



Global Jason-1 Data Quality Assessment Including first results on geodetic orbit

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Recent events on Jason-1:

Fuel depletion campaign fall 2011

Safe Hold Mode mid February 2012 → decision to move to end-of-life orbit (April/May 2012)

Data used:

- ✓ 1 Hz Jason-1 (GDR-C)

Objective:

- ✓ Assess Jason-1 data quality and system performances
- ✓ Comparison between different data types (Gdr, Igdr, Osdr)

Overview:

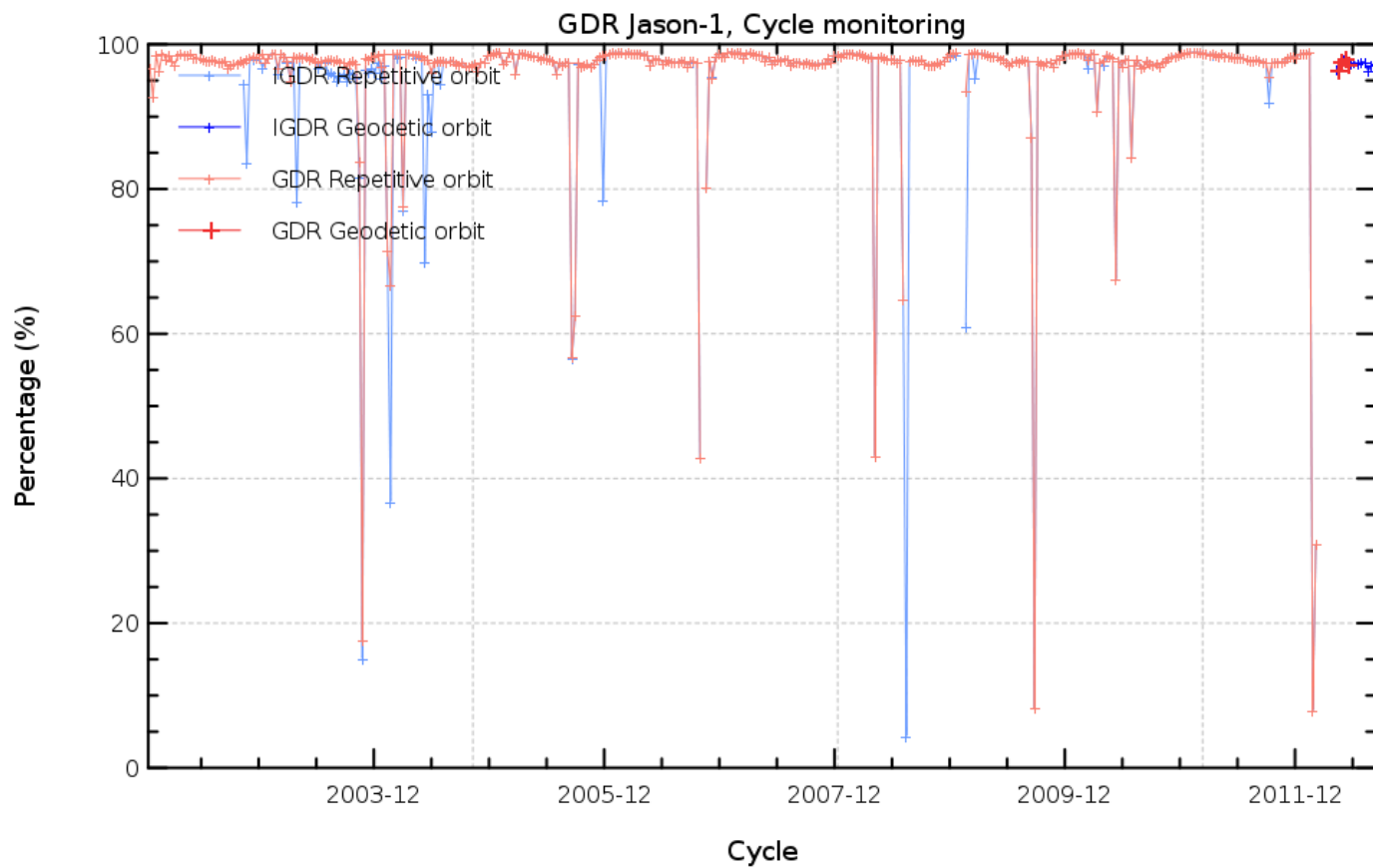
- ✓ Analysis of missing and edited measurements
- ✓ Analyze altimeter and radiometer parameters
- ✓ Assess Sea Surface Height (SSH) performances and consistency at temporal scales less than 10 days
- ✓ Assess along-track Sea Level Anomaly (SLA) performances and consistency
- ✓ Stability of Mean Sea Level
- ✓ Summary of the first results with Jason-1 new orbit

Data coverage



Available measurements (over ocean)

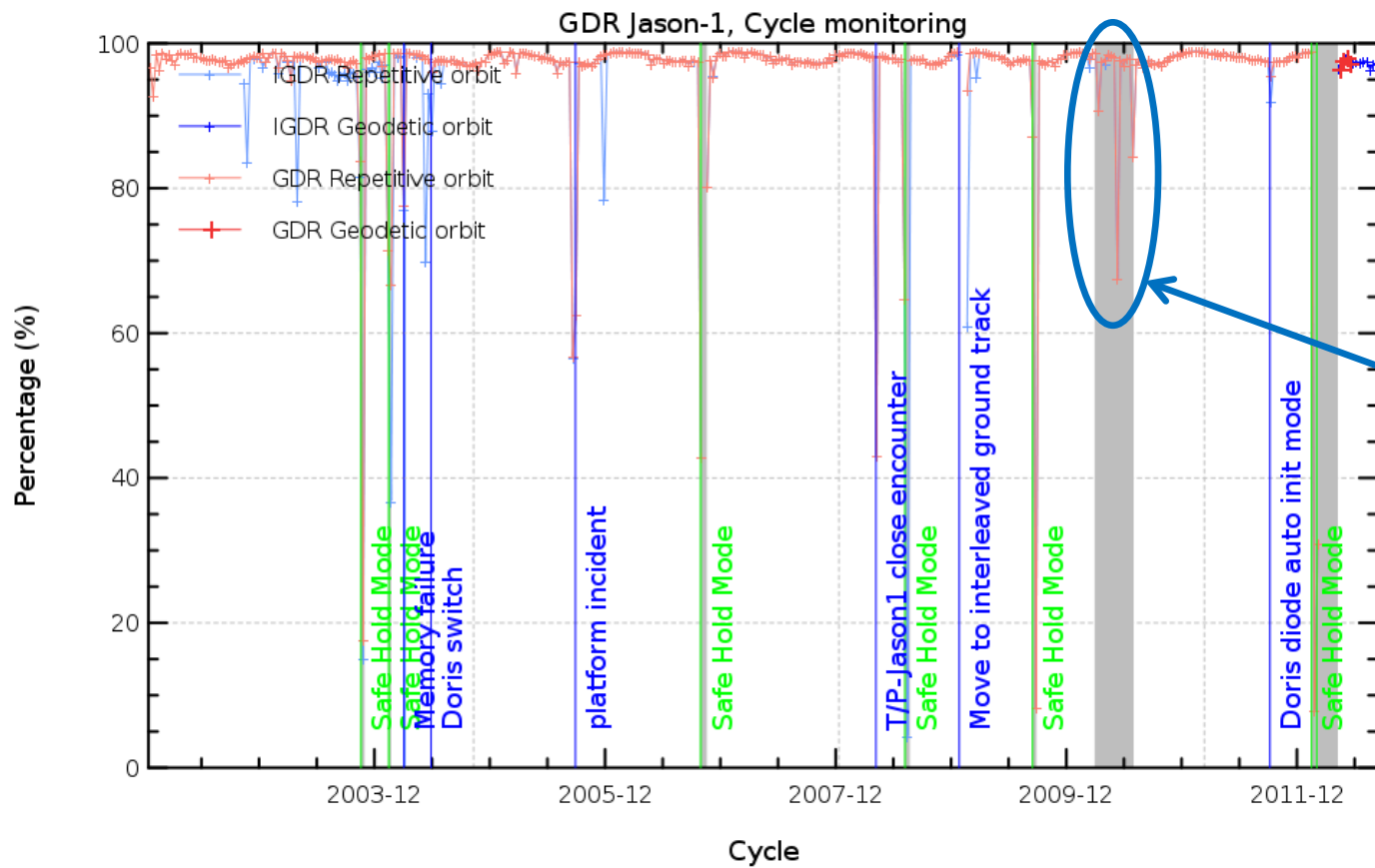
Available measurements (over ocean)





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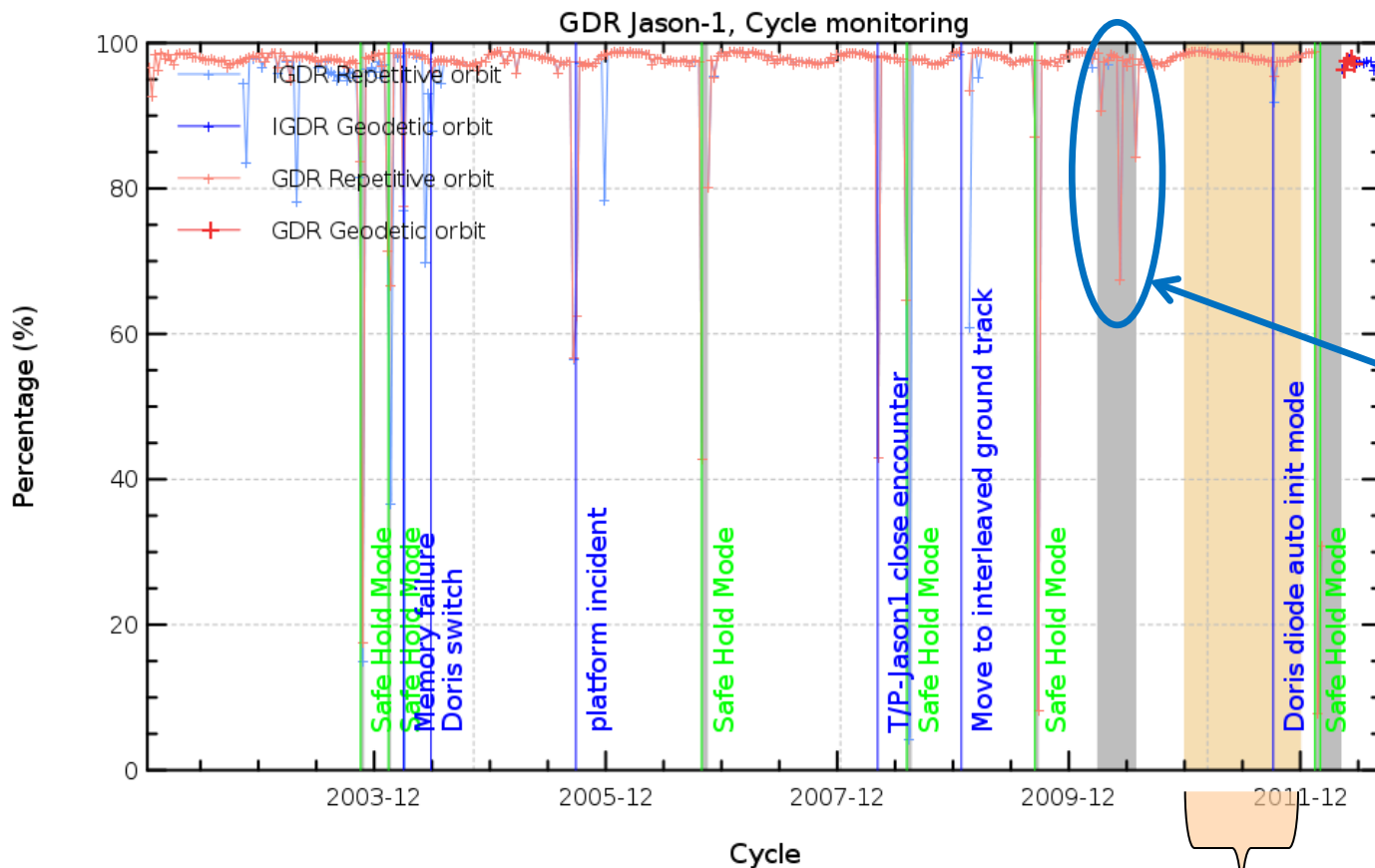


Tracking problems
due to star tracker
low performance
+
calibrations



Available measurements (over ocean)

Available measurements (over ocean)



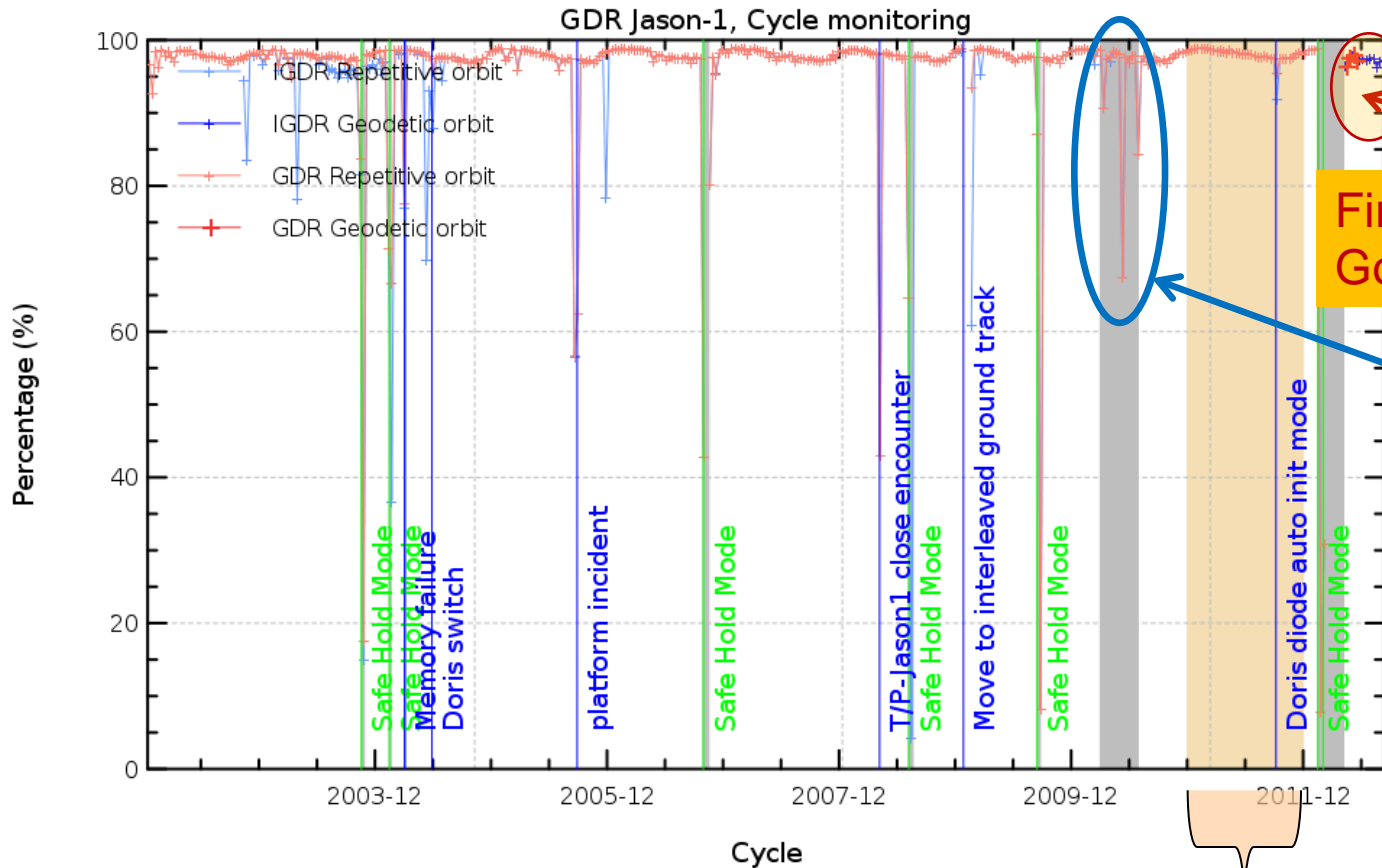
Tracking problems
due to star tracker
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calibrations

In 2011 and until 2012-02-15:
good data availability for Jason-1



Available measurements (over ocean)

Available measurements (over ocean)



First cycles on new orbit:
Good availability of data

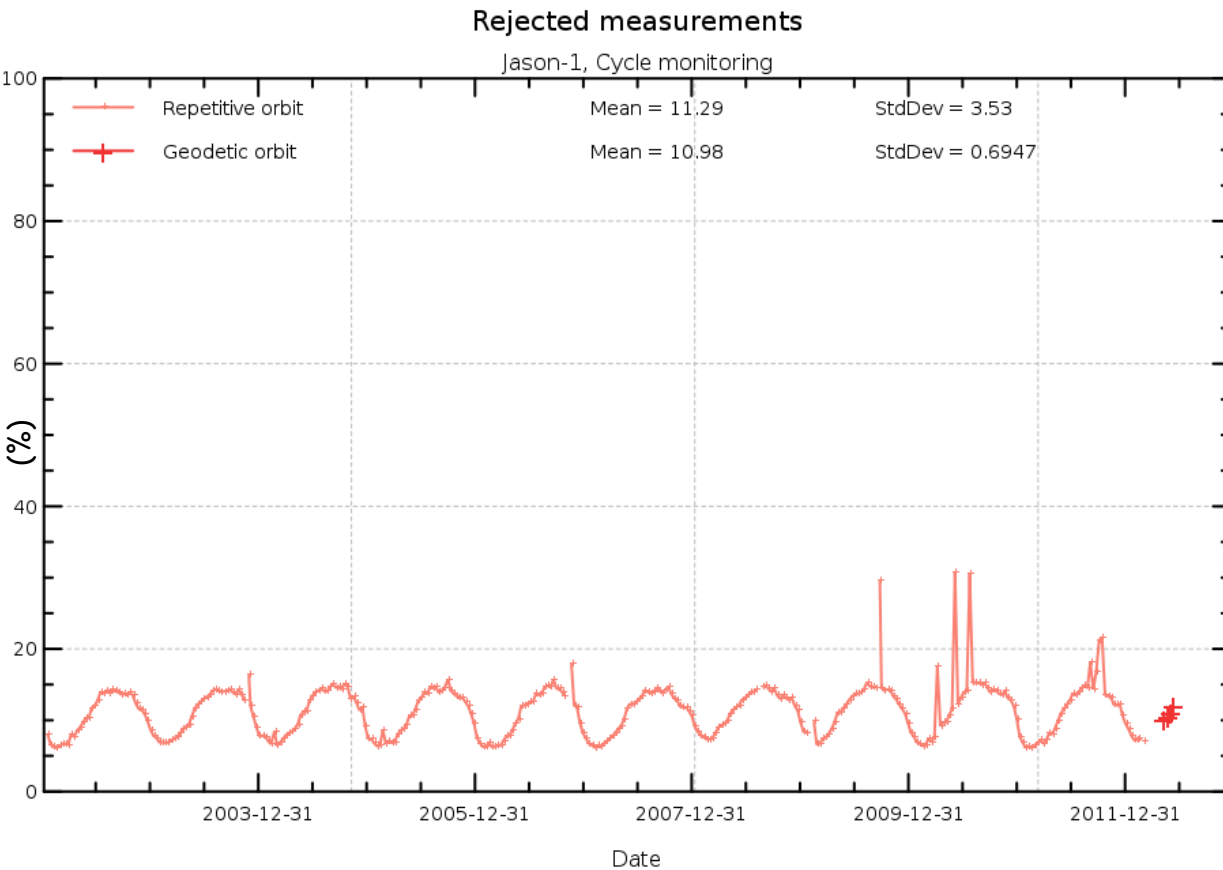
Tracking problems
due to star tracker
low performance
+
calibrations

In geodetic phase, there will be regular unavailability of data due to Jason-1 altimeter INIT mode during Jason-2 overflight

In 2011 and until 2012-02-15:
good data availability for Jason-1

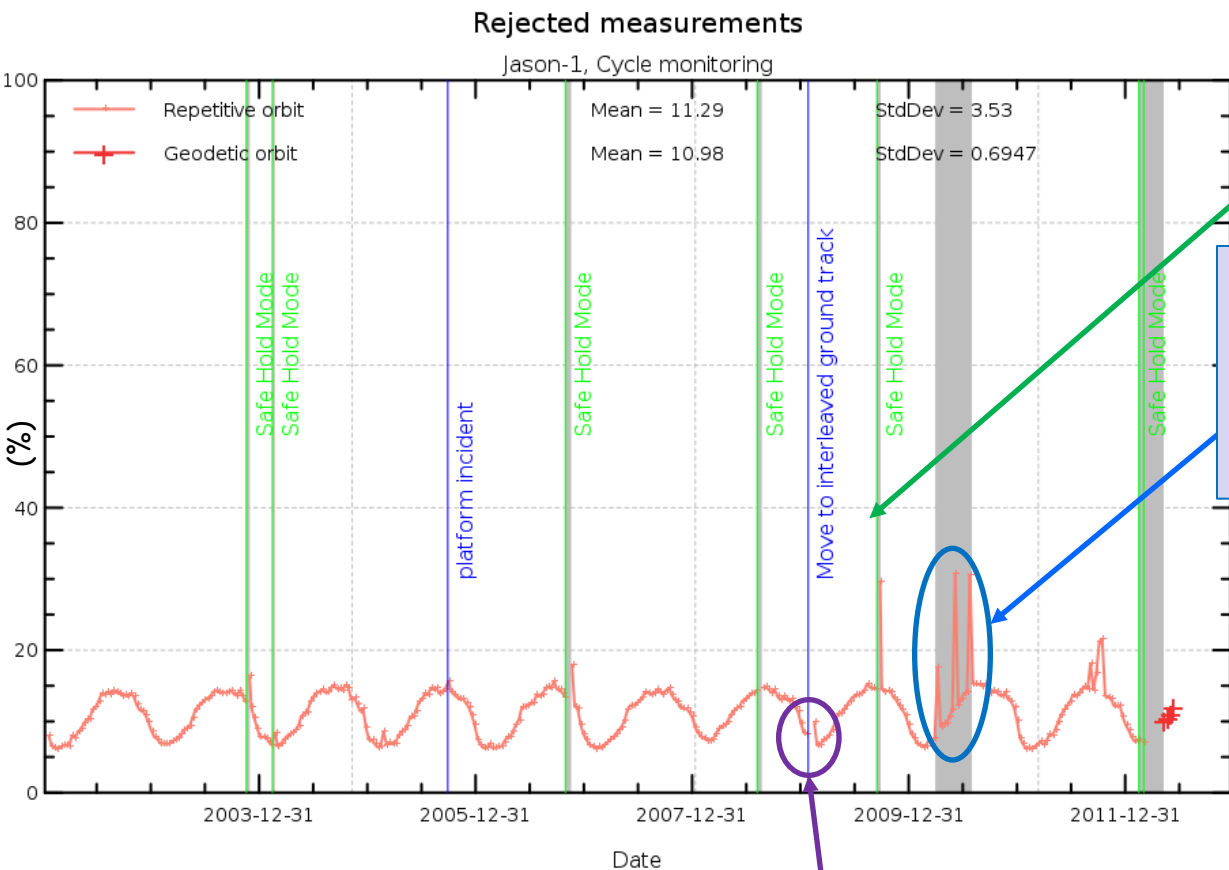


- Percentage of edited measurements show an annual signal due to ice coverage





- Percentage of edited measurements show an annual signal due to ice coverage
- Very few measurements edited due to anomalies



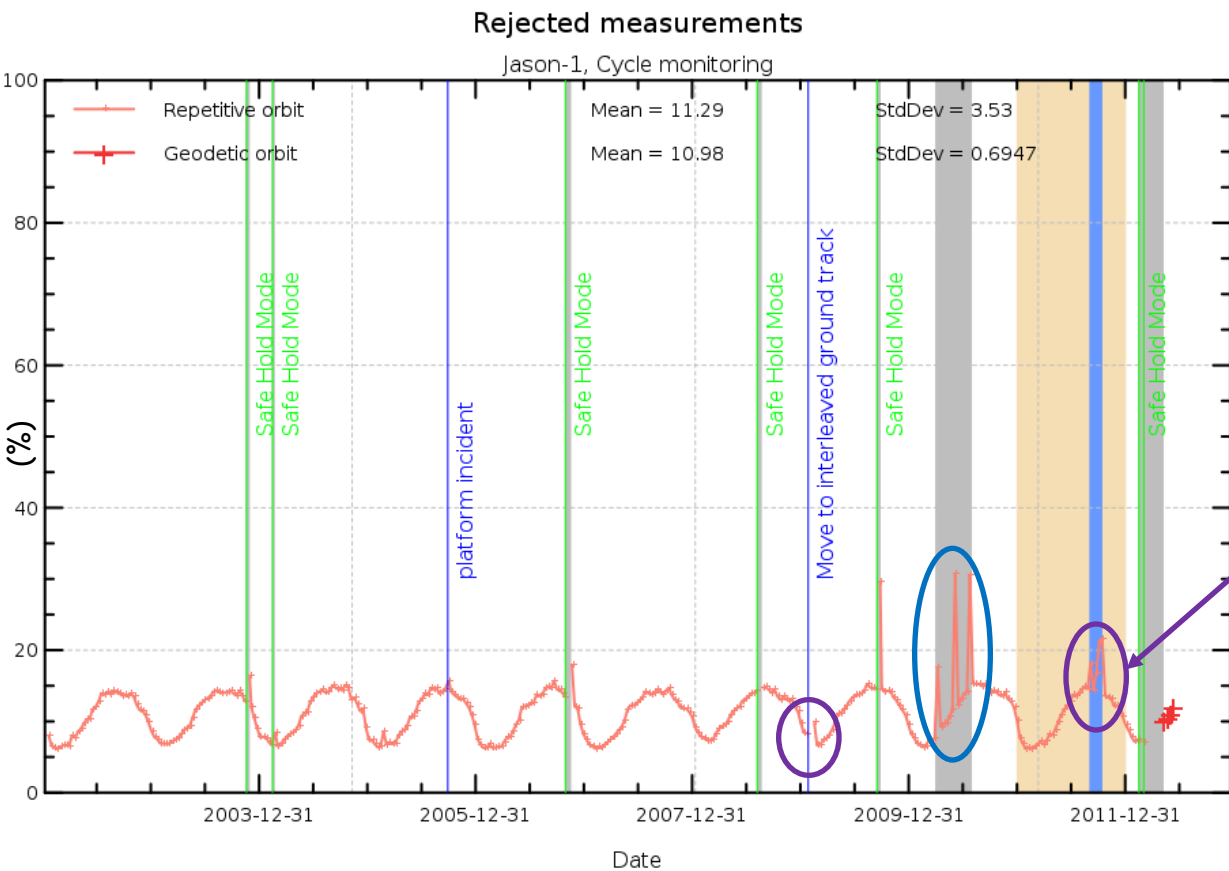
JMR switched on later after Safehold

Tracking problems due to star tracker low performance
-> altimeter parameters at default value

SLA out of threshold during maneuver



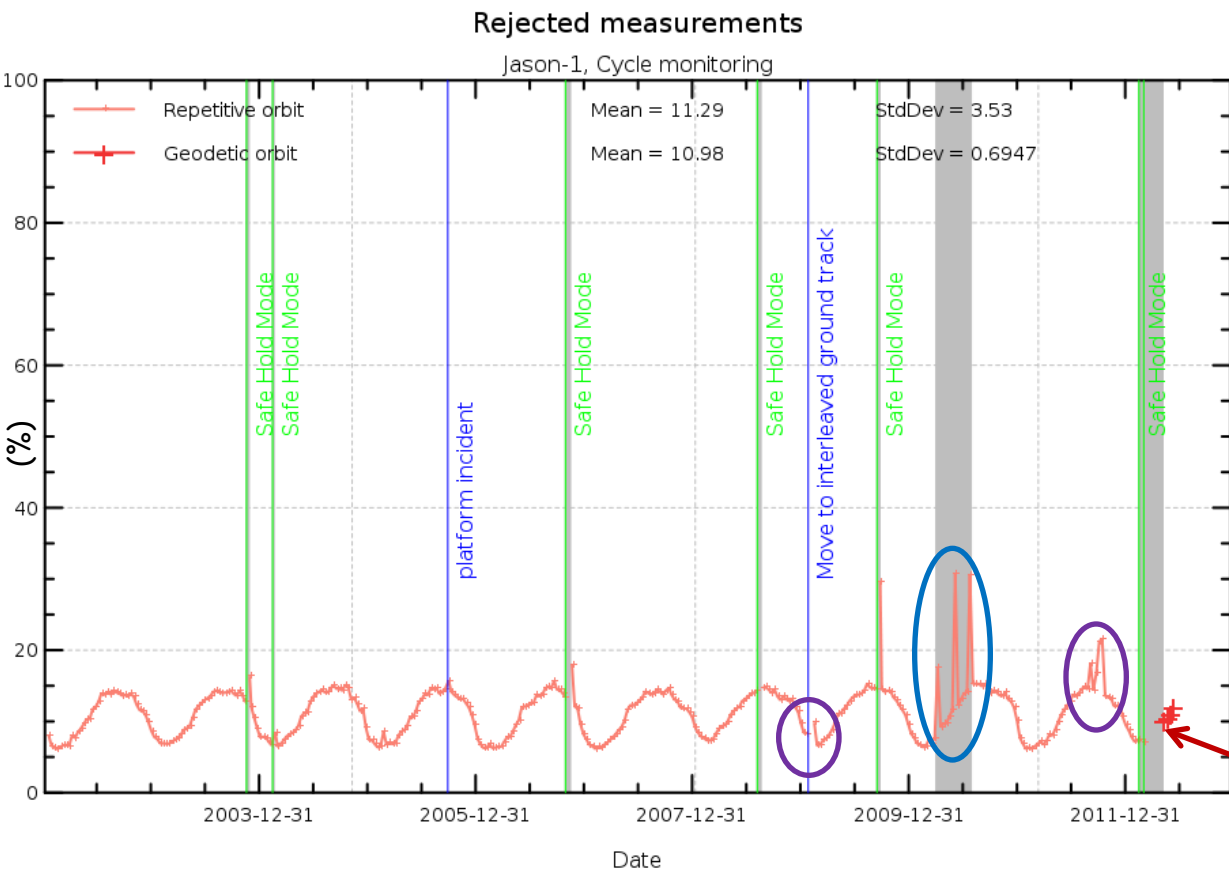
- Percentage of edited measurements show an annual signal due to ice coverage
- Very few measurements edited due to anomalies



Cyc356 to 360:
fuel depletion maneuvers
(2011-09-04 to 2011-10-13)



- Percentage of edited measurements show an annual signal due to ice coverage
- Very few measurements edited due to anomalies



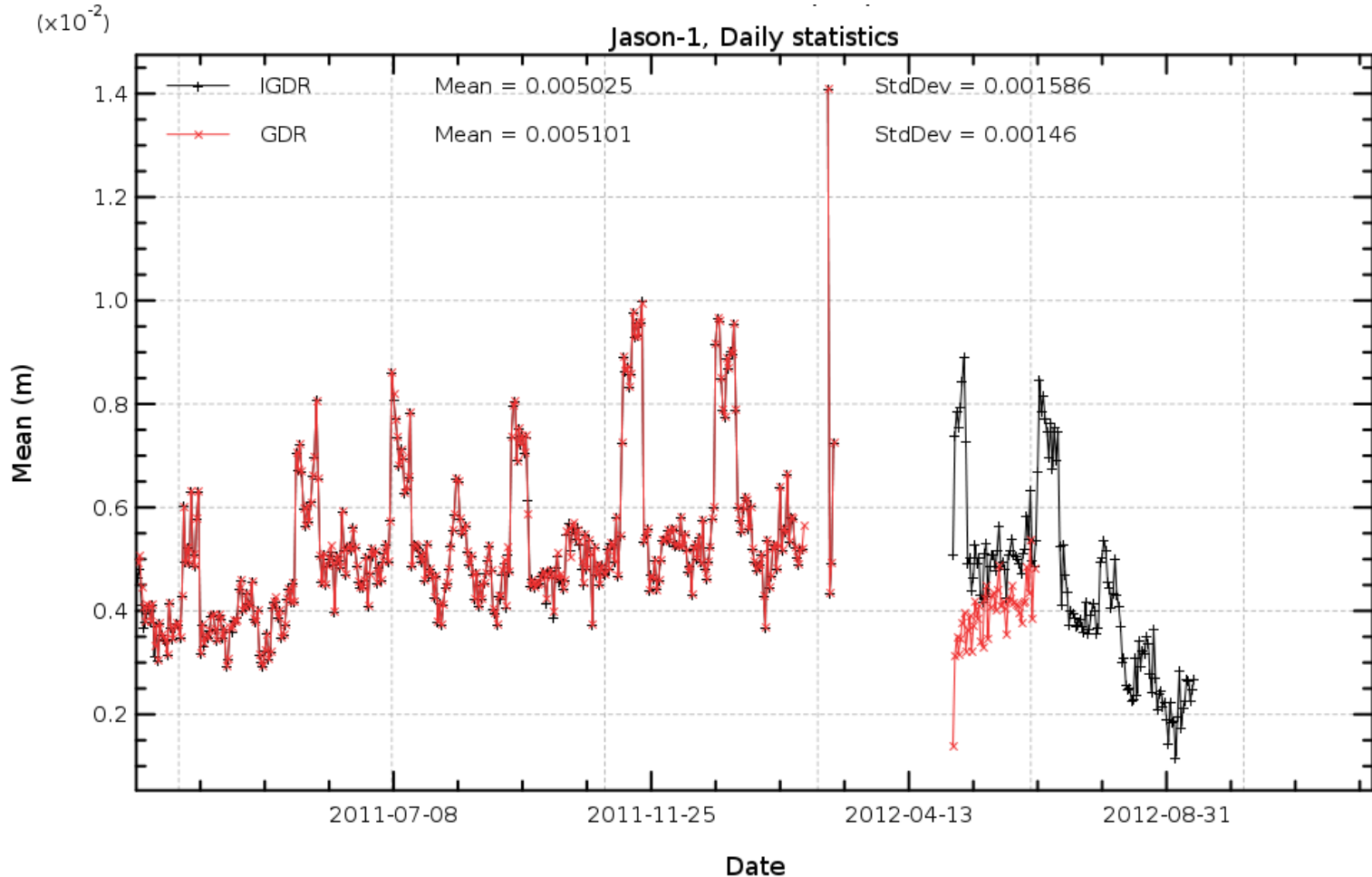
First cycle on new orbit :
Coherent with previous level

Monitoring of parameters



Stability of radiometer wet troposphere correction

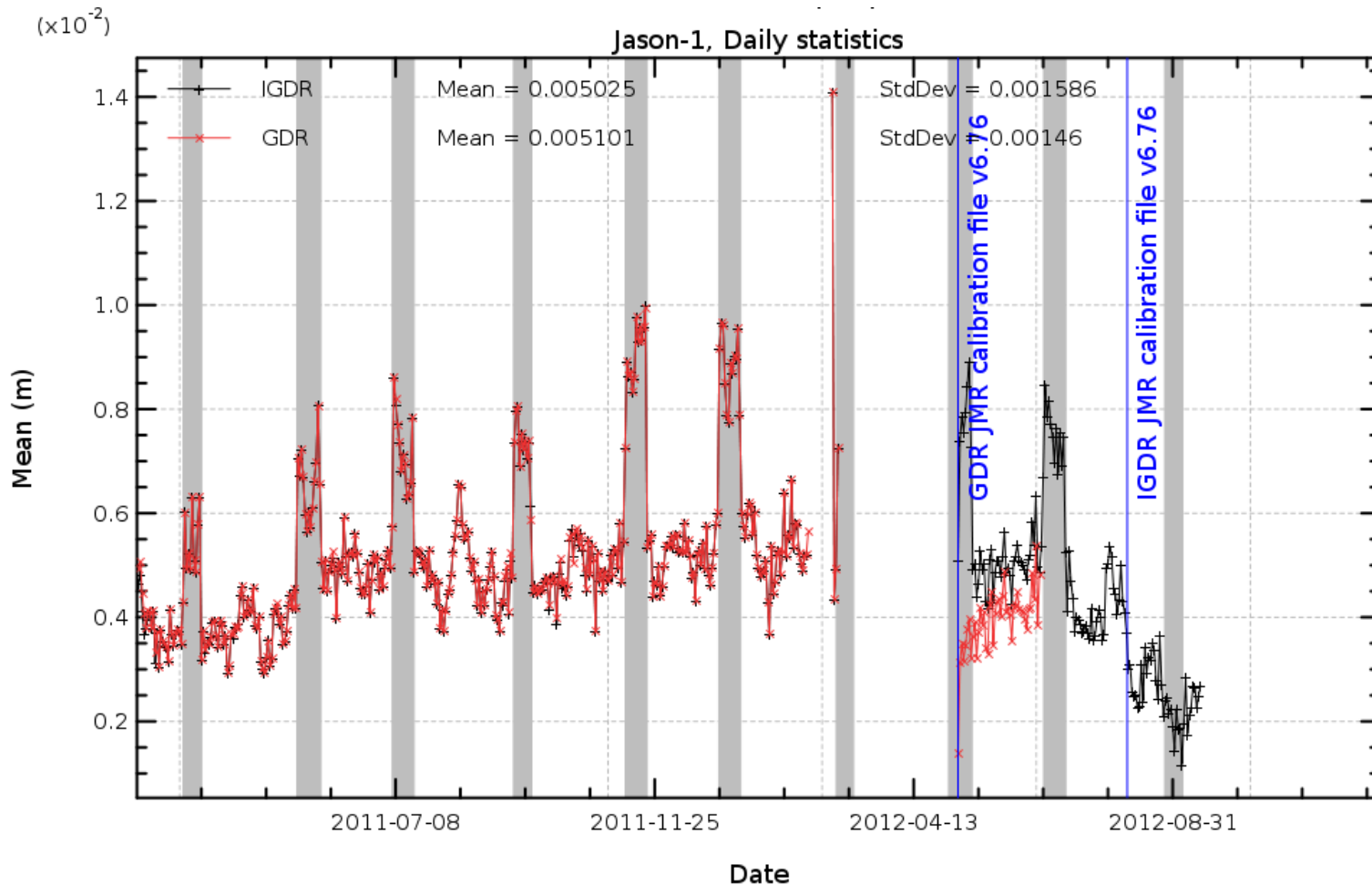
Daily Radiometer – Ecmwf model wet troposphere correction differences show:





Stability of radiometer wet troposphere correction

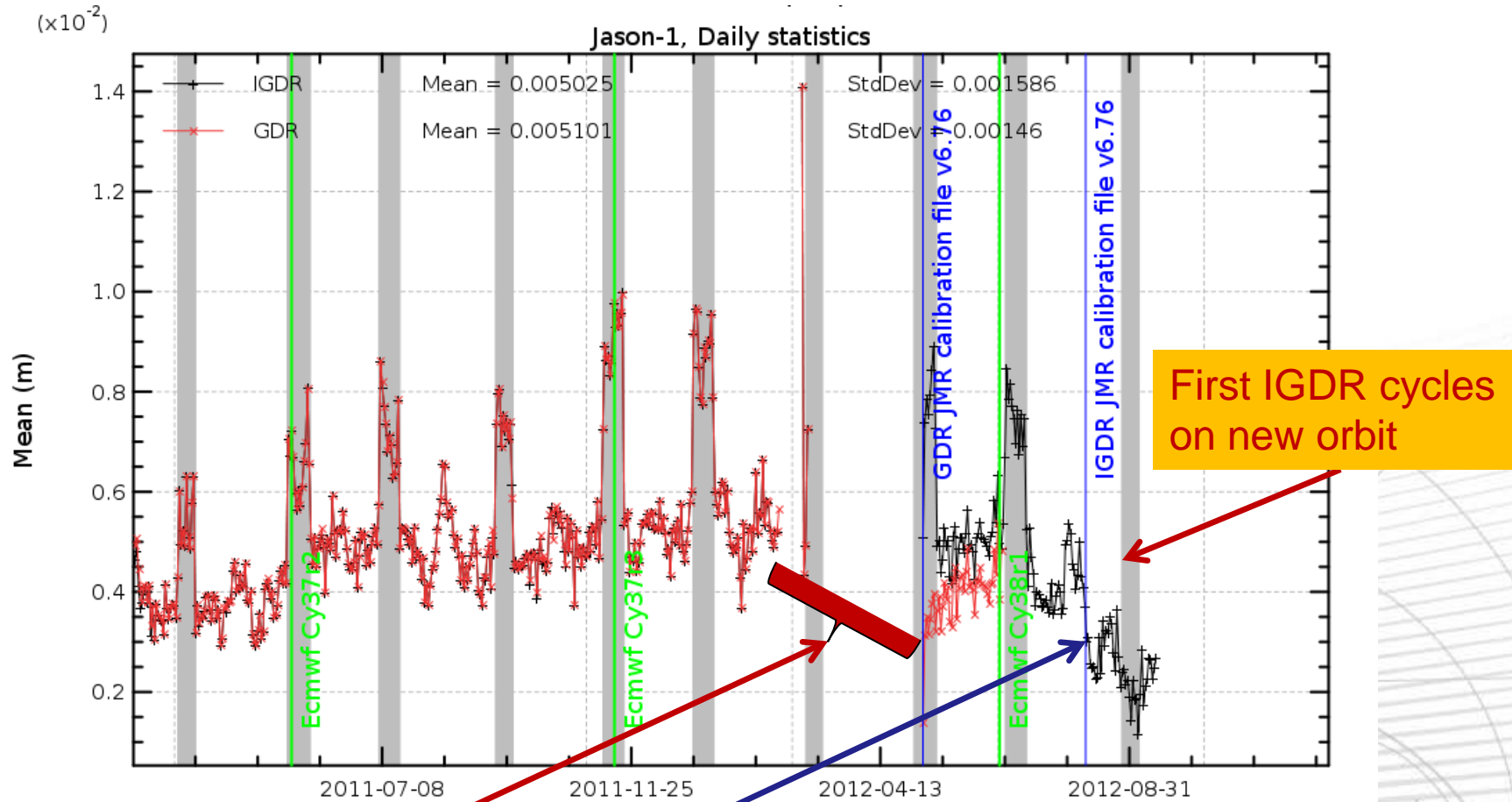
Daily Radiometer – Ecmwf model wet troposphere correction differences show:





Stability of radiometer wet troposphere correction

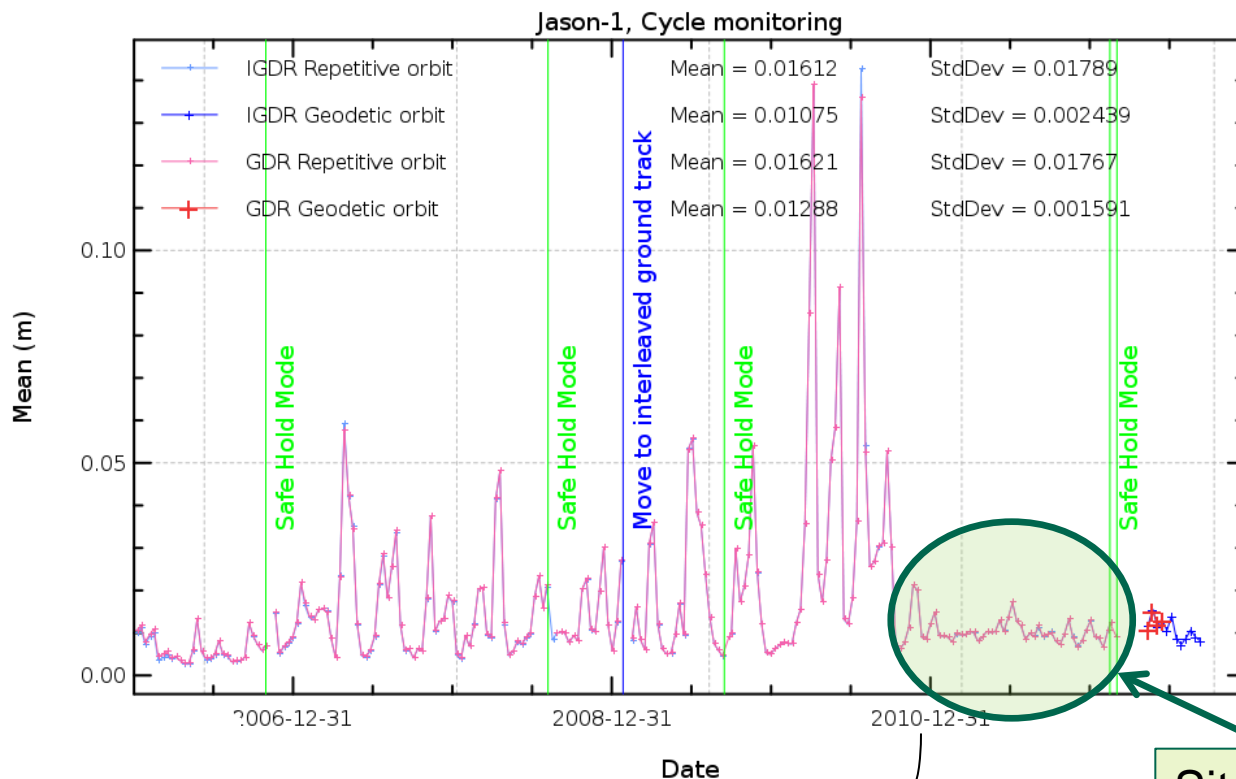
Daily Radiometer – Ecmwf model wet troposphere correction differences show:



First GDR cycle on new orbit :
Jump of ~2 mm (related to new JMR calibration file)



Apparent Squared Mispointing

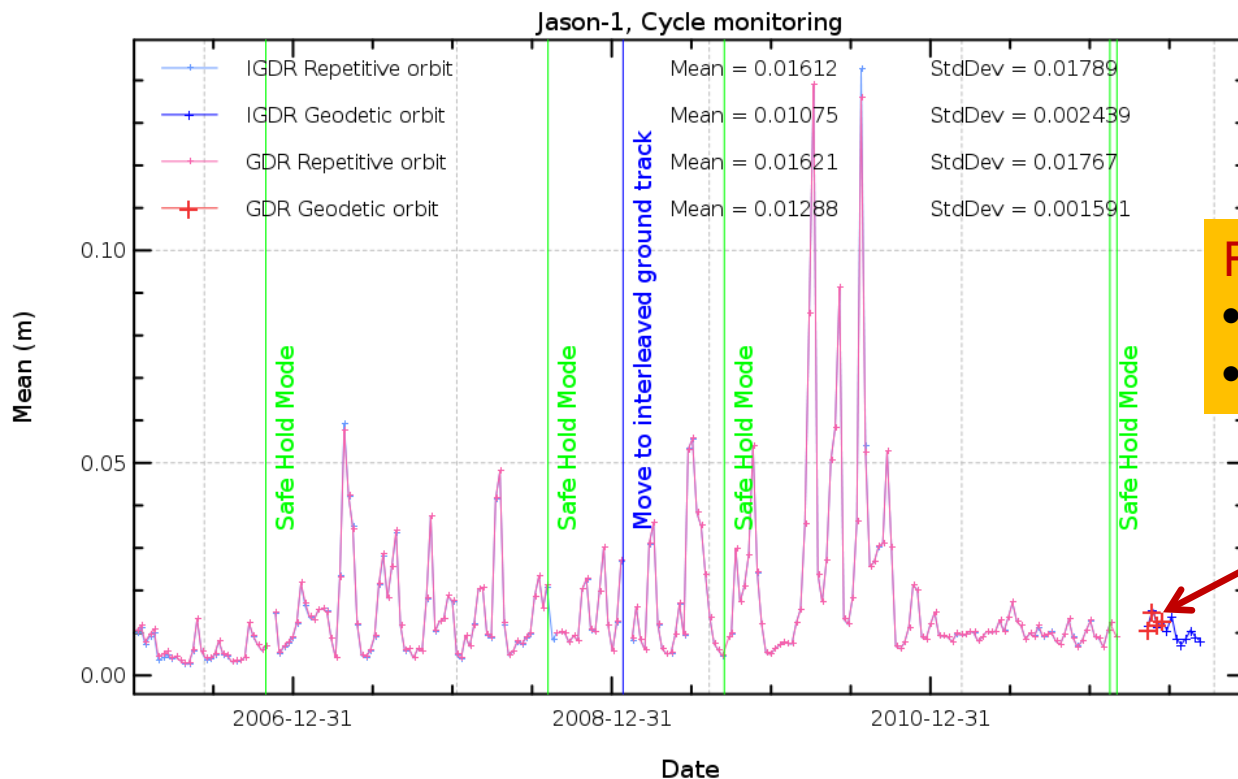


J1 periodically impacted by low star tracker performances related to beta angle value (environment conditions)

Situation largely improved since end 2010 thanks to a calibration of the gyro wheels



Apparent Squared Mispointing



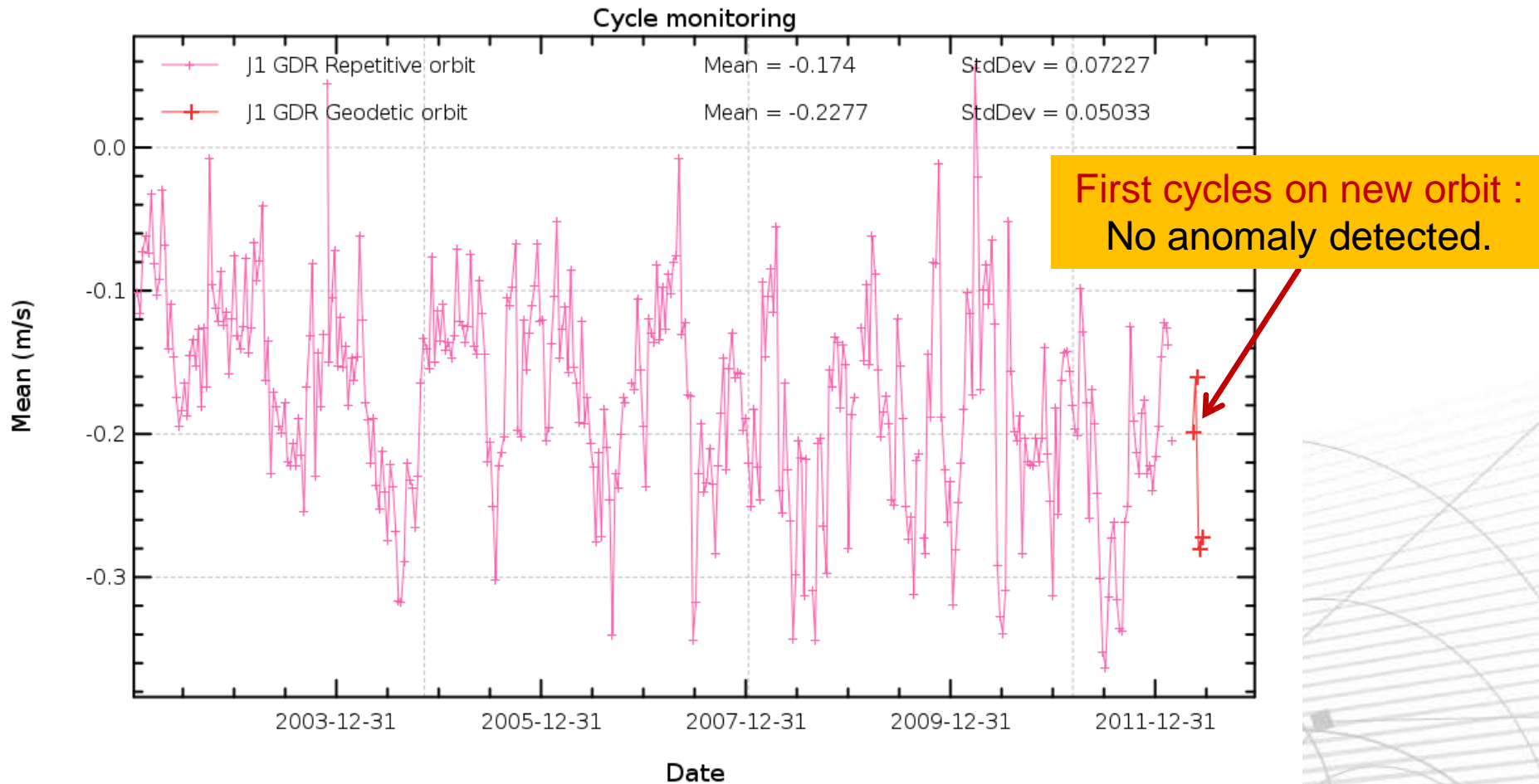
First cycles on new orbit :

- Coherent with previous level
- Quite stable





Altimeter wind speed : Gdr minus Model difference



Sea Level performance

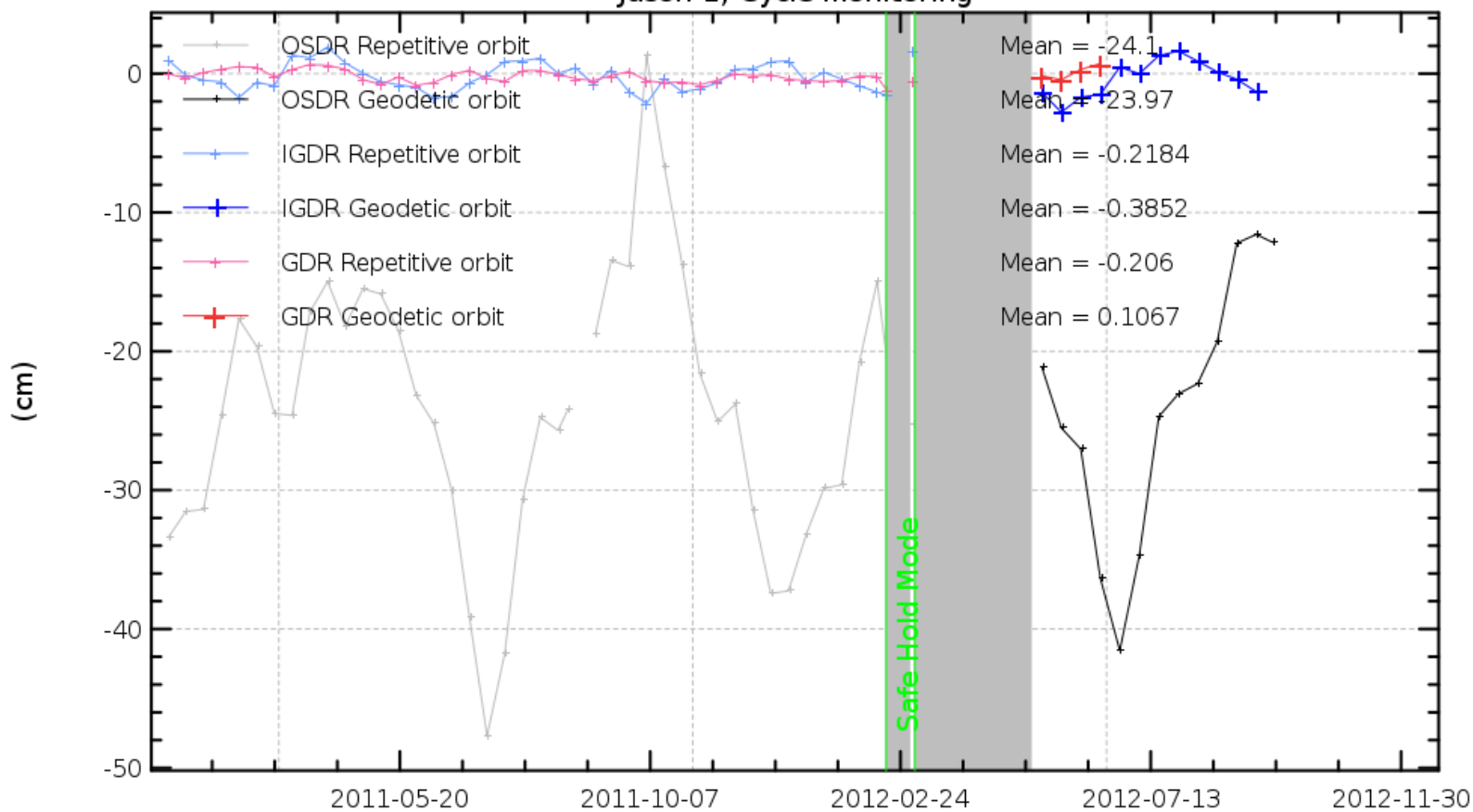


Temporal evolution of asc/desc SSH differences

Improvement of mean SSH differences at crossovers

from Osdr to Igdr and Gdr :

Jason-1, Cycle monitoring



Selecting data with $|\text{latitude}| < 50^\circ$, bathymetry $< -1000\text{m}$, low ocean variability ($< 20\text{cm}$)

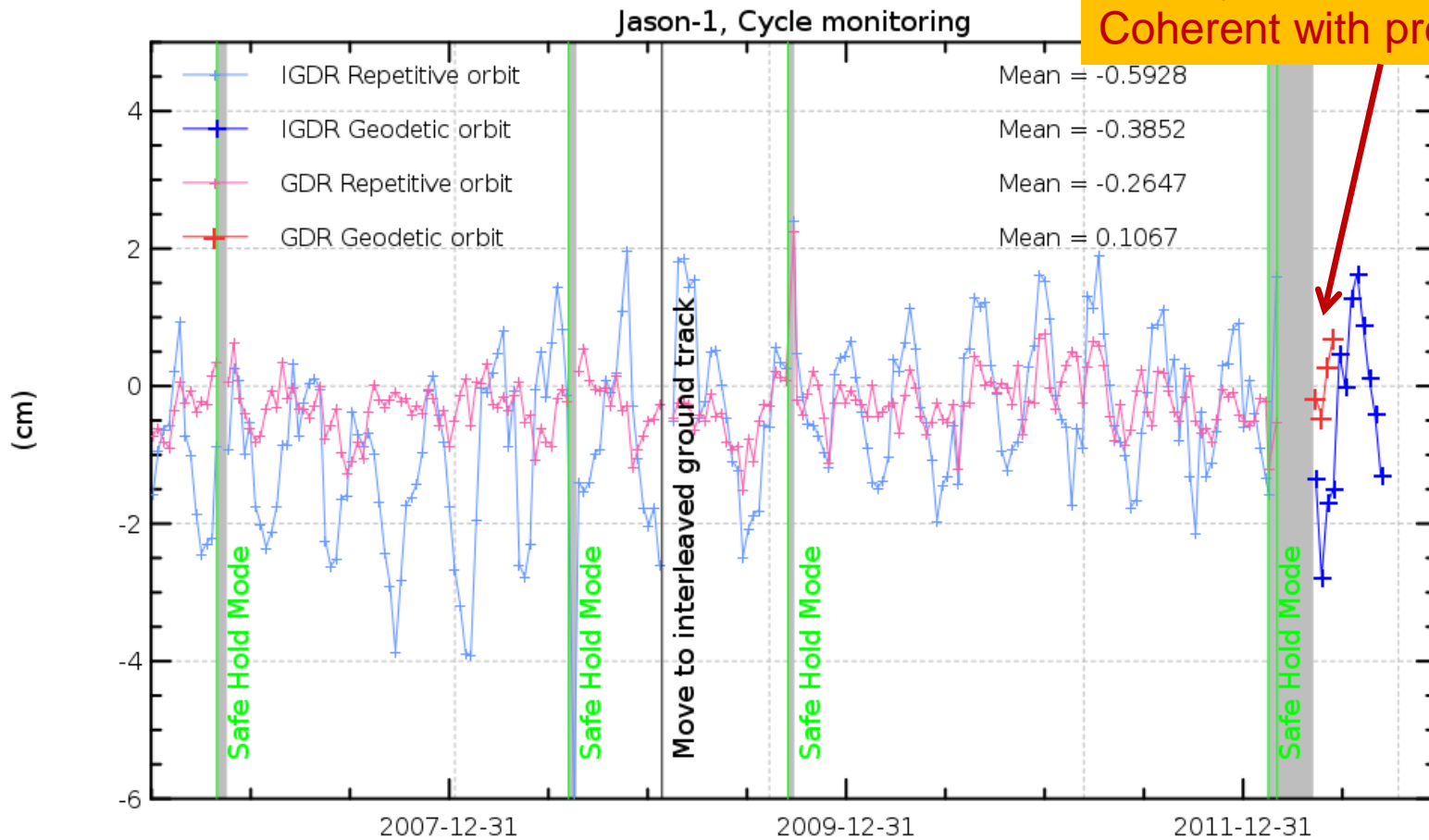


Temporal evolution of asc/desc SSH differences

Cyclic monitoring of mean SSH differences at crossovers is good, but:

Show a periodic 120-days signal, related to orbit

First cycles on new orbit :
Coherent with previous level



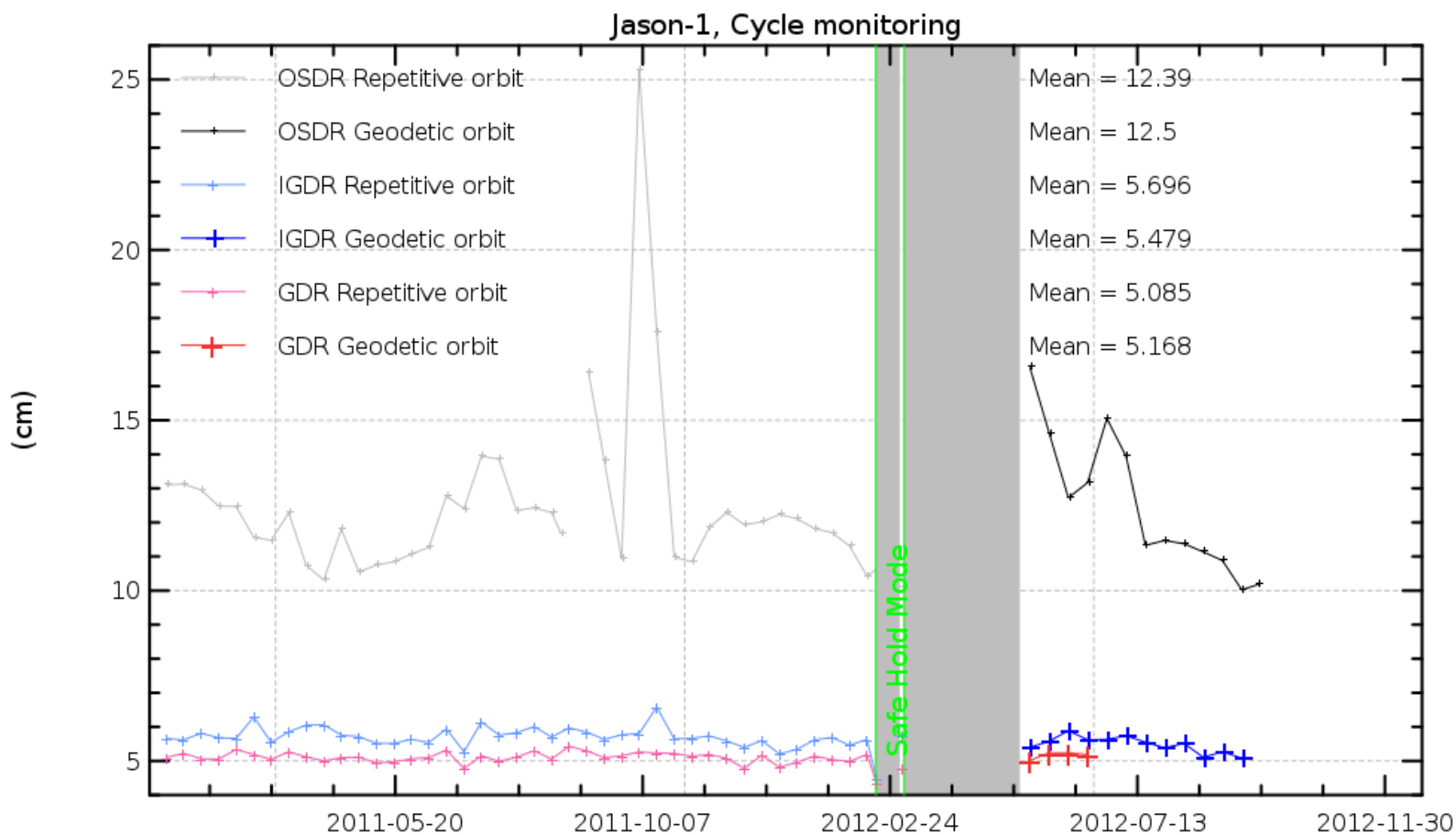
Selecting data with $|\text{latitude}| < 50^\circ$, bathymetry $< -1000\text{m}$, low ocean variability ($< 20\text{cm}$)



Temporal evolution of asc/desc SSH differences

Standard deviation of SSH differences at crossovers :

Reduction from Osdr to Igdr to Gdr

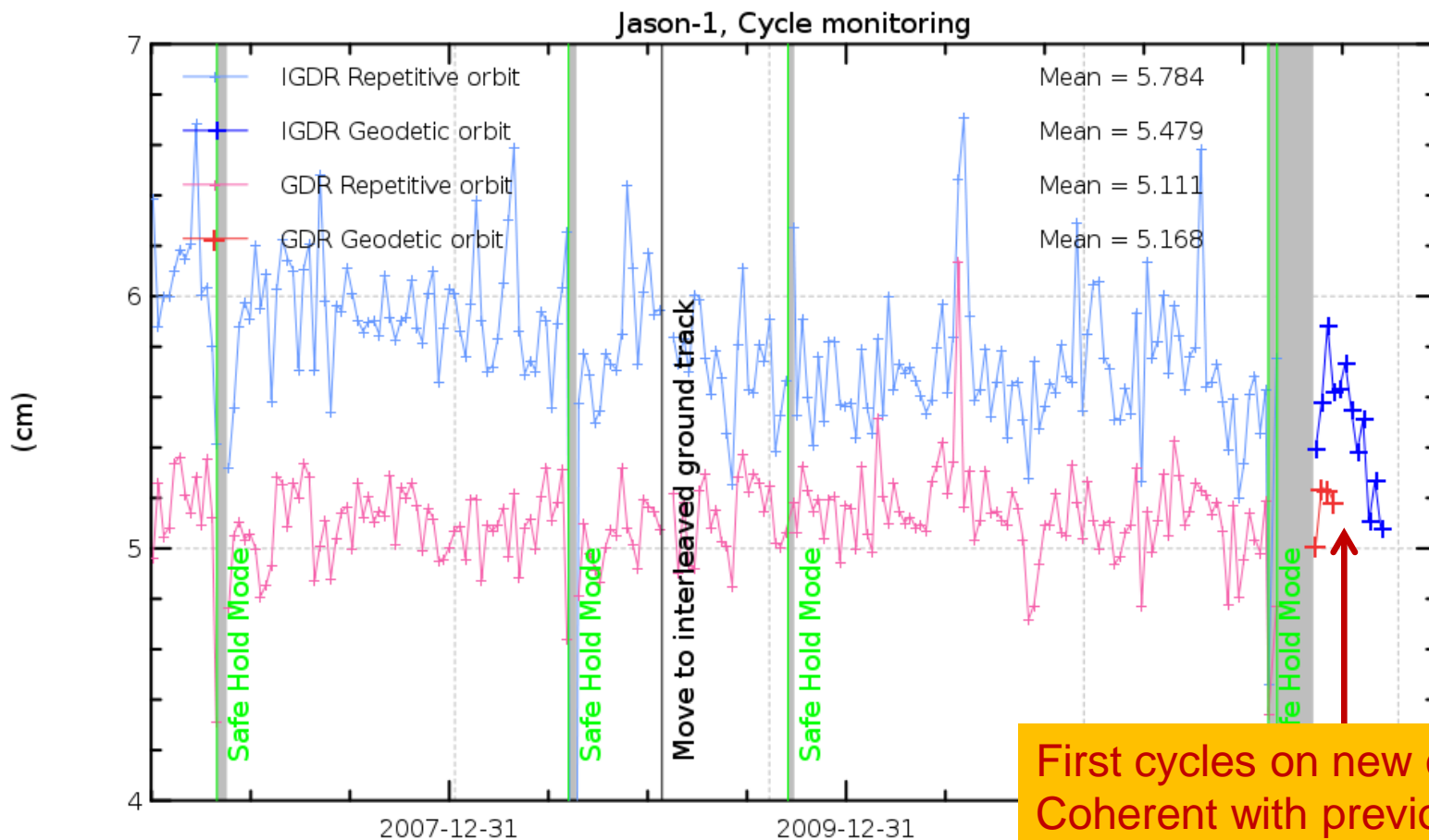


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Temporal evolution of asc/desc SSH differences

Standard deviation of SSH differences at crossovers:

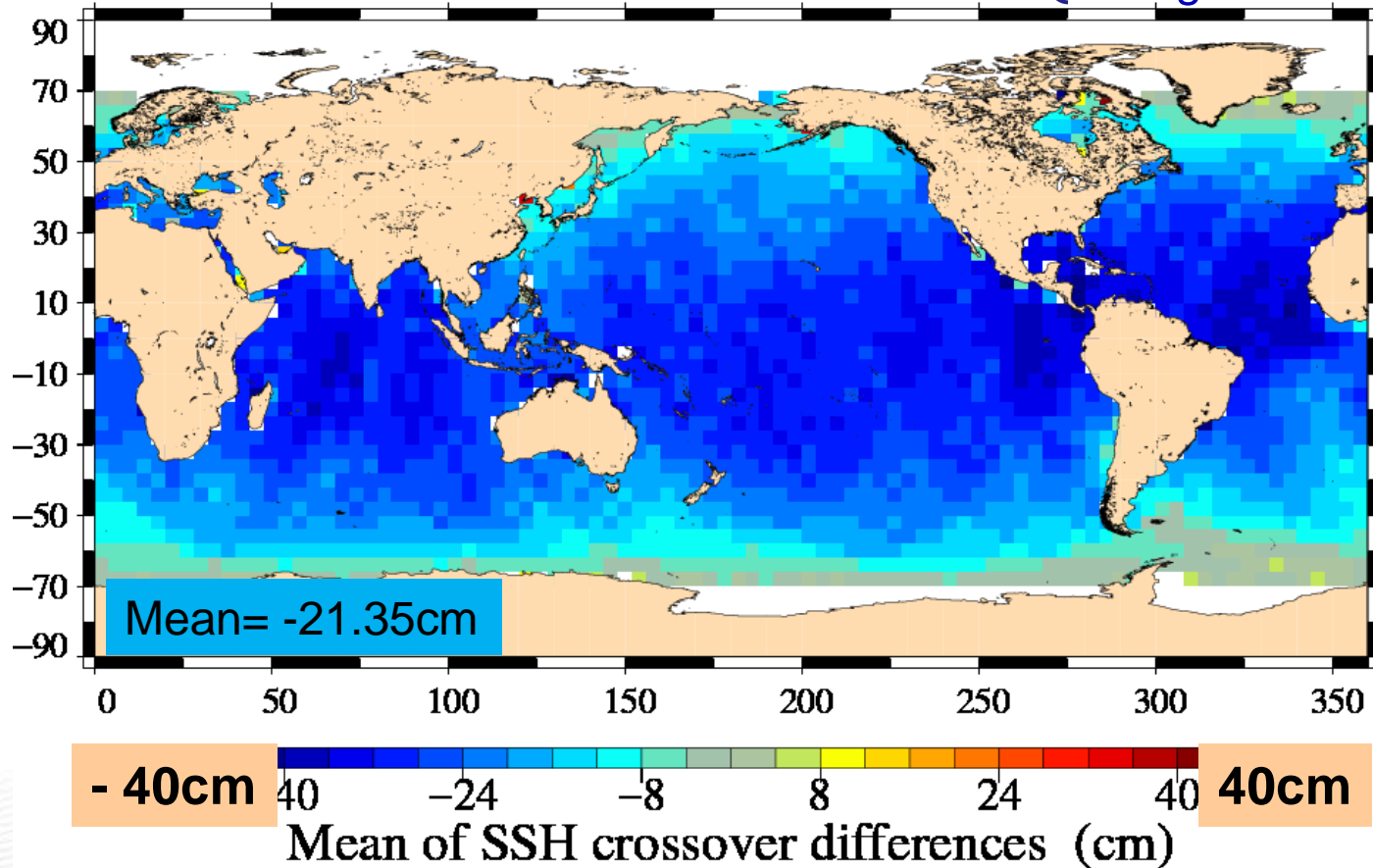


Selecting data with $|\text{latitude}| < 50^\circ$, bathymetry $< -1000\text{m}$, low ocean variability ($< 20\text{cm}$)



Spatial distribution at crossovers :

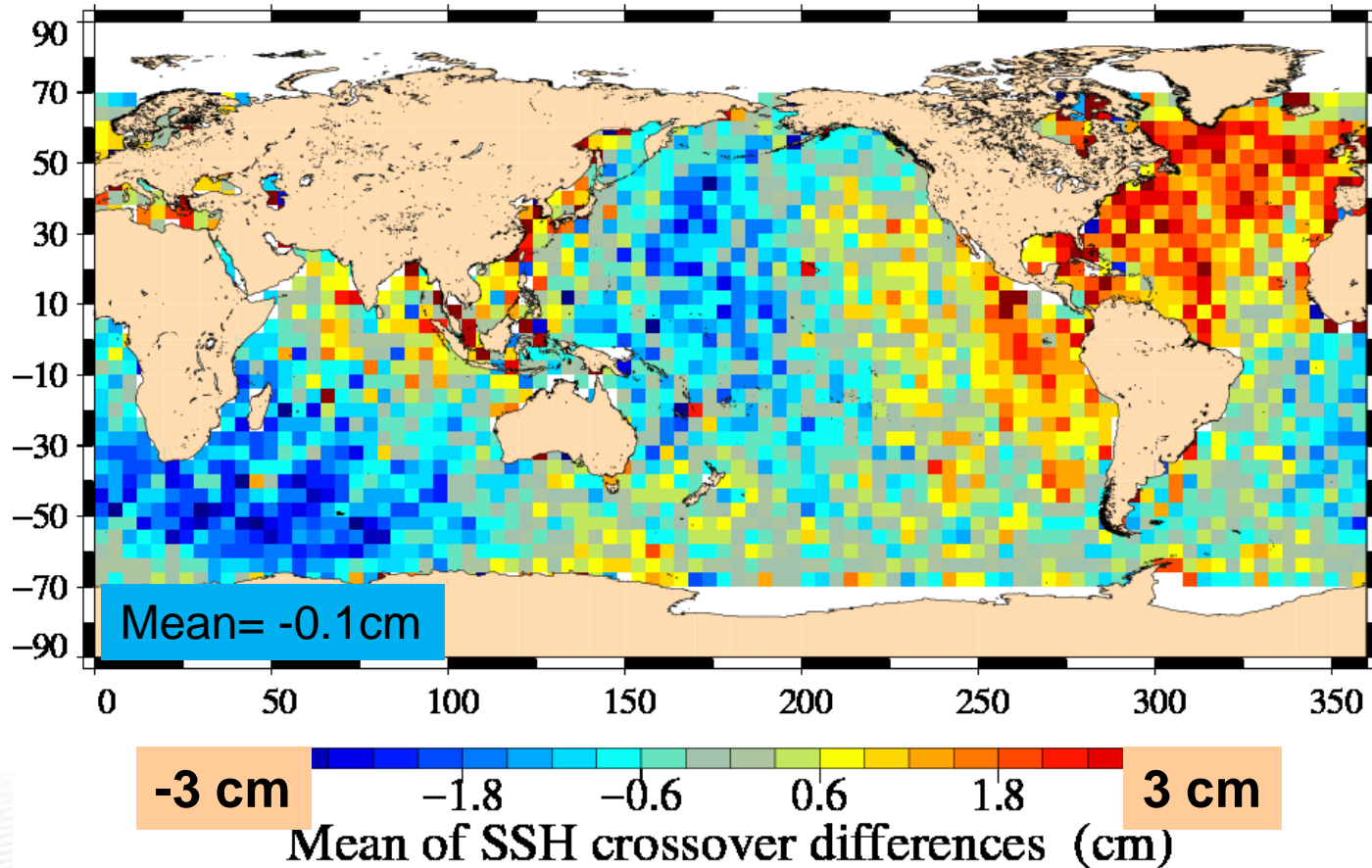
Cycle 331 to 500 : OSDR (Wind/Wave product
Navigator orbit)



Very strong ascending/descending differences
Correlated with latitude



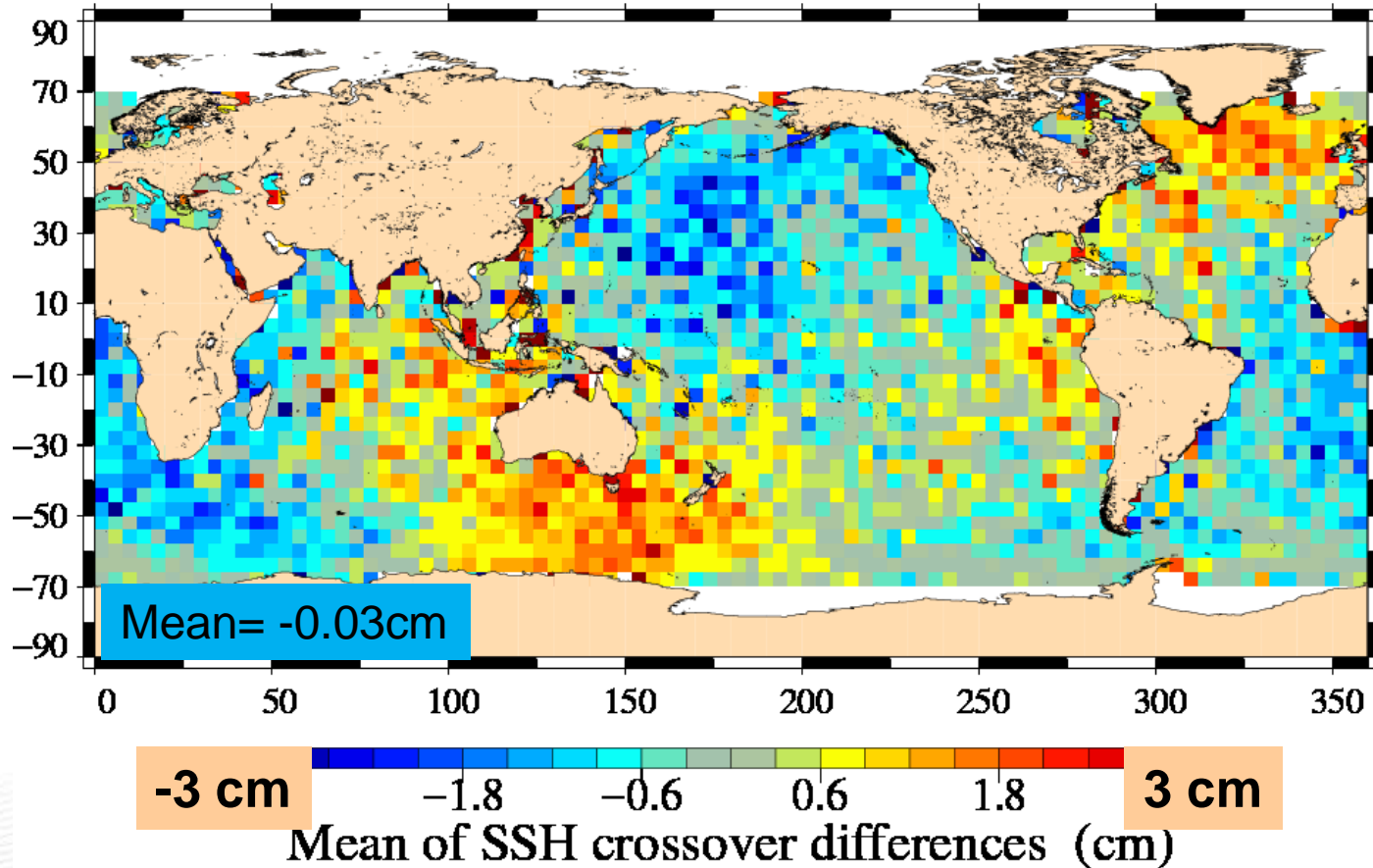
Spatial distribution at crossovers : Cycle 331 to 500 : IGDR (MOE orbit)



Geographically correlated patterns up to +/- 2.5 cm amplitude



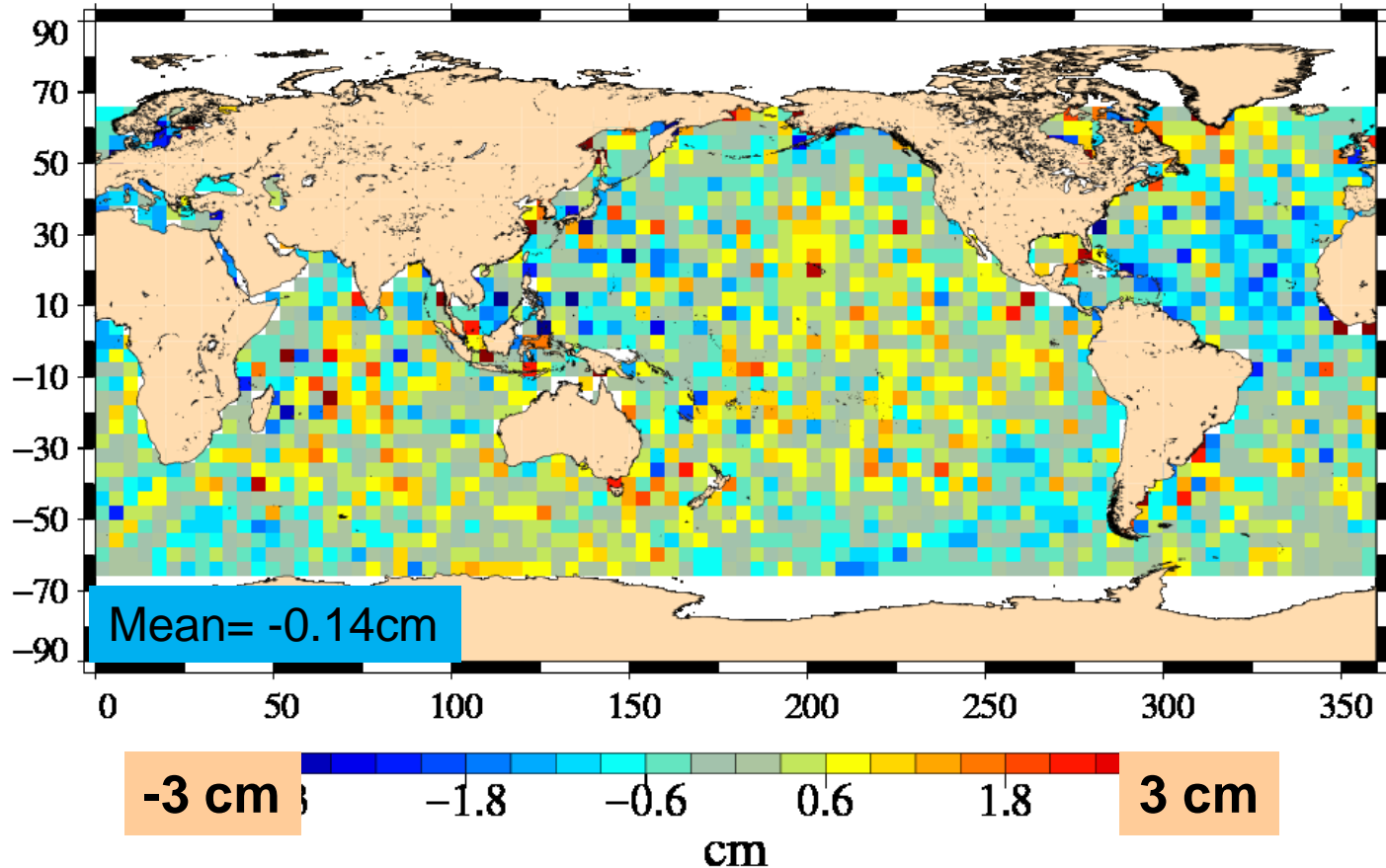
Spatial distribution at crossovers : Cycle 331 to 500 : GDR with Orb POE-C



SSH performances at crossovers are good,
but shows still geographically correlated patterns (+/- 1.5 cm amplitude)



Spatial distribution at crossovers : Cycle 332 to 368 : GDR with Orb POE-D



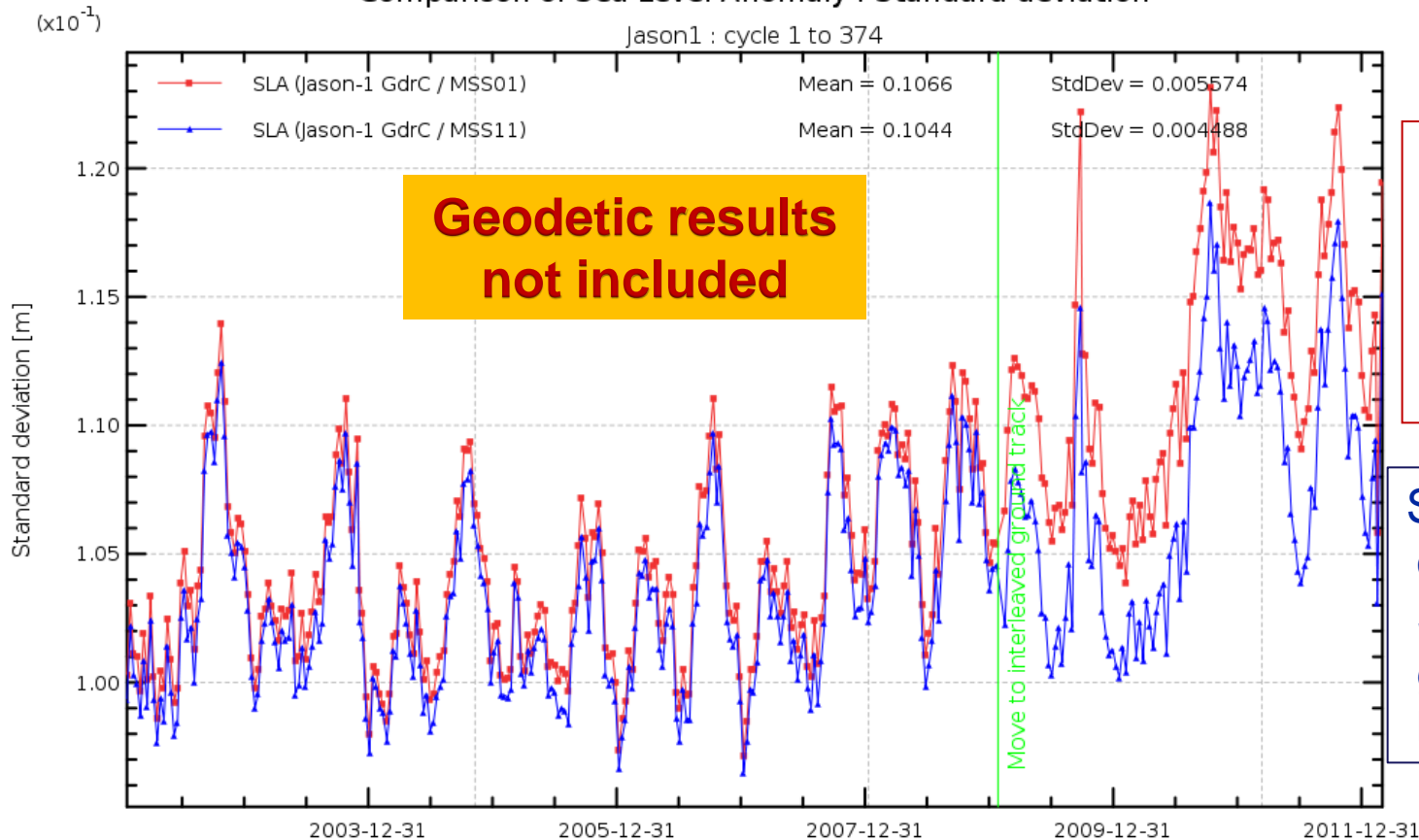
Reduction of geographically correlated patterns



Along-track Sea Level Analysis

Standard Deviation of Sea Level Anomaly

Comparison of Sea Level Anomaly : Standard deviation

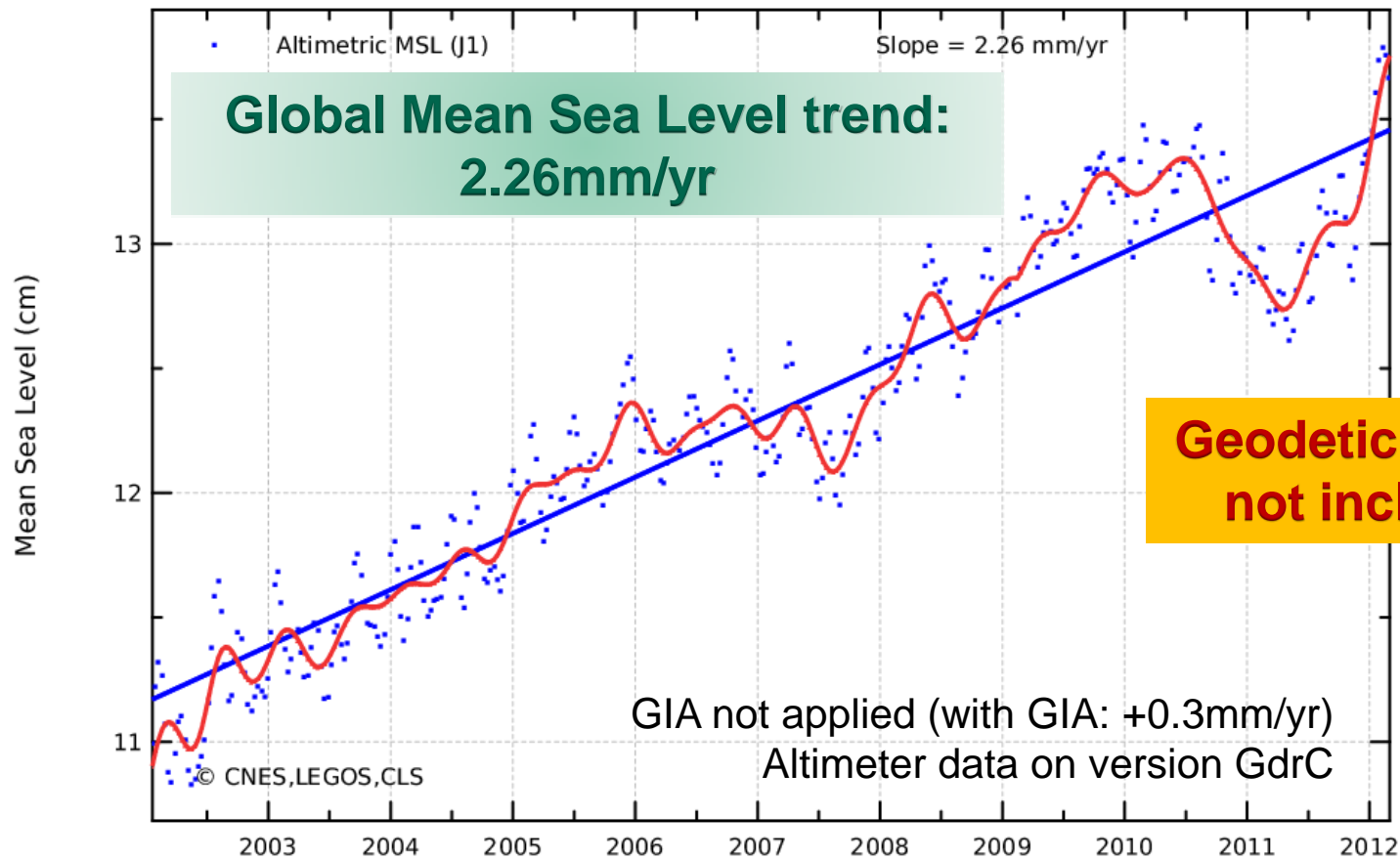


Standard deviation of SLA over repetitive orbit period about 10.7 cm

Mean Sea Level Stability

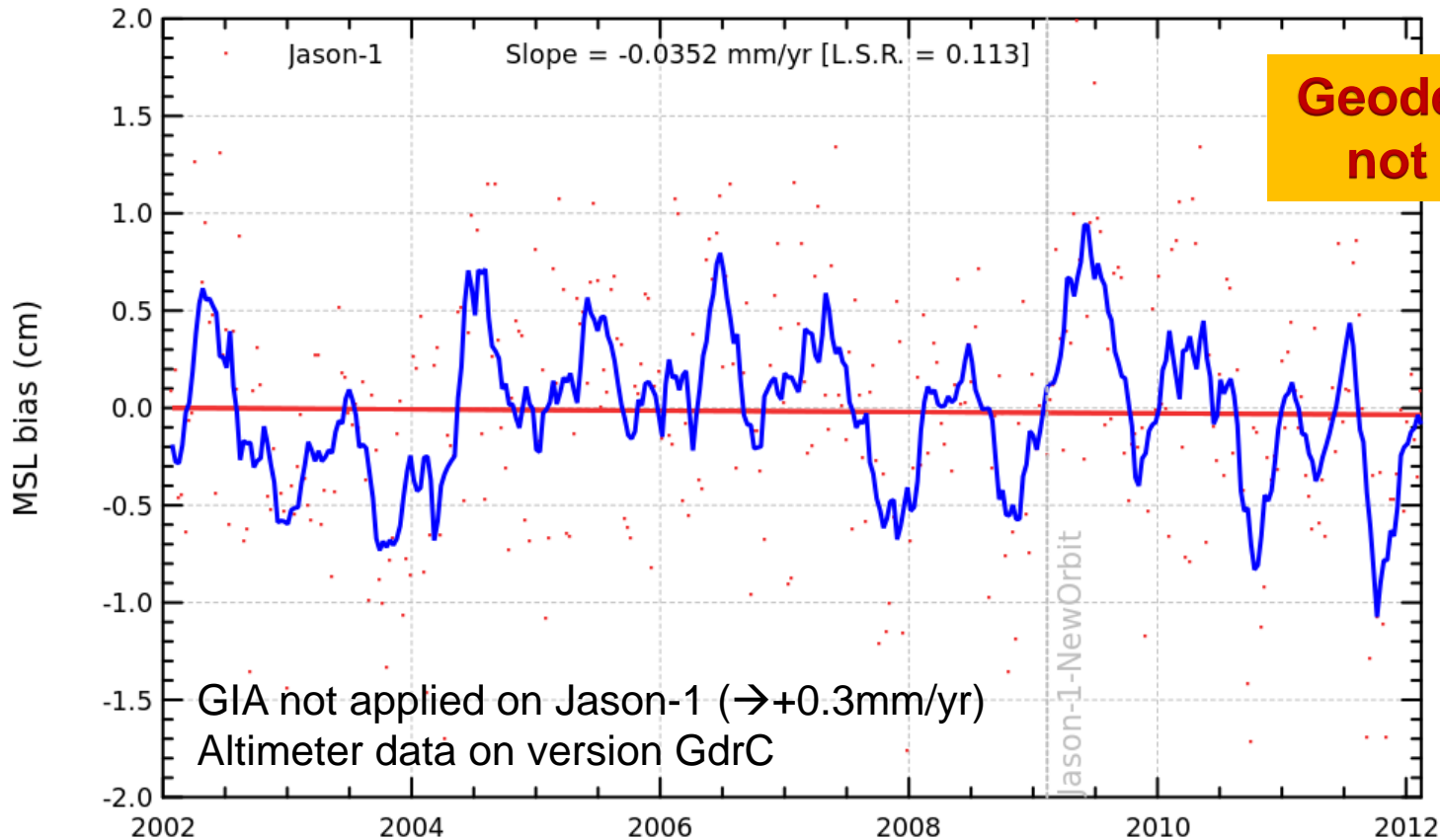


Global Mean Sea level with Jason-1 GdrC :





Comparison between Jason-1 SLA and Tide-gauges :



**Geodetic results
not included**

good agreement with in-situ measurements (difference of 0.26mm/yr)

See also: *G. Valladeau poster:*

Quality assessment of altimeter and tide gauge data for Mean Sea Level and climate studies

See also: *J.F. Legeais presentation:*

Comparing altimetry with Argo and GRACE data for quality assessment and mean sea level studies

Jason-1 new orbit
First conclusions



Data coverage:

good availability of data

Data quality:

coherent with previous level

Radiometer:

Jump of ~2 mm (related to new JMR calibration file)

Apparent squared mispointing from waveforms:

Coherent with previous level

Quite stable

Altimeter Wind Speed:

Shows correct behaviour

Sea Level performance

SSH crossover differences show mean of standard deviation coherent with previous level

Mean Sea Level:

no computation with data from new orbit performed yet

First results on Jason-1 new orbit
are coherent with previous results.
Levels are coherent in term of
quality and performances