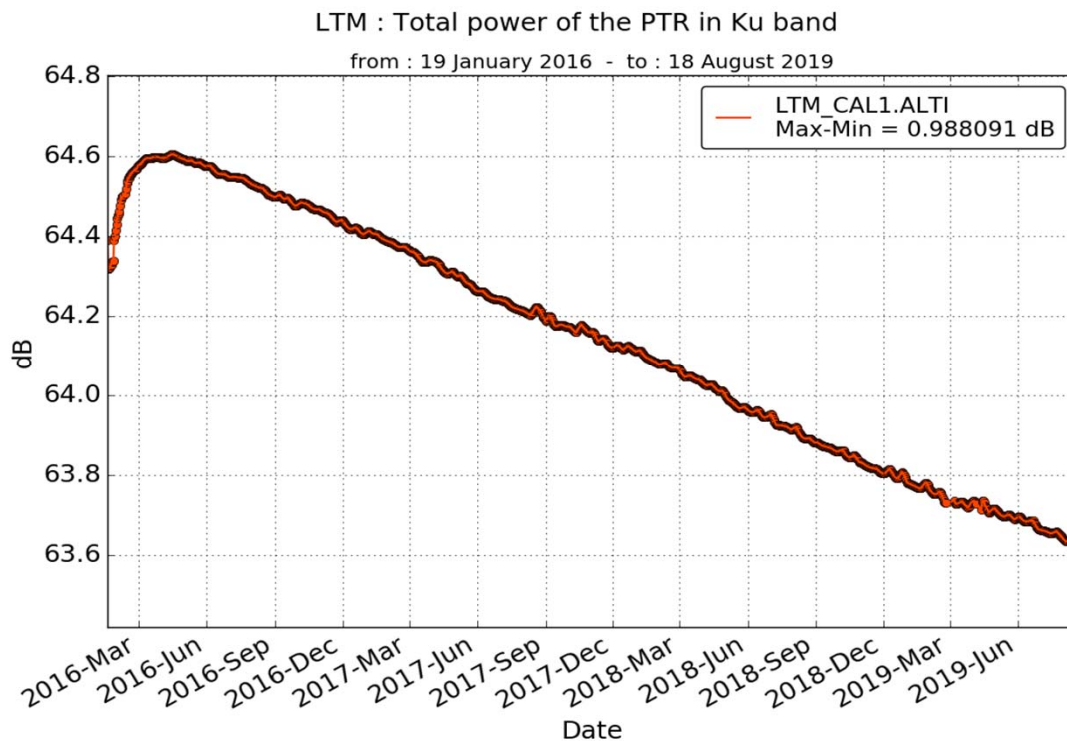
pointing performance
stable since cycle4



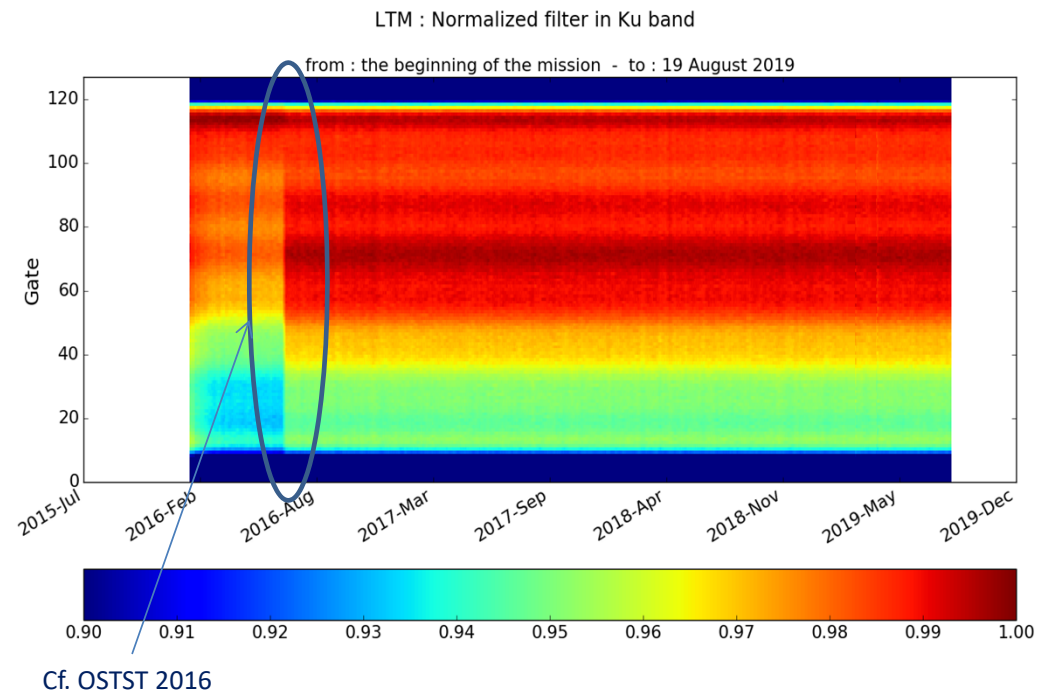
POSEIDON-3B / JASON-3

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

– CAL1 Ku-band PTR power

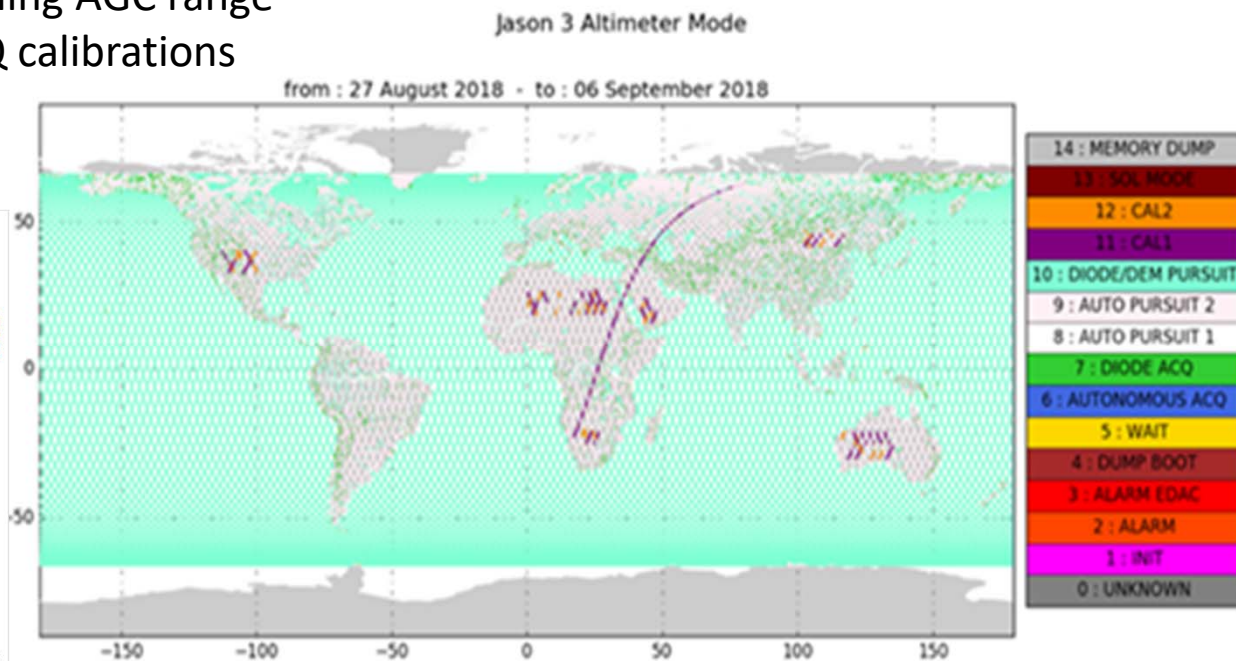
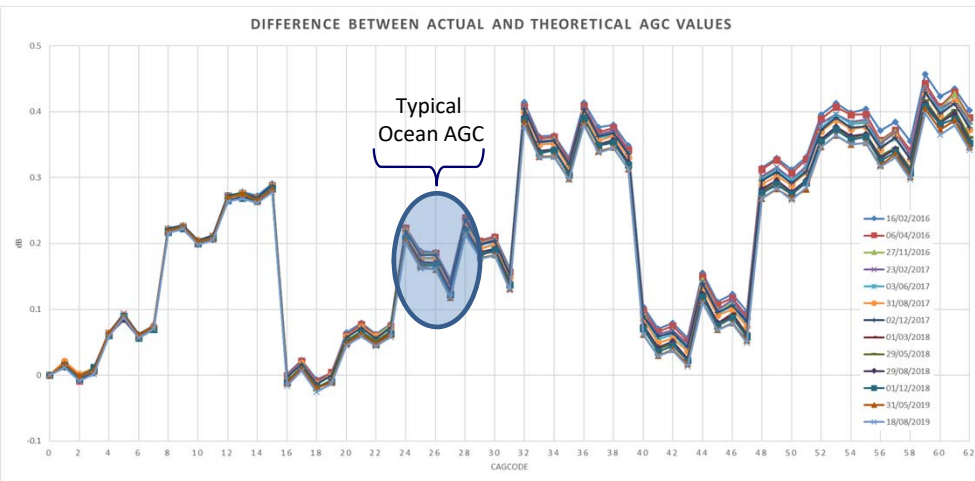


– CAL2 Ku-band LPF



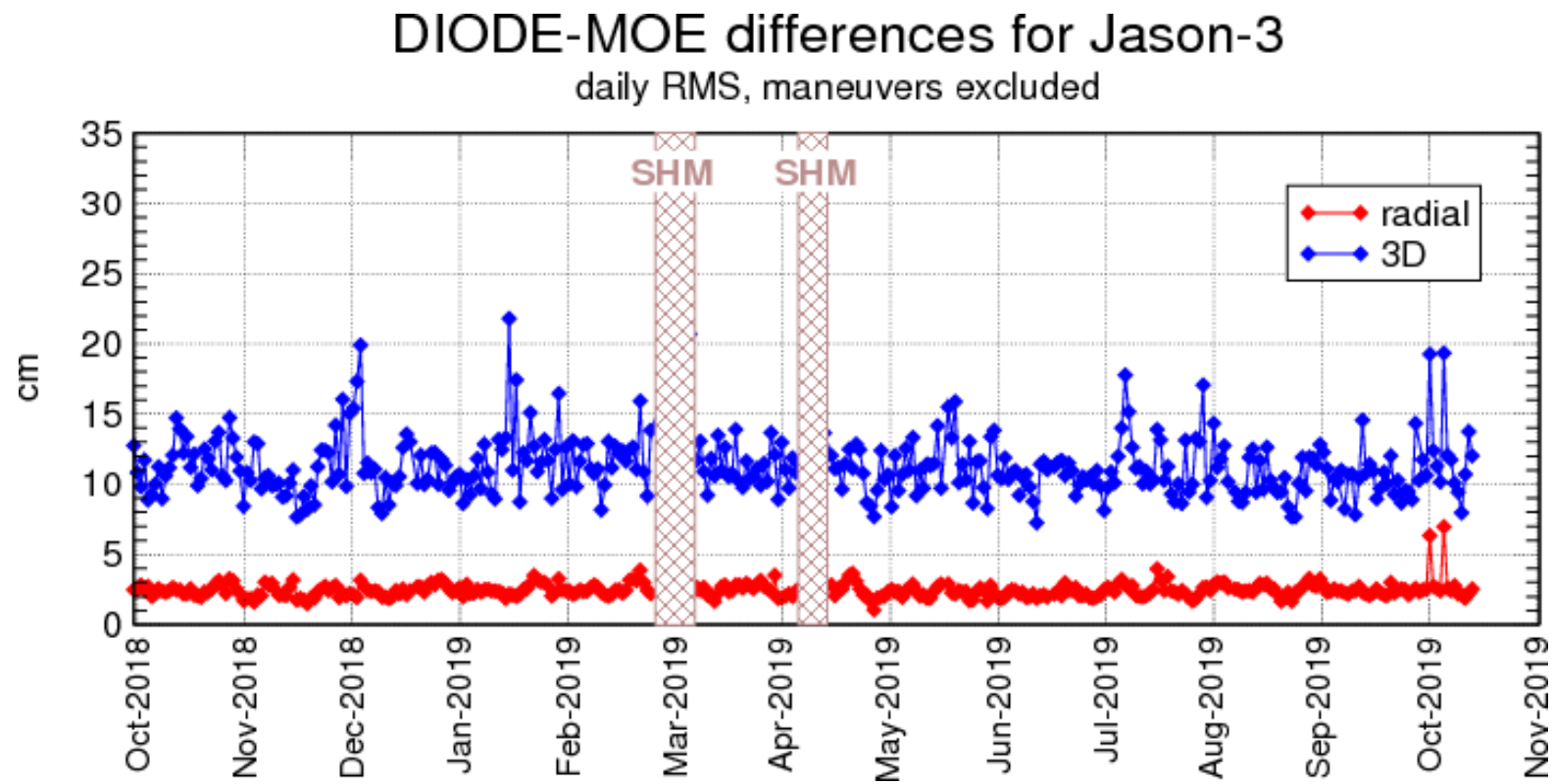
POSEIDON-3B CNG calibrations

- CNG calibration
 - Approximately every 3 months
 - Last processed : 18/08/2019
 - Analysis and processing performed by CNES instrument responsible
 - Good Stability (of the order of calibration accuracy)
 - Very low trend variation in the functioning AGC range
 - Increase accuracy wrt Jason-2 with I&Q calibrations



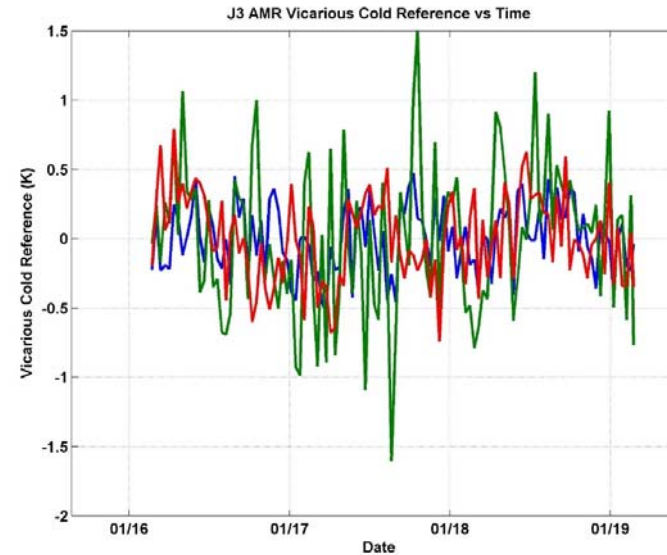
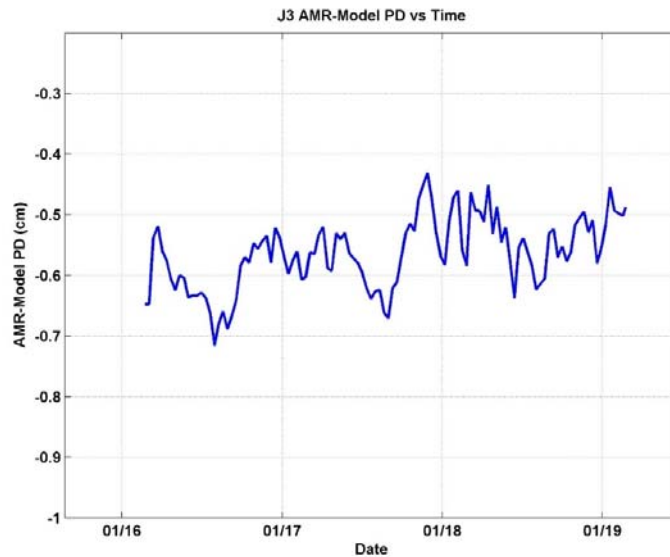
Availability = **100%** over the period

DORIS



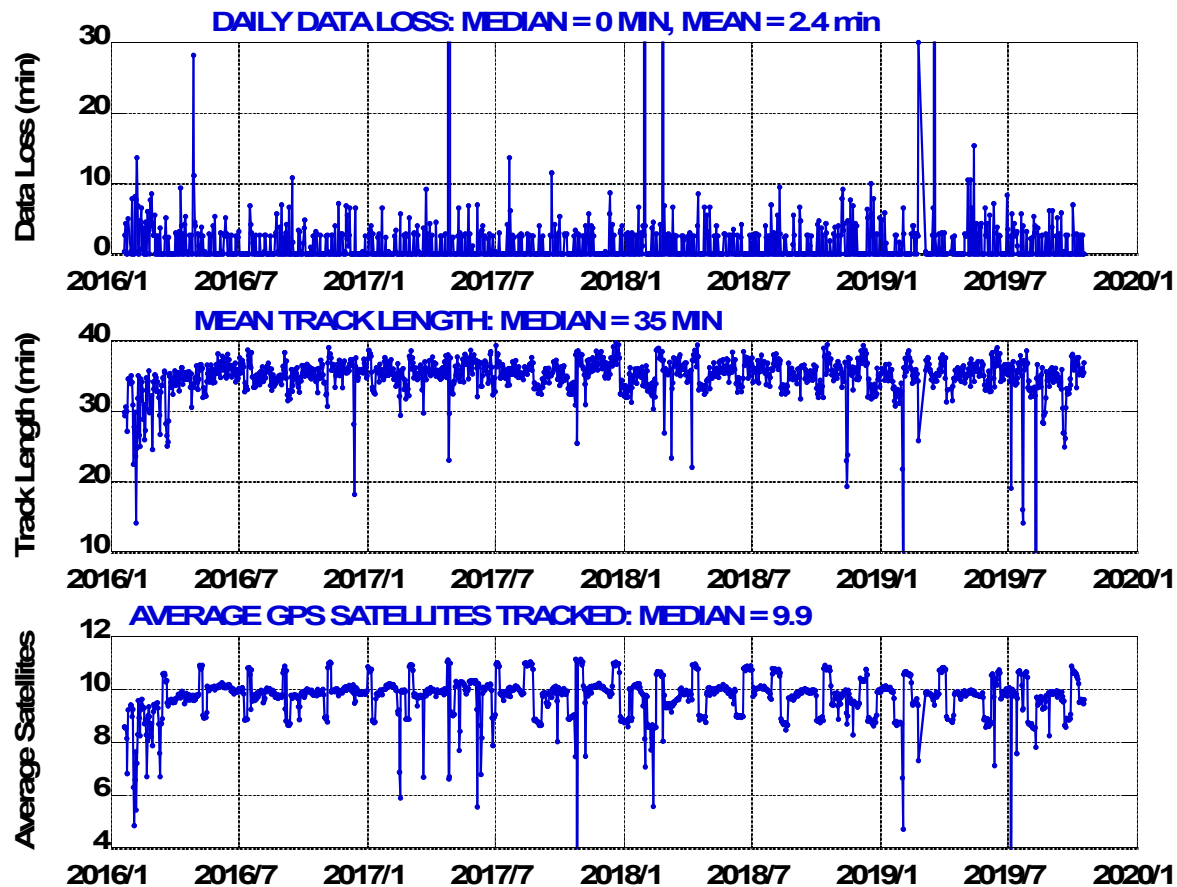
AMR

- **Jason-3 AMR performing nominally since launch**
 - Jason-3 AMR maintains excellent performance
 - Cold sky calibrations are critical to stabilizing Jason-3 at the mm-level
 - Jason-3 AMR global average PD within $\pm 1\text{mm}$ of the ECMWF model PD over 2 years
 - No detectable calibration shifts on the AMR resulting from the 24 February 2019 (and 6 April 2019) safe hold events.



Jason-3 GPSP: Receiver Performance

GPSP

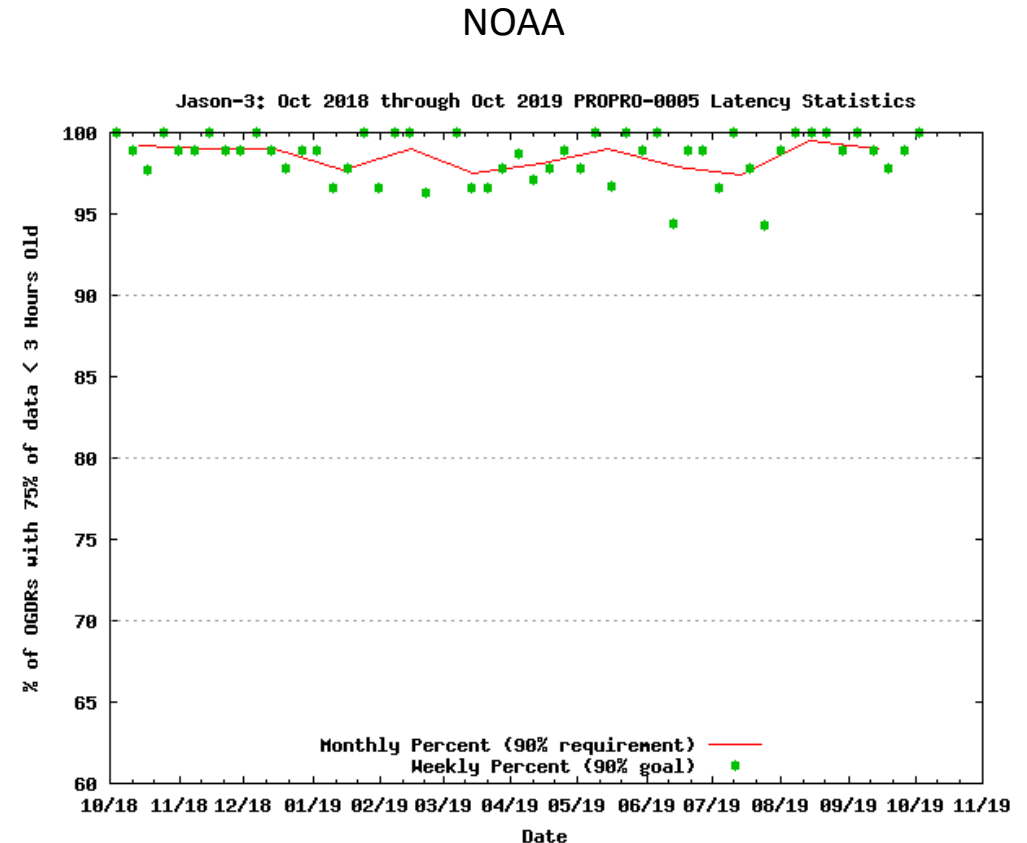


Tracking metrics are consistent since launch

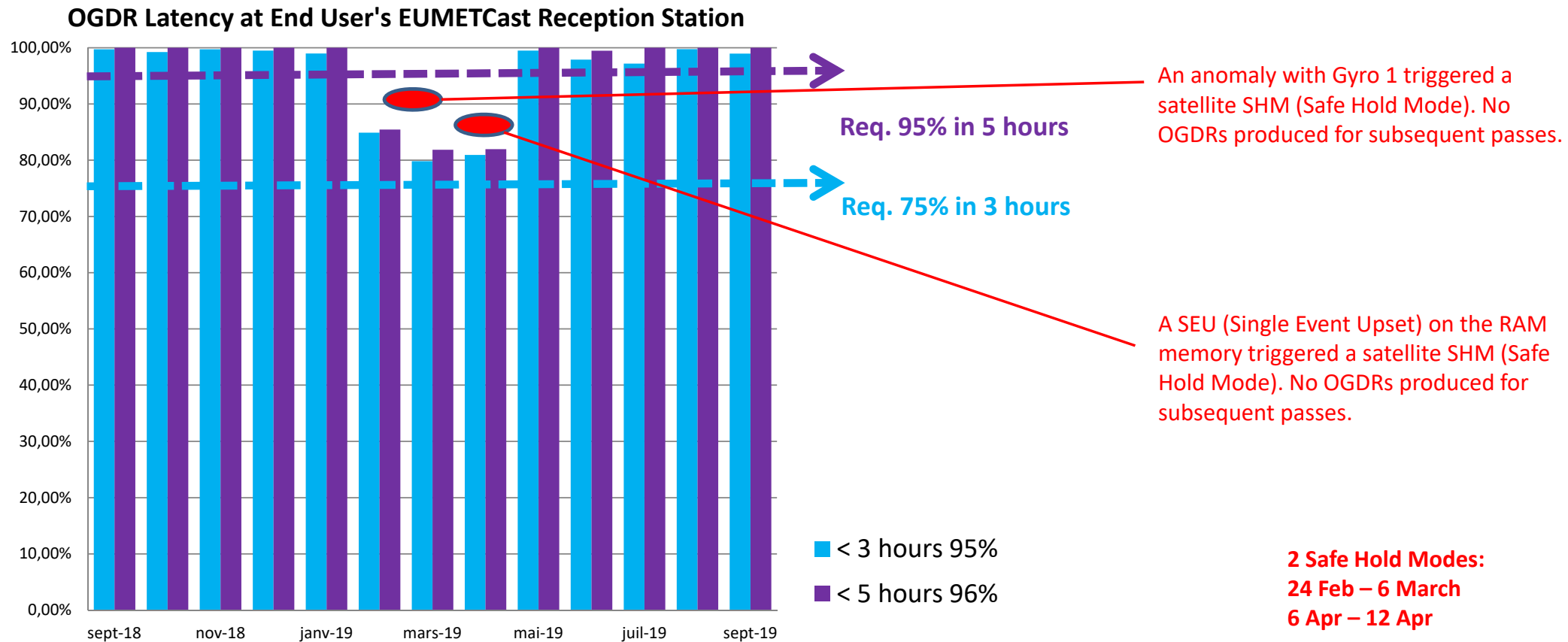
Jason-3 receiver tracks to lower elevations than Jason-2

OGDR products Status and performances 1/2

- 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



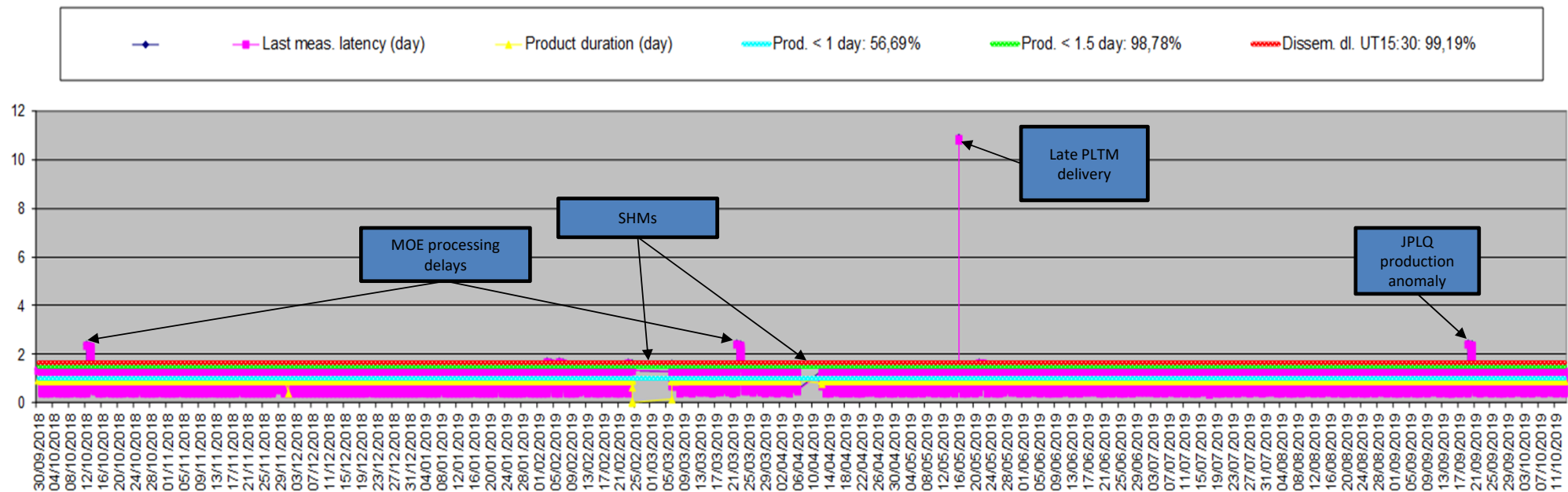
OGDR products Status and performances 2/2



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

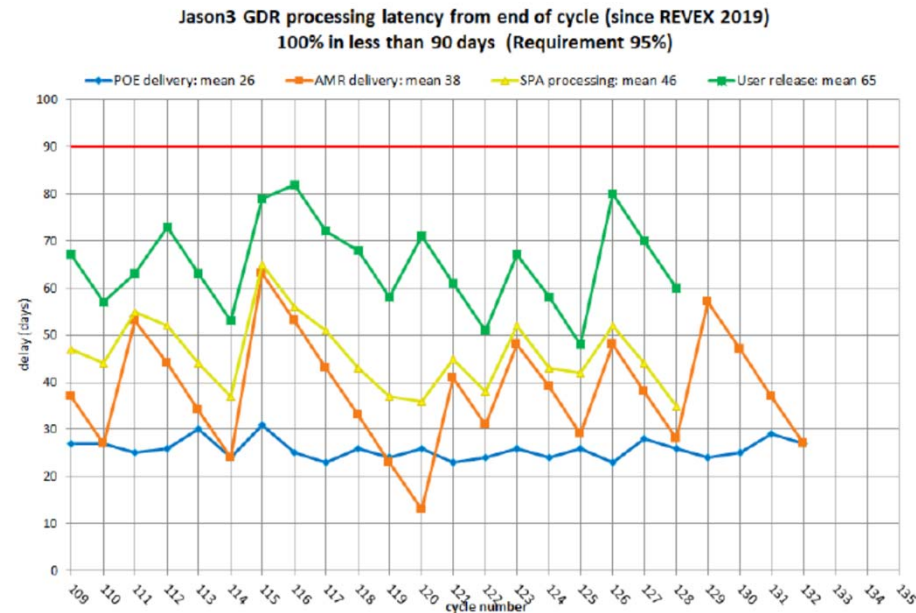
Jason-3 IGDR Timeliness



GDR - status and performances

- GDR produced by CNES/SSALTO
- Jason-3 GDR processing is OK
 - Data availability & latency OK
 - Systematic cross checked validation by CNES and JPL
 - Cycle per cycle (and yearly) validation reports available on AVISO+
<http://www.aviso.altimetry.fr/en/data/calval/systematic-calval.html>

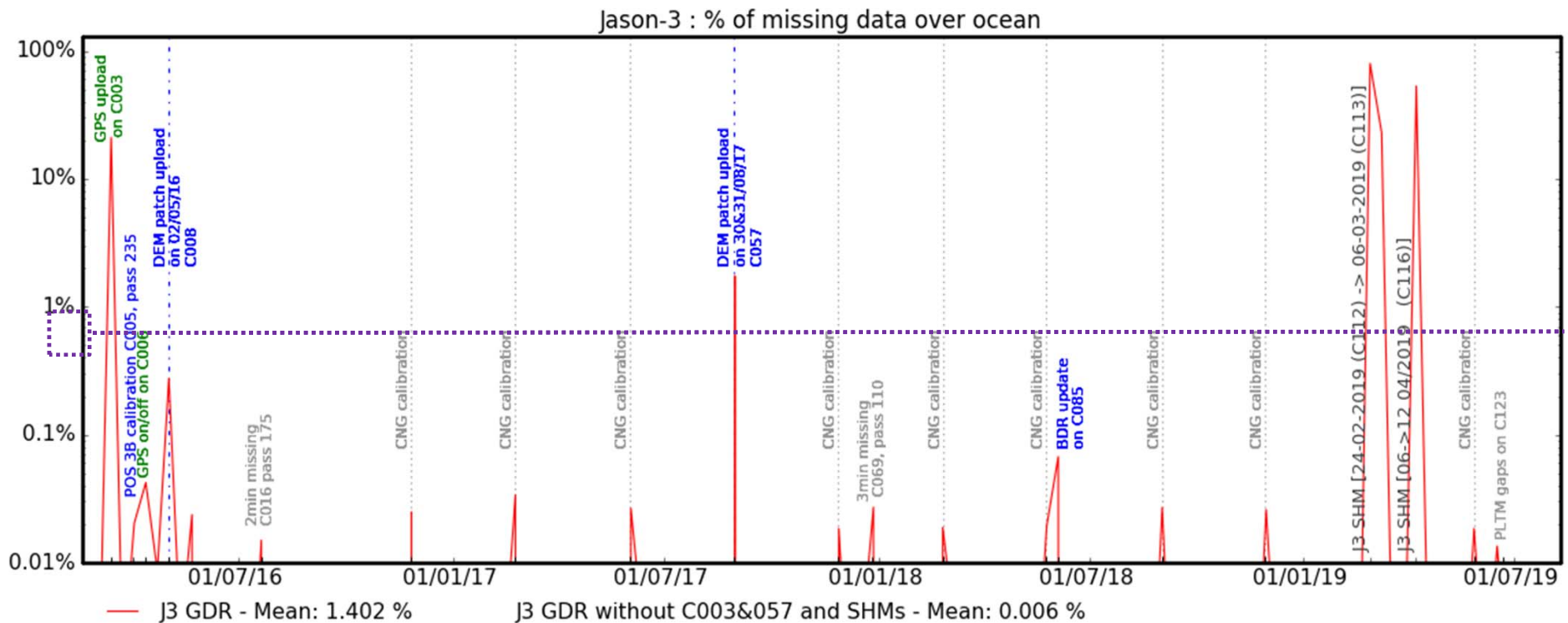
- 100% GDR products archived
- All disseminated via CNES AVISO+ and NOAA dissemination services



Performances – missing measurements

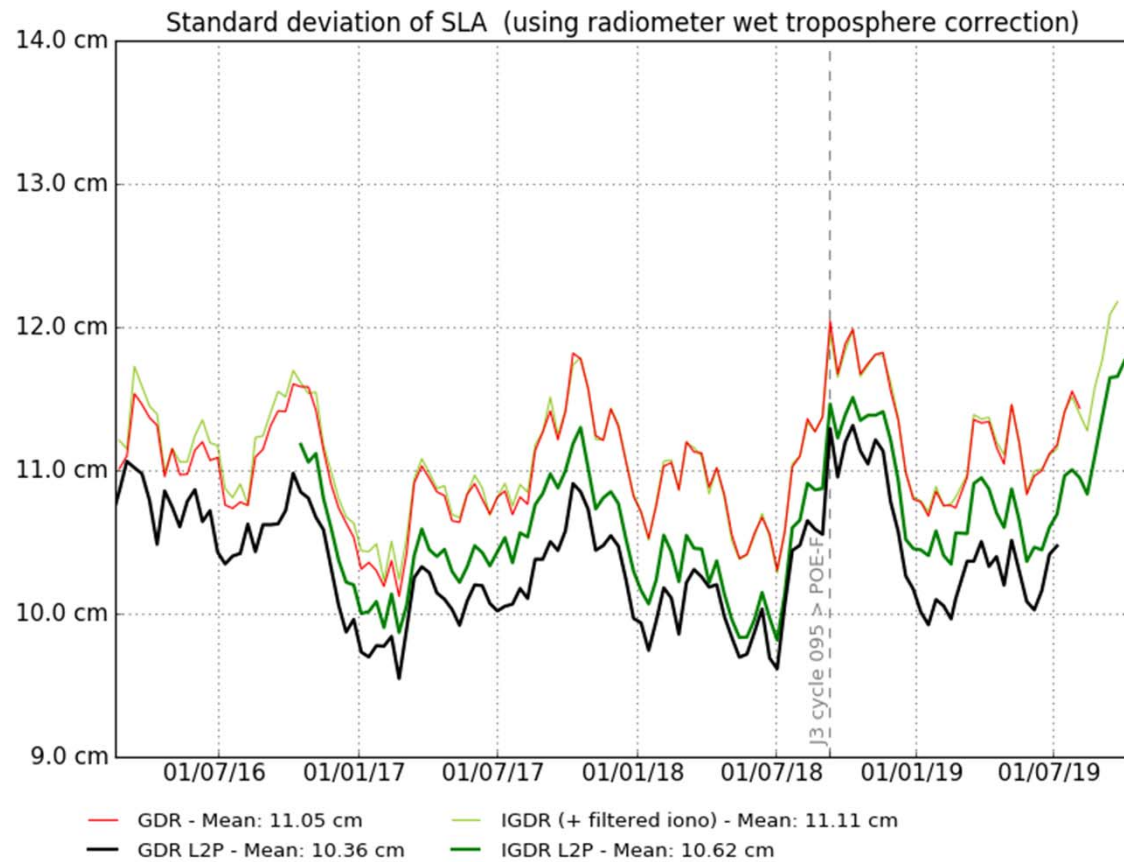
Very good data availability over ocean 98.60 % calibrations and incidents included

After removing uploads and SHM: >99.9 % data are available over ocean

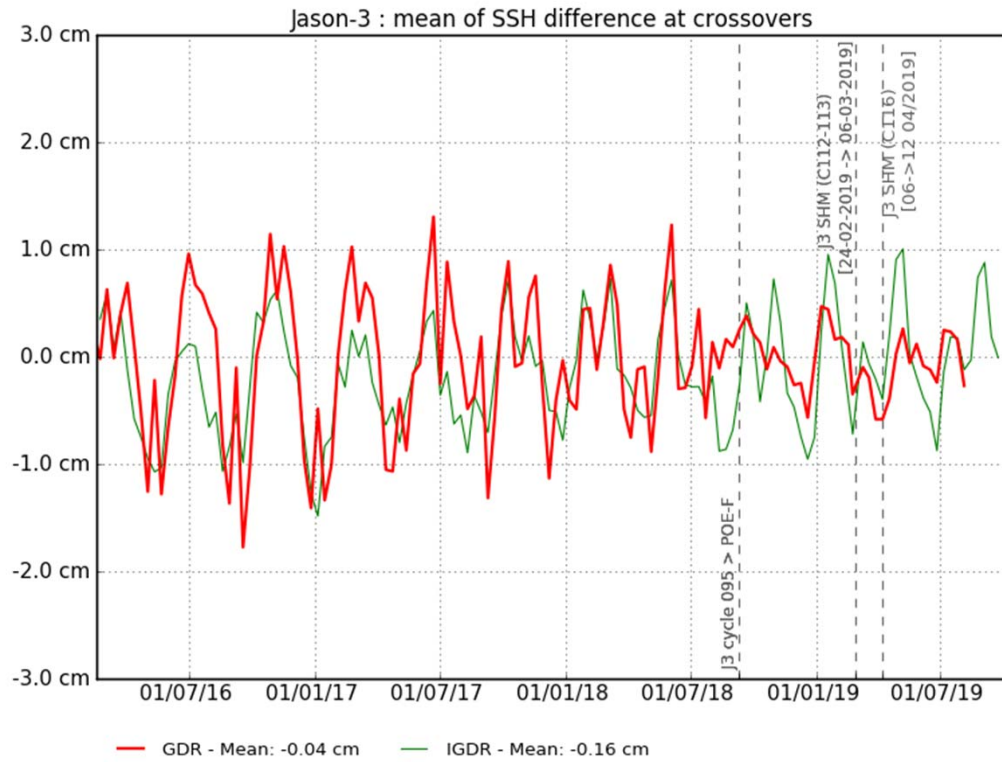


Performances – Sea Level

Reduction
from **L2 (GDR:11cm)**
to **L2P(GDR:10.4cm)**

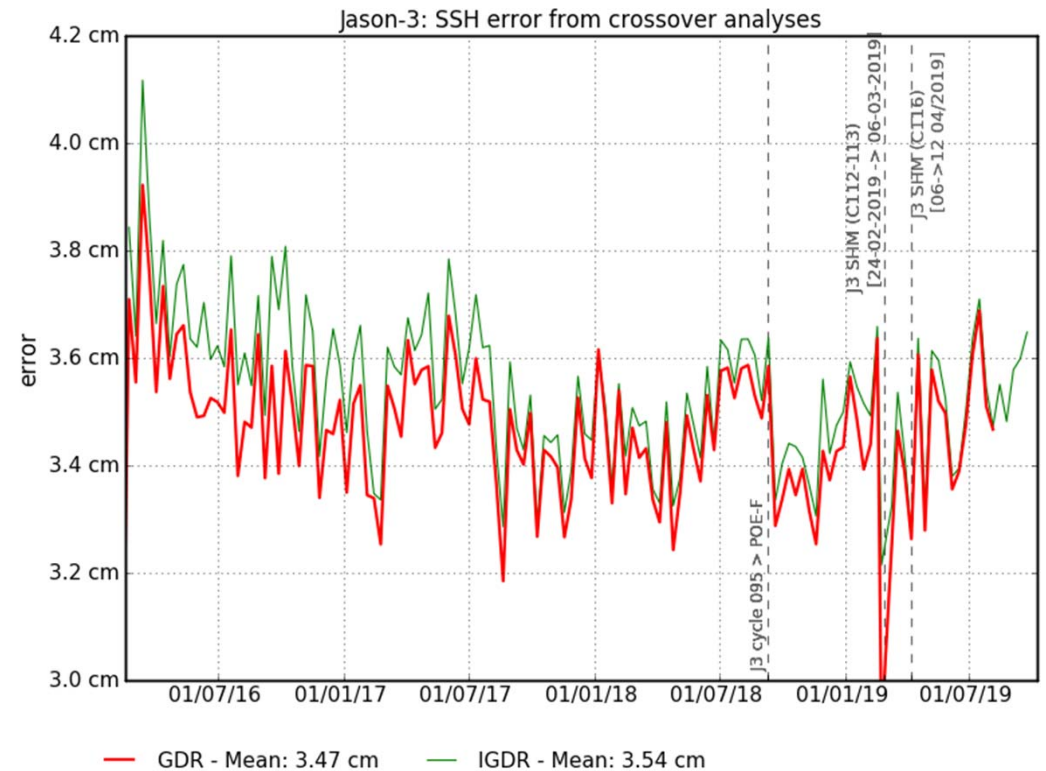


Performances – Xover



In GDR -> better homogeneity between ascending / descending passes since use of POE-F

SSH error is deduced from crossovers analyses using radiometer data
->selecting $|\text{latitudes}| < 50^\circ$, bathy < 1000m, oceanic variability < 20 cm



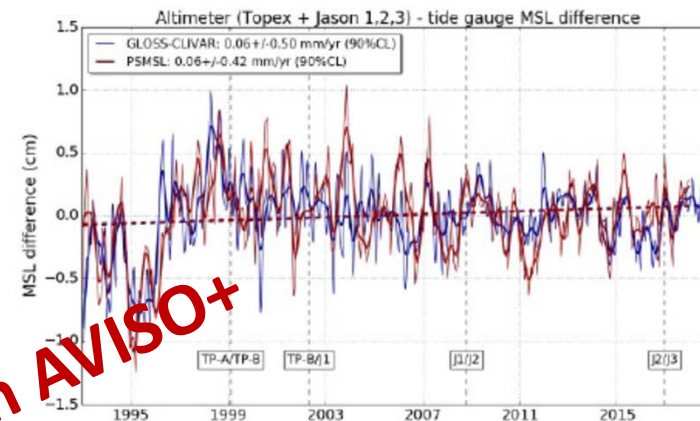
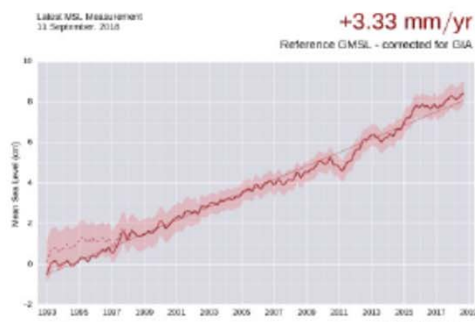
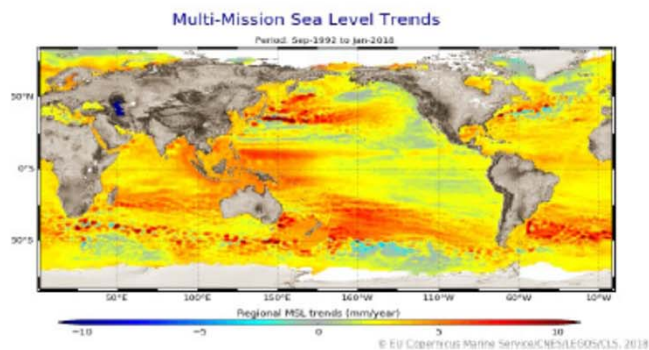
System Requirements and Performances

- 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 November 2018 until October 2019

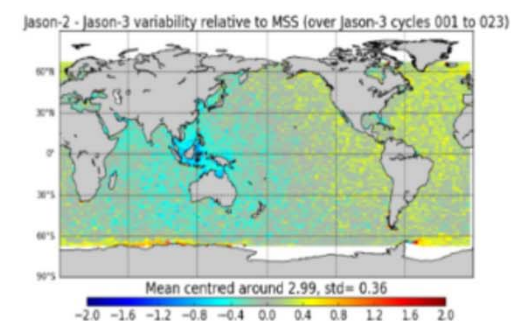
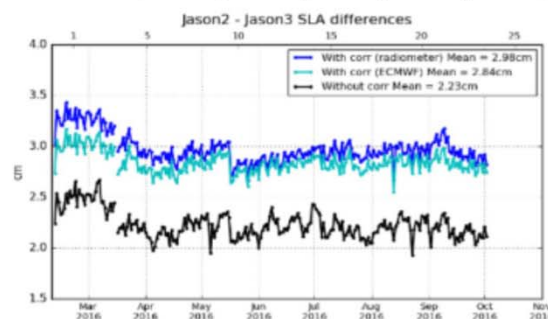
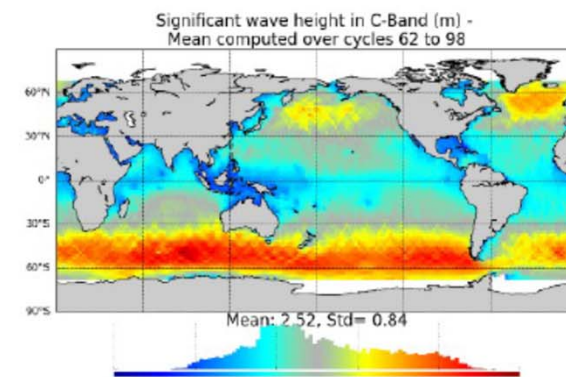
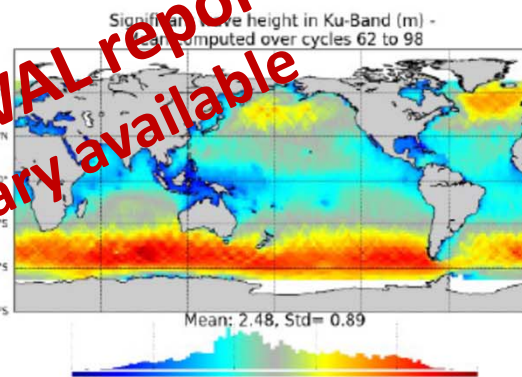
⇒ **satellite unavailability** ~**2.7 %** < **4% req**
 – bus : 2.7% altimeter : 0.01% Doris : 0% **AMR : 0.35%**

⇒ **ground unavailability** ~**0.00 %** < **1% req**

➔ **Global Jason-3 system availability : 97.3%**



CalVal Jason-3



Jason-3 validation and cross calibration activities (Annual report 2018)

Contract No 160182-14026/00 Lot 1.6.3

Conclusion – Jason-3 at a glance

- 3rd Jason-3 Exploitation Review (REVEX) : successful in April 2019
- Platform and instrument in perfect conditions
- GDR-F standard end of 2020
 - Objective is to deliver a 1-year dataset for next OSTST

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

Items to consider

- Jason-3 is required for Jason-CS/Sentinel-6 intercalibration**
- What will be its mission after that ?**
 - Interleaved orbit ?**
 - Geodetic ?**

An aerial photograph of the Chicago skyline, showing the Chicago River flowing through the city. The river is crossed by a bridge, and several boats are visible in the water. The skyline is composed of numerous tall skyscrapers, including the Willis Tower. The sky is blue with some clouds.

- NOAA

- D. Donahue
- D. Richardson

- EUMETSAT

- M. Tahtadjiev
- L. Soliveres
- A. Richardson

- CNES

- T. Médina
- E. Coulaud
- J. Caron
- F. Bally-Poirot
- N. Picot
- Ch. Jayles
- A. Guerin
- A. Guerry
- S. LeGac
- J-P Chauveau

- JPL

- G. Shirtliffe
- S. Brown
- S. Desai
- JD Desjonquères
- B. Haines
- A. Dorsey
- W. Bertiger

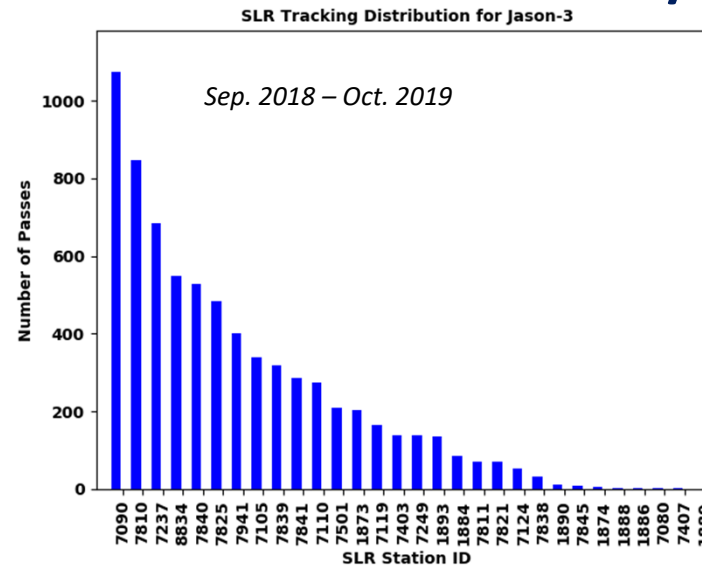
**Thank you for your attention ... and also to
the contributors !!**

Backup slides

SLR/LRA



- Laser ranging array (LRA) is passive (No electronics or software)
- Copy of Jason-1 & Jason-2 LRA system, supporting cm-level ranging
- Tracking of Jason-3 and Jason-2 high priority for International Laser Ranging Service (ILRS)
- Performance of Jason-3 LRA has been nominal



Cumulative Passes Per Station for Jason-3

- Top 5 stations by pass volume from Sep. 2018 to Oct. 2019:
 - *Yaragadee, Zimmerwald, Changchun, Wetzell, Herstmonceux*