SUMMARY ABOUT DATA PRODUCTION AND QUALITY

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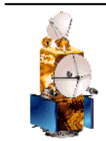
(Contributions from and Thanks to
all members of the JSDS, PO.DAAC and SSALTO teams)



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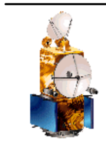
- **2. Improvements brought to Science Processing to derive GDRs**
- **3. Some global validation results**
- **4. Known Improvements to be considered in a new step**

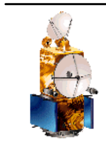
Using a double parallel processing facility at JPL and CNES: Very useful

- **Debugging of Science Software and System anomalies**
- **Sharing the workload between current processing and reprocessing operations:**
  - at CNES/SSALTO
    - current operations for IGDRs and GDRs
  - at JPL/JSDS-PO.DAAC
    - OSDR routine processing + GDR reprocessing operations
- **Parallel validation of the data products using different and complementary methods and softwares**
- **Plans to come back to parallel current processing at CNES/SSALTO and JPL/JSDS-PO.DAAC**



OSDR Performance

- **Mission Requirement – 75% of available data processed in 3 hours, 95% in 5 hours**
  - This objective is routinely met at JSDS and PODAAC distribution site. Averaging better than 90% in 3 hours.
- **These statistics are reported weekly in the JSDS OCG report to project management.**
- **One outstanding anomaly related to a wrongly processed default value for time-stamping in level-1 products:**
  - correction is known and is under implementation



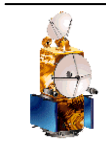
Science Processing Upgrades: OSDR

- **All anomalies reported before the New-Orleans October 2002 meeting and detected since then have been corrected**
  – for instance, sigma0 are now well corrected for atmospheric attenuation

- **In addition:**
  – Instrumental corrections through polynomials (initially set to 0 at launch) have been implemented

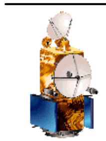
- **Only two remaining anomalies still to be corrected:**
  – RMS of elementary sigma0 values in OSDR are in error by an exact factor of 10 (should be 10 times smaller than in the present products)
    - correction is known and is under implementation

  – Check the reason why OSDR SWH are always less than 12.7 m
    - correction under investigation



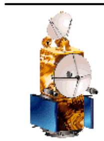
Science Processing Upgrades: IGDR and GDR

- **General Features:**
  - All upgrades implemented:
    - From cycle 46 onwards, for the IGDRs
    - For all GDRs:
      - from cycle 46 onwards, for the current processing
      - from cycle 1 to 45 that were re-processed into GDRs
  - Upgrades concern:
    - Correction of a few geophysical algorithms
    - JMR processing
    - POSEIDON-2 processing



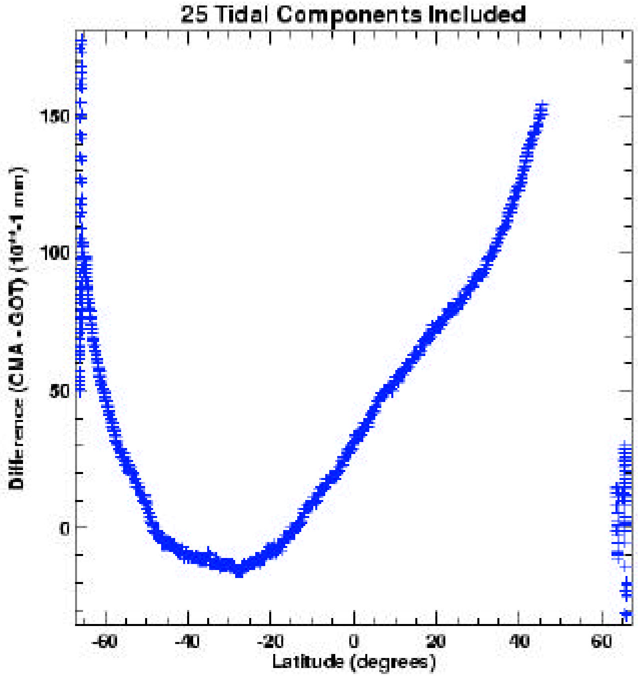
Upgrades at geophysical level

- **To take into account the reference atmospheric pressure figure that is different from the one considered in the Jason processing:**
  - Add a range bias to the GSFC MSS
- **Sigma0:**
  - Provide "unbiased -as measured- sigma0" in the products (and use the "biased" sigma0 in the geophysical algorithms that need sigma0 as inputs)
  - Correct the 1 way/2 way tmospheric attenuation on sigma0.
- **To improve the dry tropospheric correction in IGDRs**
  - Use analyzed meteorological fields in IGDRs (as in GDRs)
- **To make all IGDRs available in the 2 day delay:**
  - Remove DORIS TEC grids from Jason IGDRs
- **Correct for the anomalies in the GOT and FES models**



GOT and FES tide models

- Initial post-launch IGDRs had error in implementation of GOT and FES tide models.
- Error had a 9-year period, of the order 1-2 cm at its maximum.

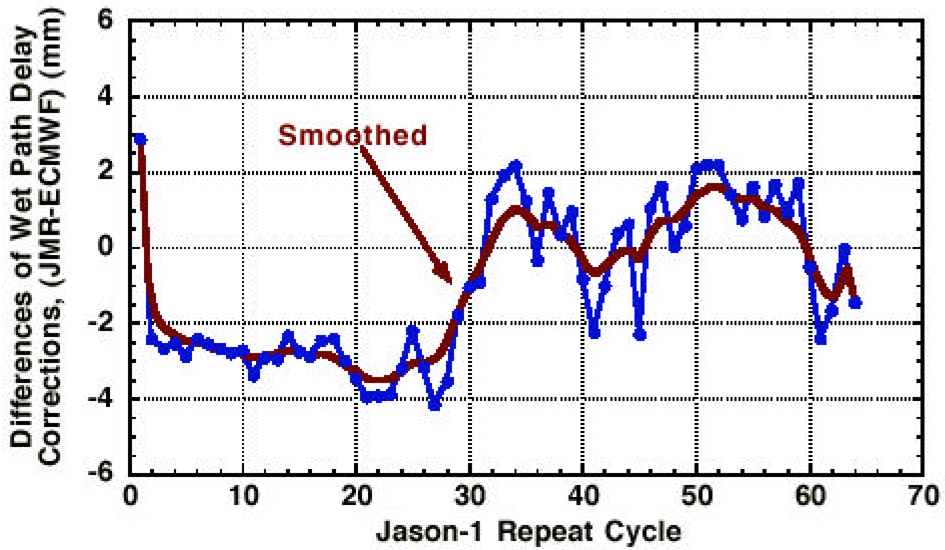


Upgrades on the JMR processing

- **JMR Processing:**
  - Implementation of new JMR calibration coefficients to be used at level 1b and at geophysical level 2.
  - Correct interpolation and JMR flagging in land/sea transitions.

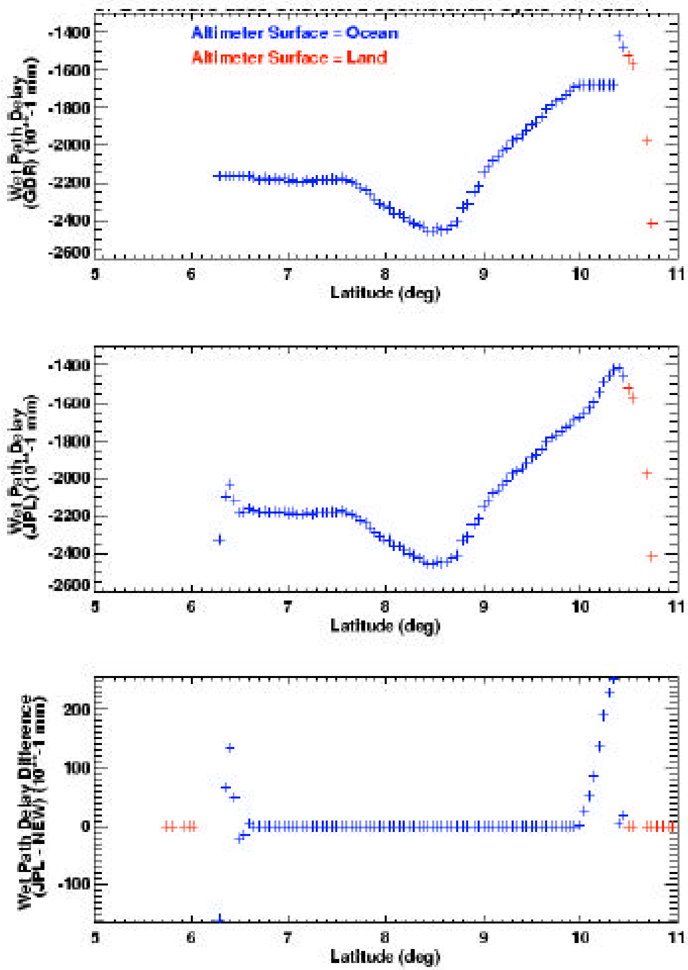
JMR Wet Path Delay

- New calibration coefficients in GDRs provide wet PD that agrees to within +/- 5mm with ECMWF model.
- +5 mm jump in JMR wet path delays at cycles 29-32 being investigated.



JMR Interpolation Near Coasts

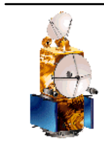
- Initial post-launch IGDRs had error with interpolation of JMR parameters < 50 km from land.
  - Erroneously constant.
- Error depended on troposphere gradient but could exceed 2 cm.
- Error corrected in GDRs and current IGDRs.
- Corrected in GDRs and current IGDRs.



Upgrades on the POSEIDON-2 processing

- **Implementation of the Labroue et al. non parametric table for the Jason SSB**
- **Take into account MQE (Mean Quadratic Error) criterium in the compression algorithm**

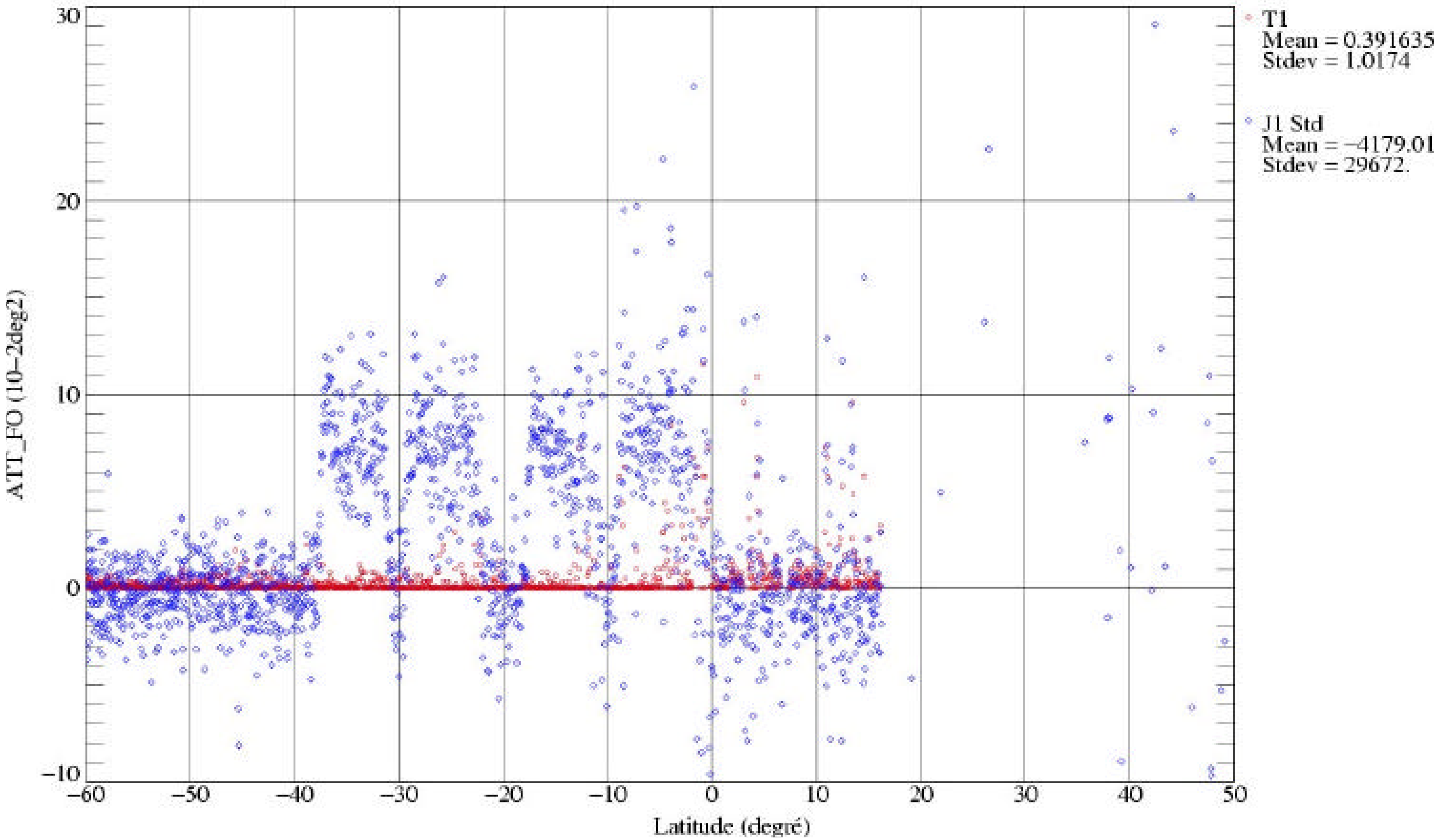
- **Most importantly:**
  - Have the waveform off-nadir angle computed at the OSDR level used as input of the MLE-3 ground retracking algorithm at the IGDR level.



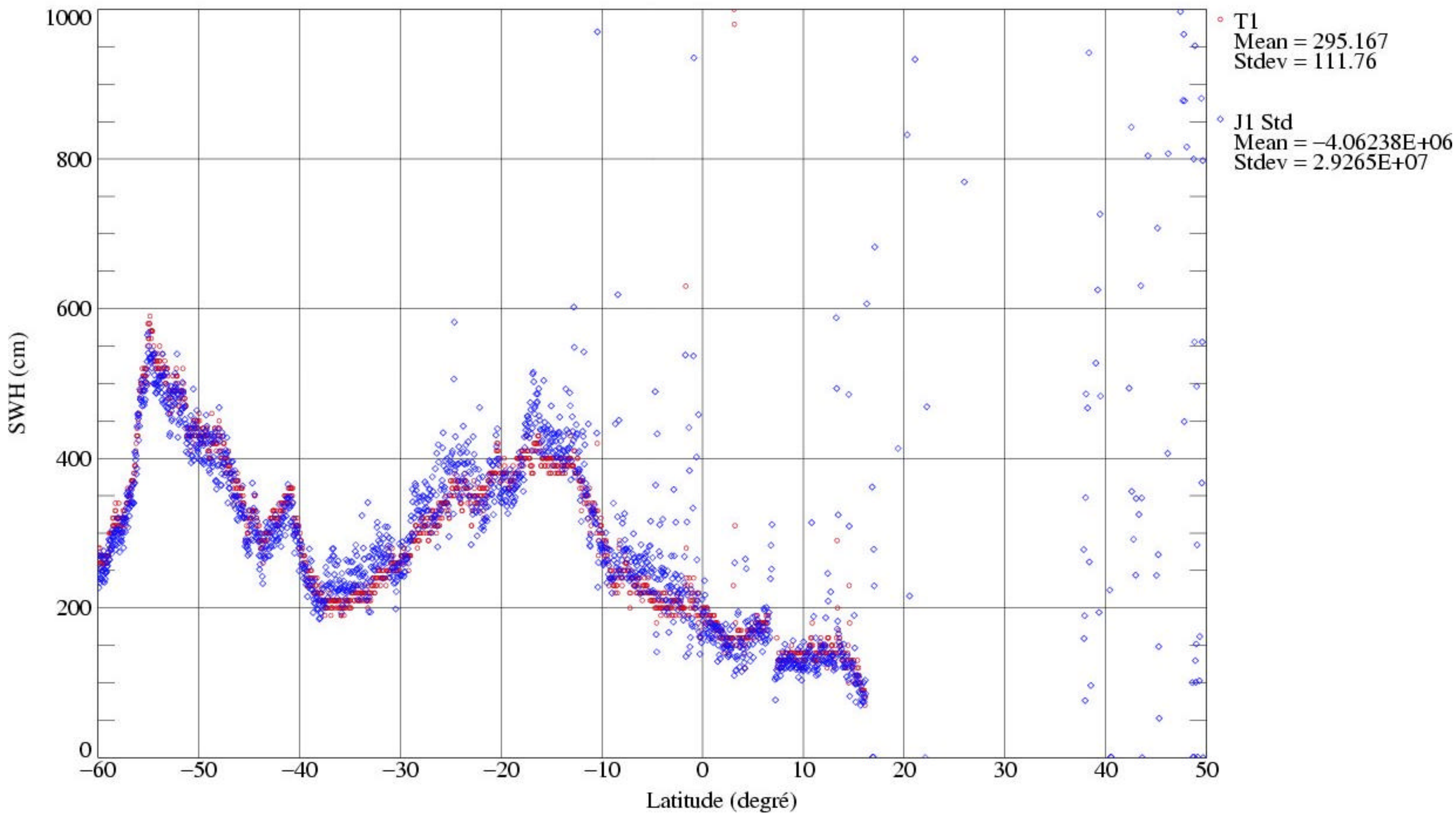
Impact analysis during Jason-1 cross-maneuvers:

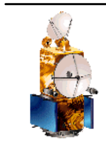
Cross-maneuvers were selected in the period when T/P and Jason were separated by 1 minute so that a direct comparison of Jason with Topex provides validation elements of the attitude effects

ATT_FO (Missions T1 et J1 Std)

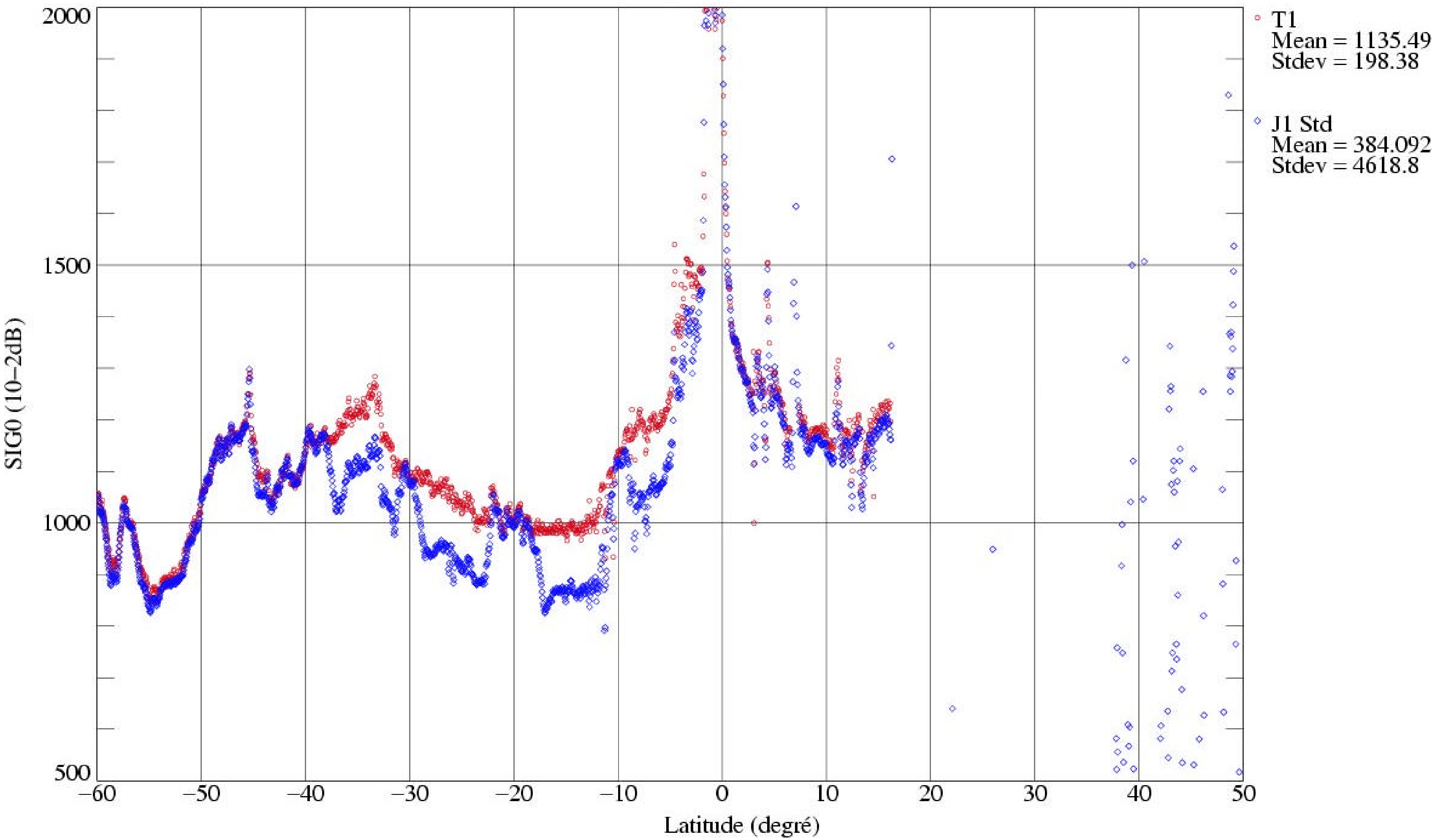


SWH (Missions T1 et J1 Std)

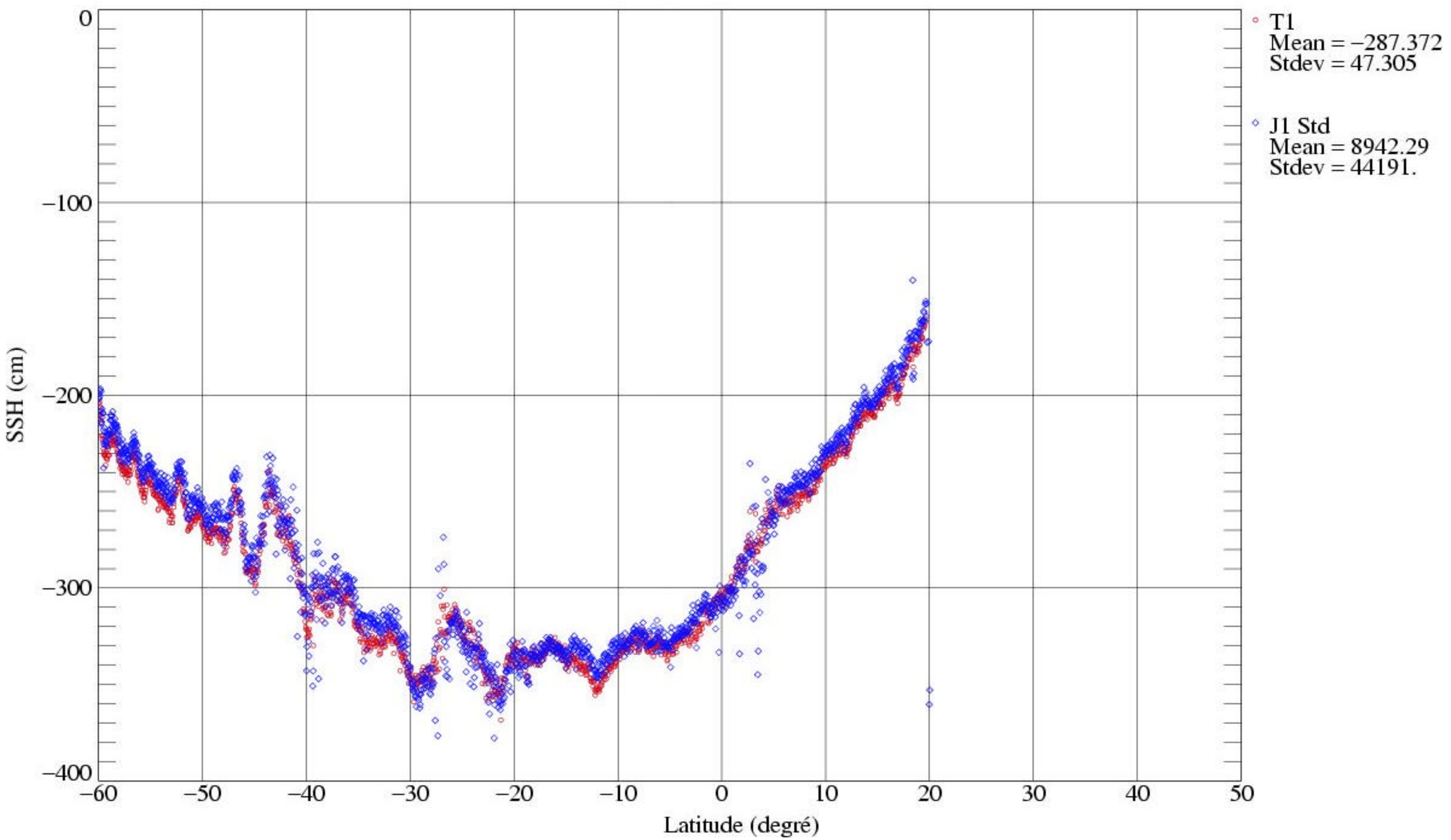




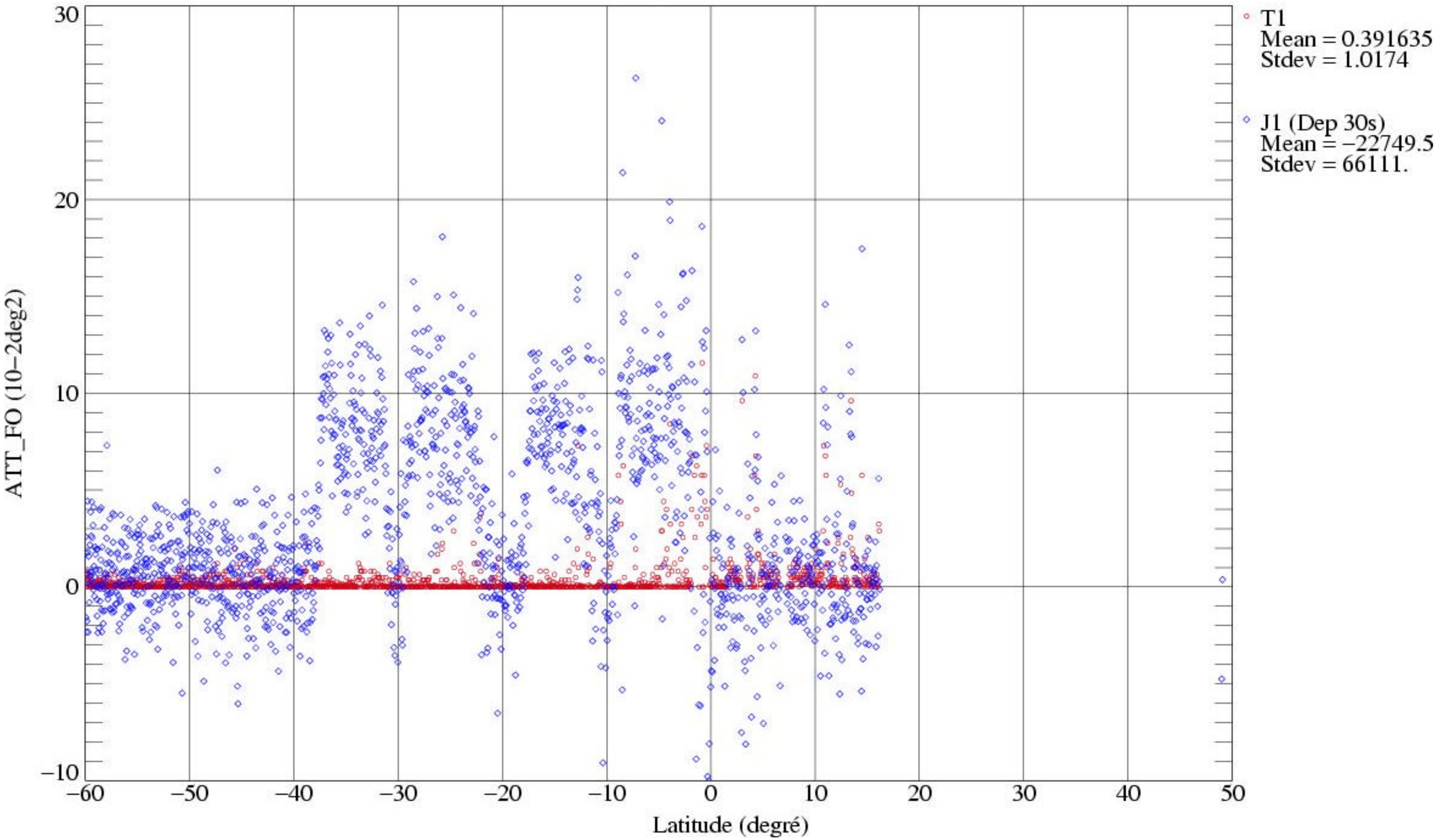
SIG0 (Missions T1 et J1 Std)

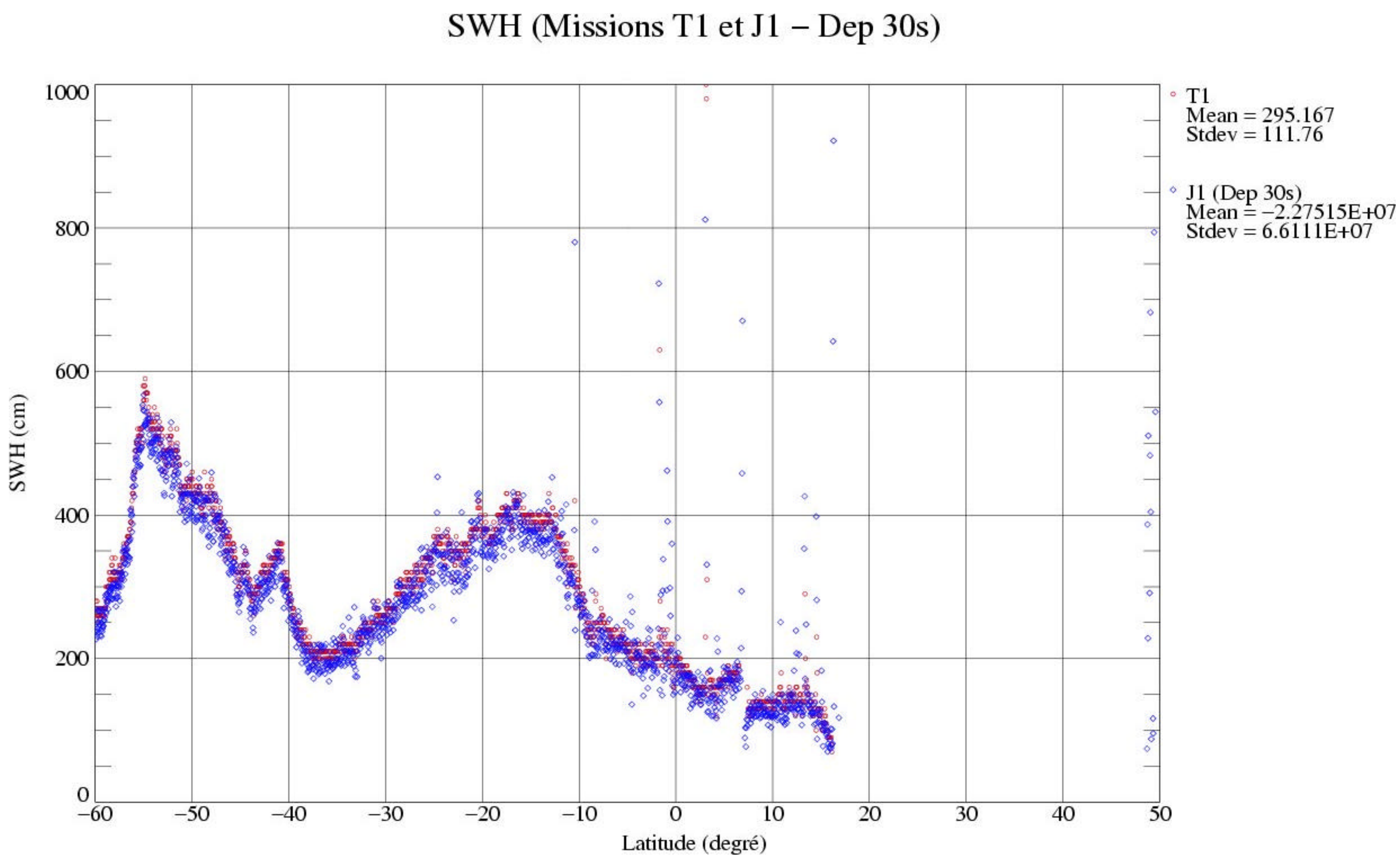


SSH (Missions T1 et J1 Std)

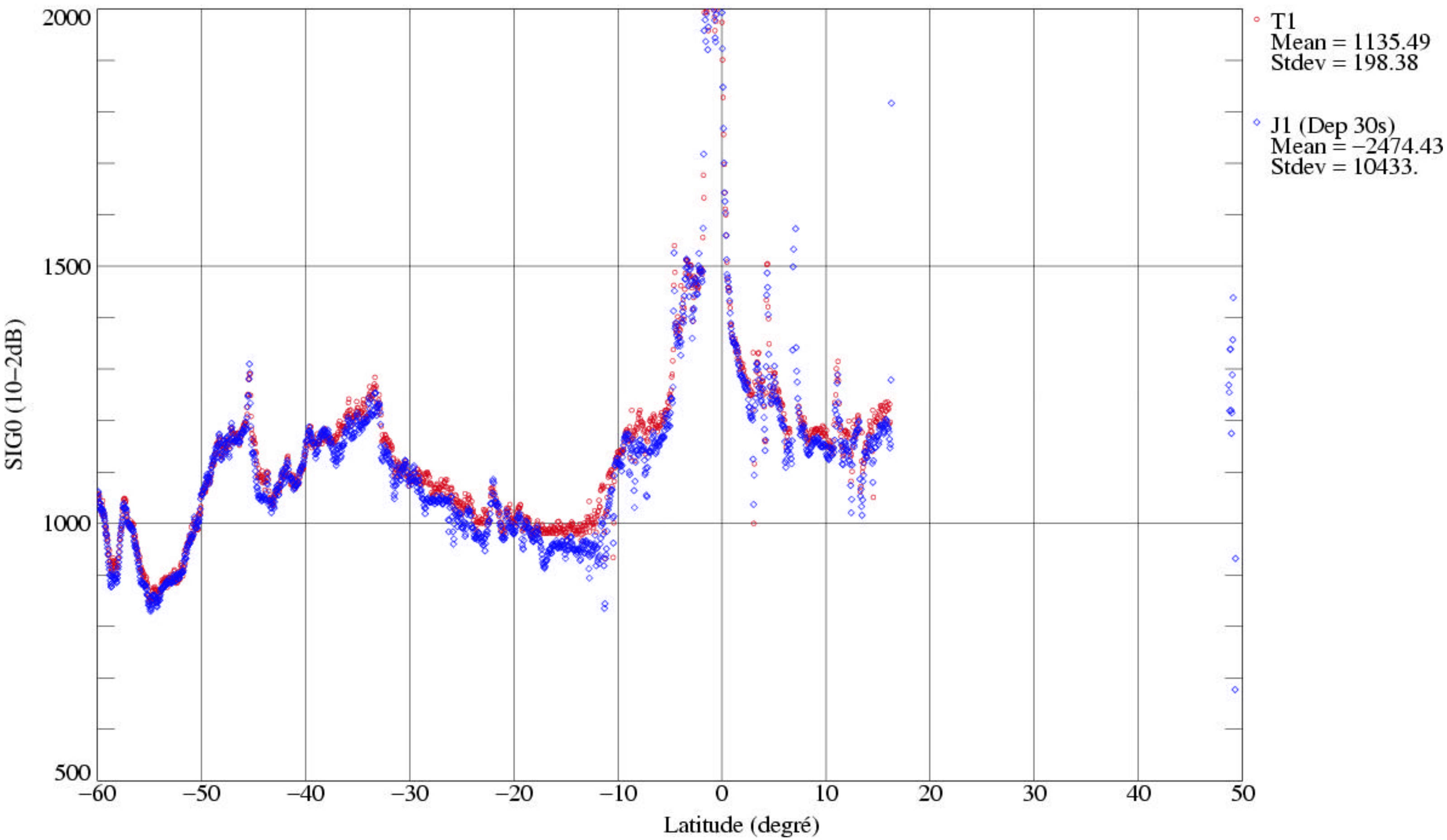


ATT_FO (Missions T1 et J1 – Dep 30s)

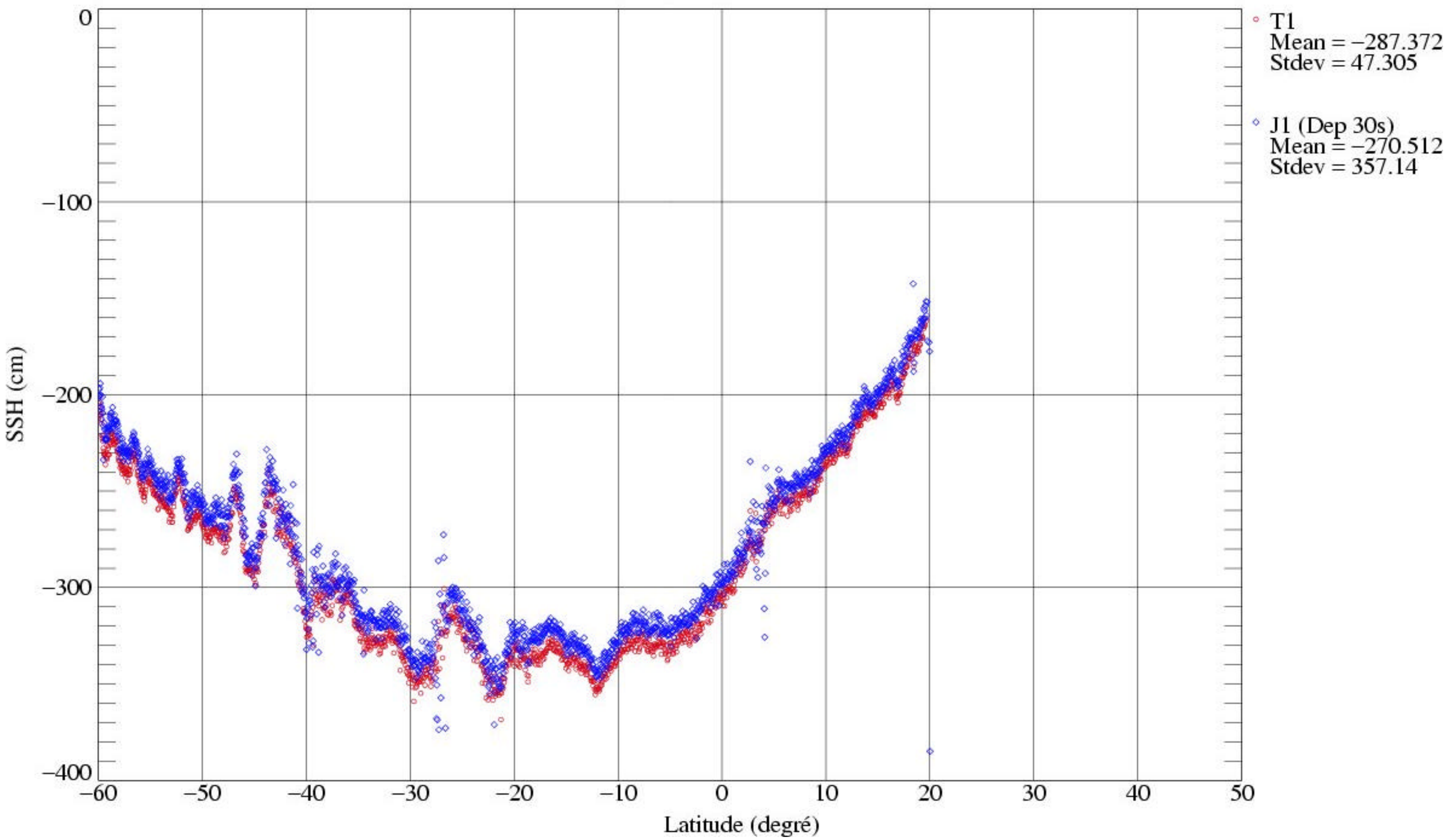



SWH (Missions T1 et J1 – Dep 30s)
T1
Mean = 295.167
Stdev = 111.76
J1 (Dep 30s)
Mean = –2.27515E+07
Stdev = 6.6111E+07
SWH (cm)
Latitude (degré)
1000
800
600
400
200
0
–60
–50
–40
–30
–20
–10
0
10
20
30
40
50

SIG0 (Missions T1 et J1 – Dep 30s)



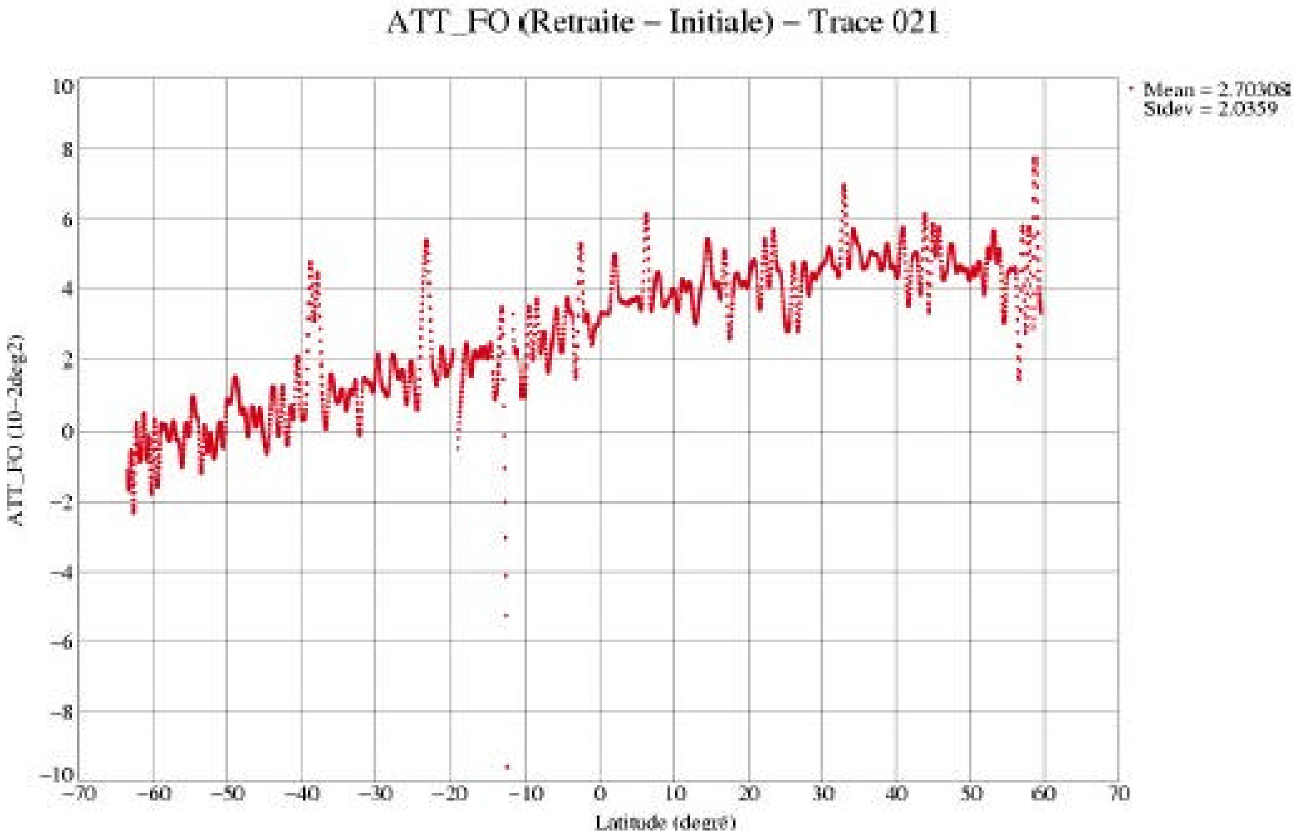
SSH (Missions T1 et J1 – Dep 30s)



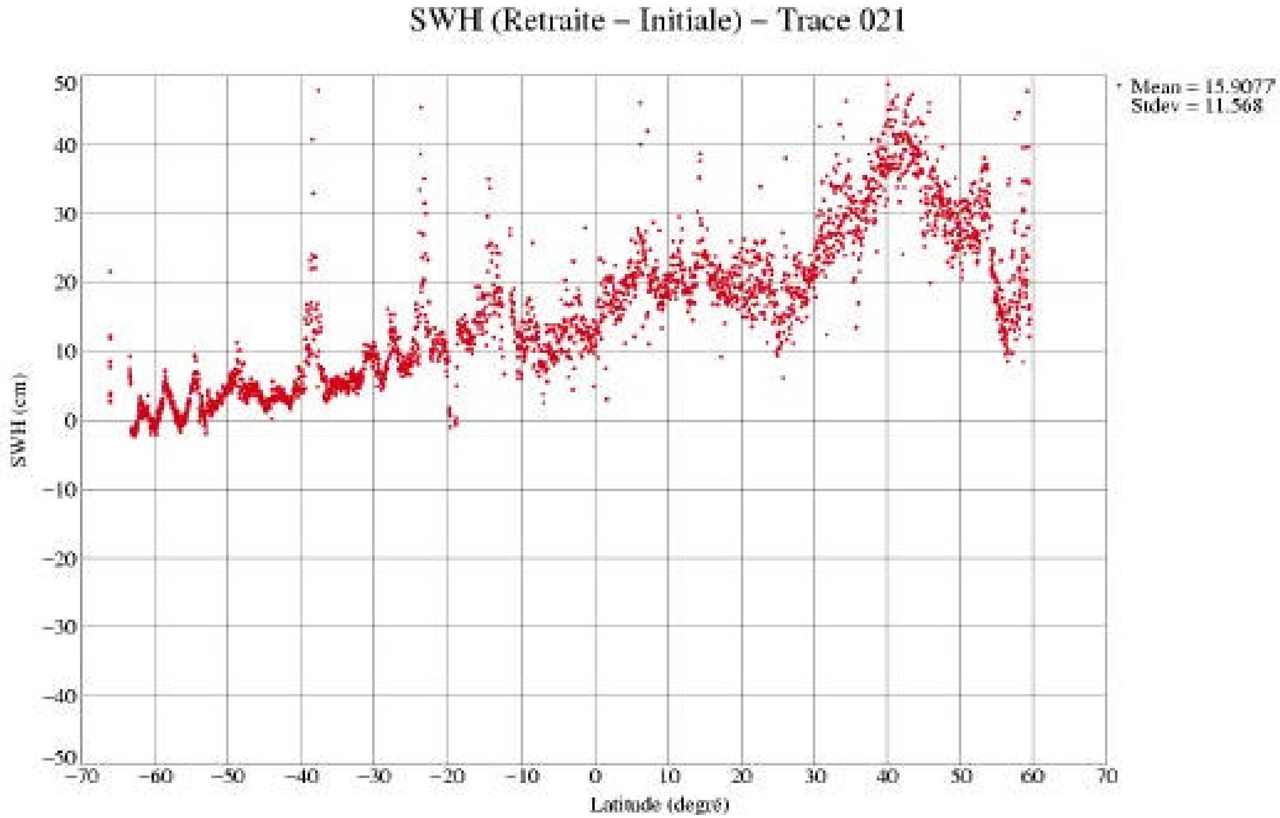
IMPACT ANALYSIS OVER 10 DAYS SPREAD OVER CYCLES 35 AND 36 with MISPOINTING ANGLES UP TO 0.2 TO 0.3 deg

Used to test the performance and the operational implementation of the algorithm improvement

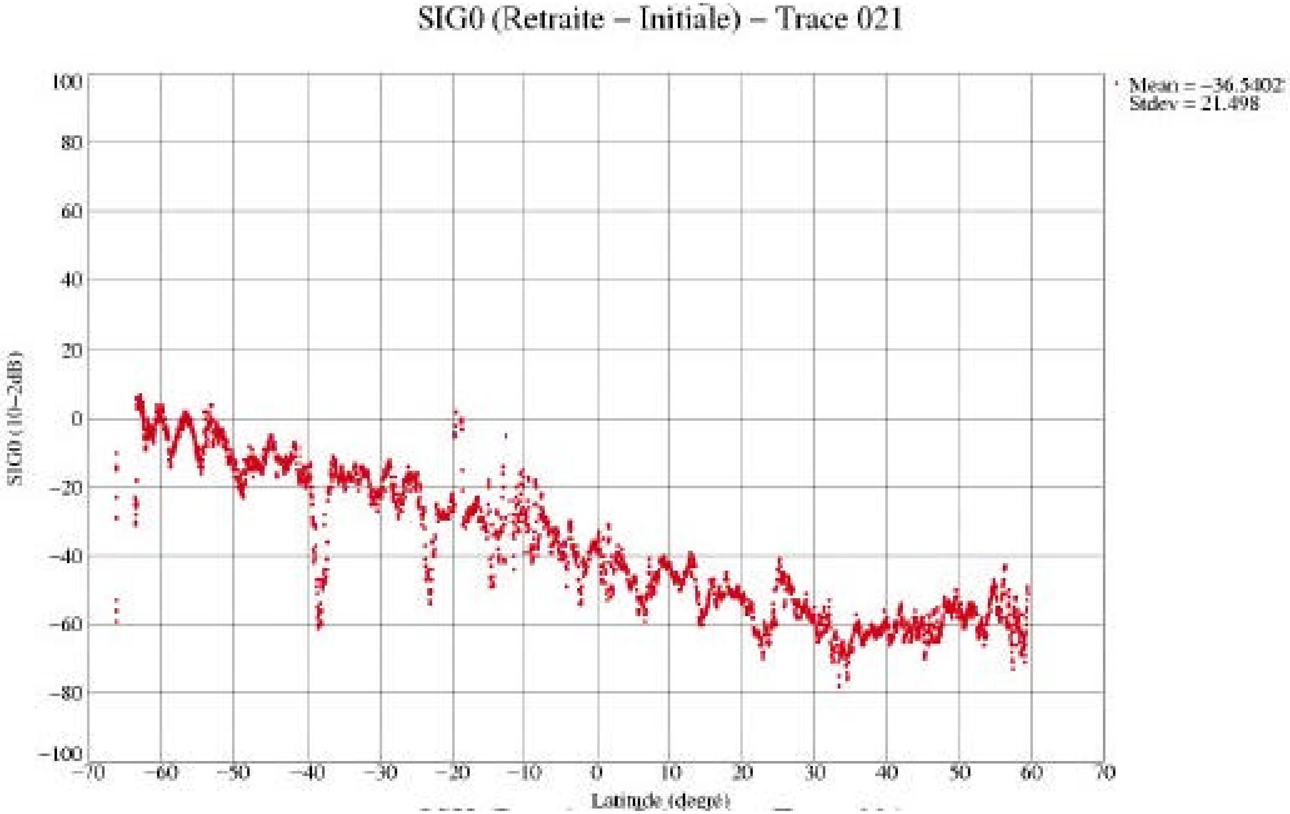
Waveform attitude differences (new IGDRs /GDRs versus old IGDRs): Cycle 36 - Pass 21



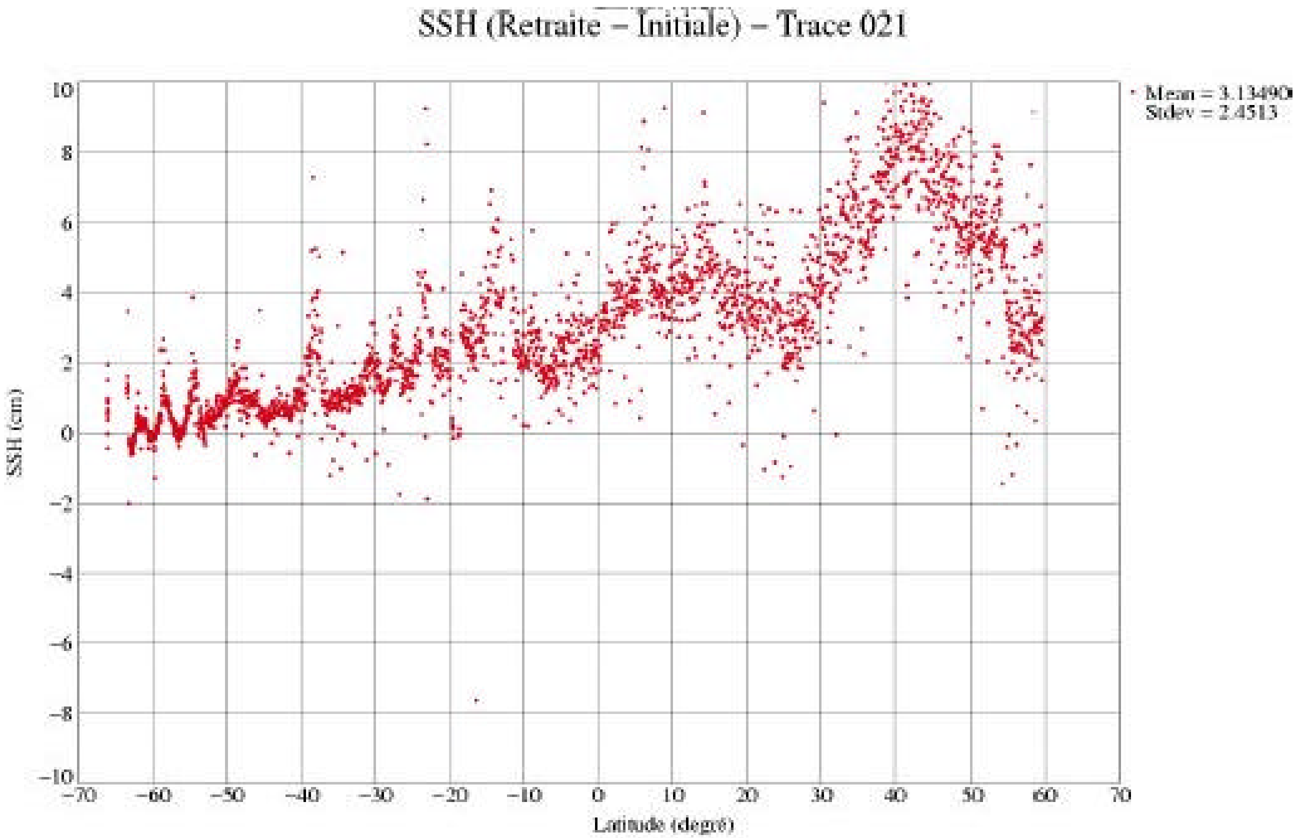
SWH differences (new IGDRs/GDRs versus old IGDRs) in cm - Cycle 36 - Pass 21



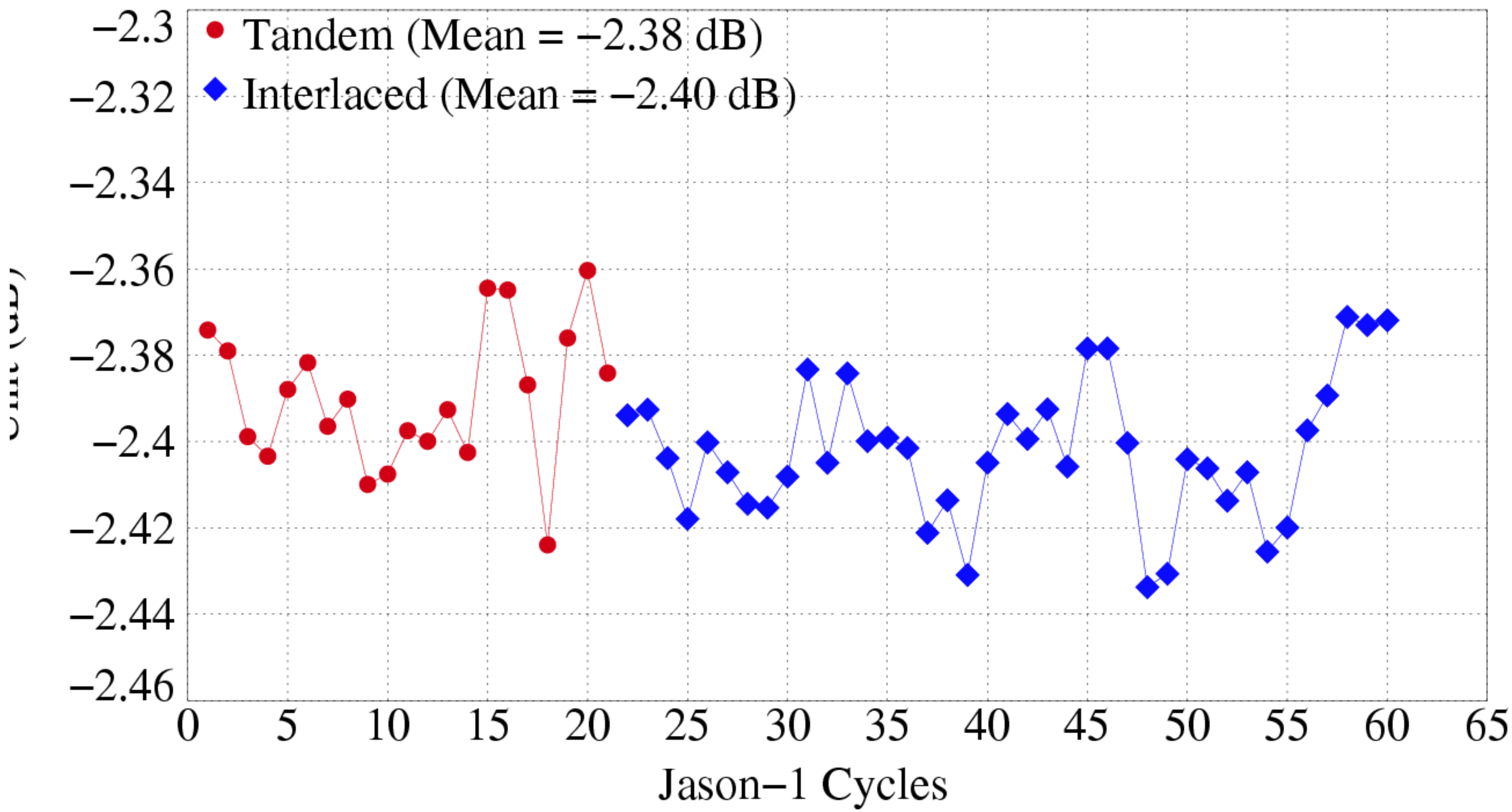
Ku-band sigma0 differences (new IGDRs/GDRs versus old IGDRs): Cycle 36 - Pass 21



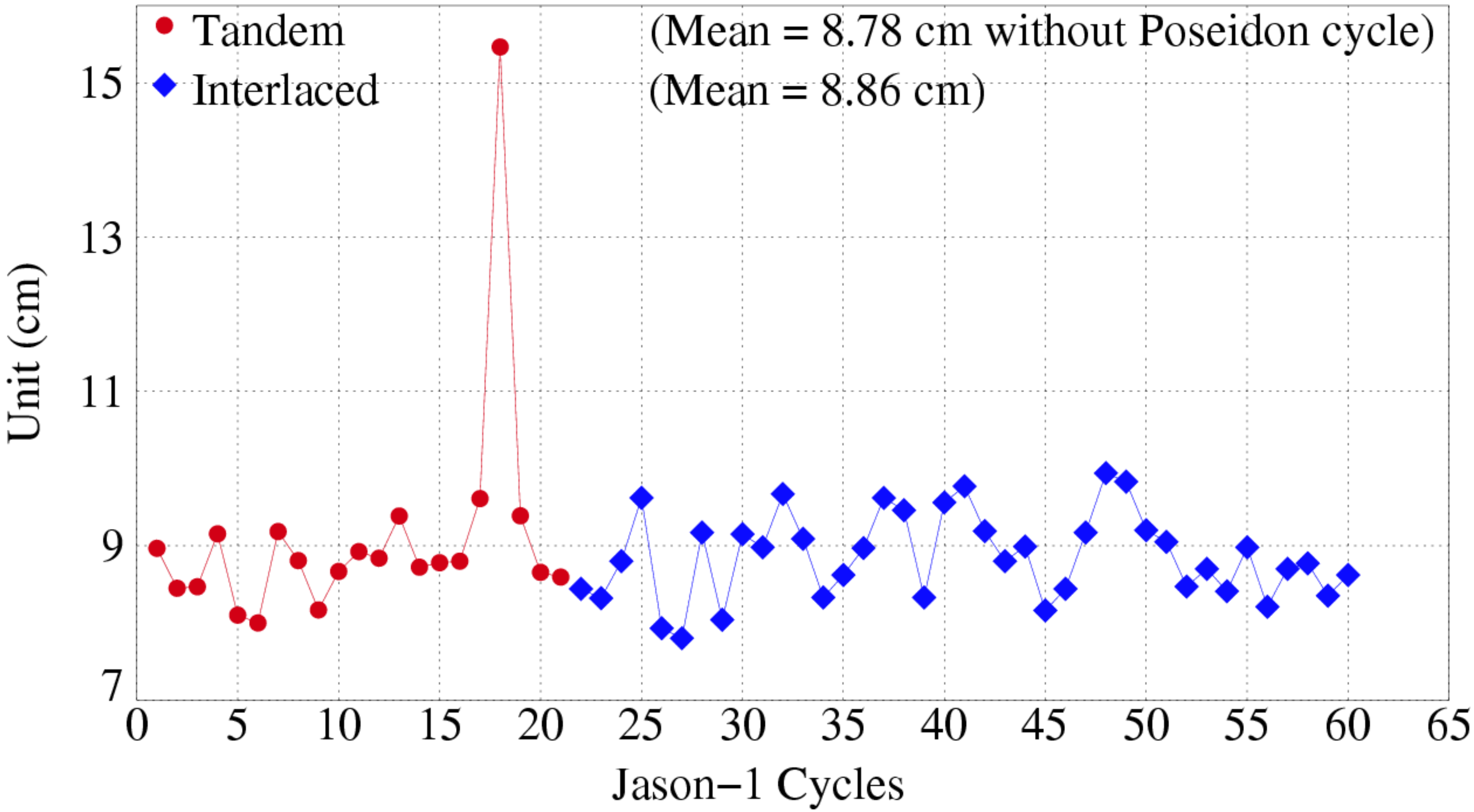
SSH differences (new IGDRs/GDRs versus old IGDRs) in cm : Cycle 36 - Pass 21



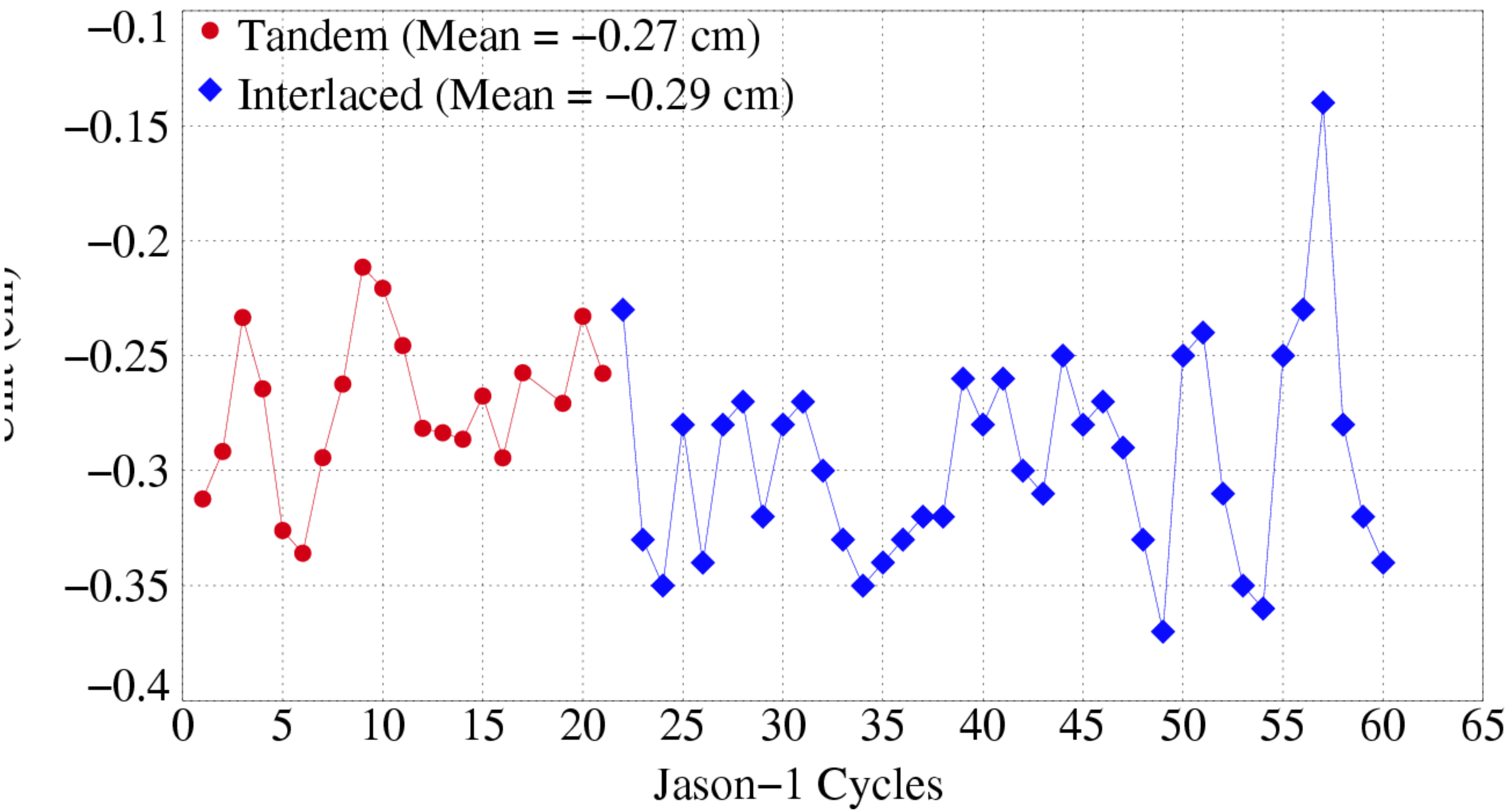
Global CALVAL results: Ku-band sigma0 T/P-J



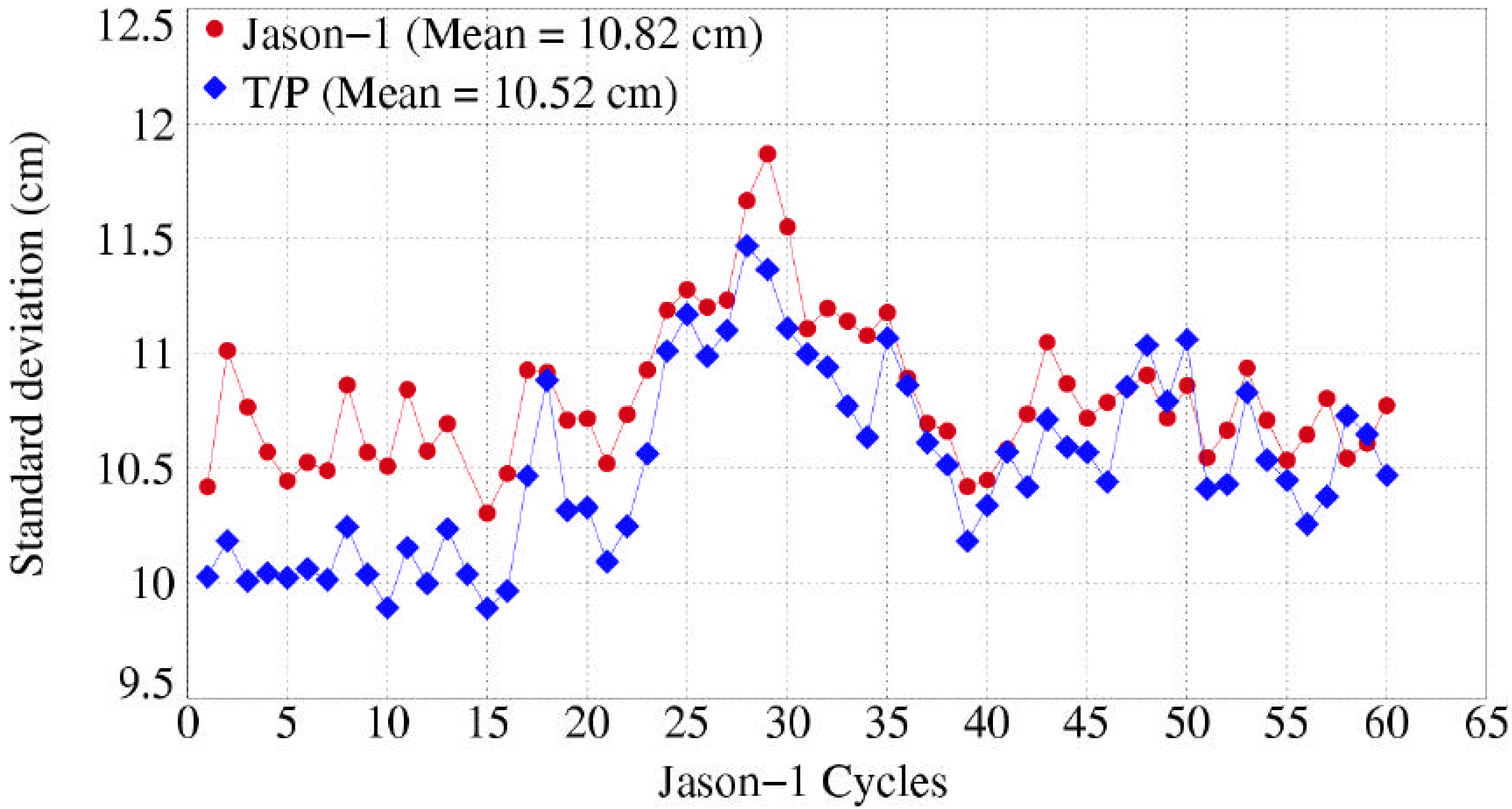
KU-band SWH differences



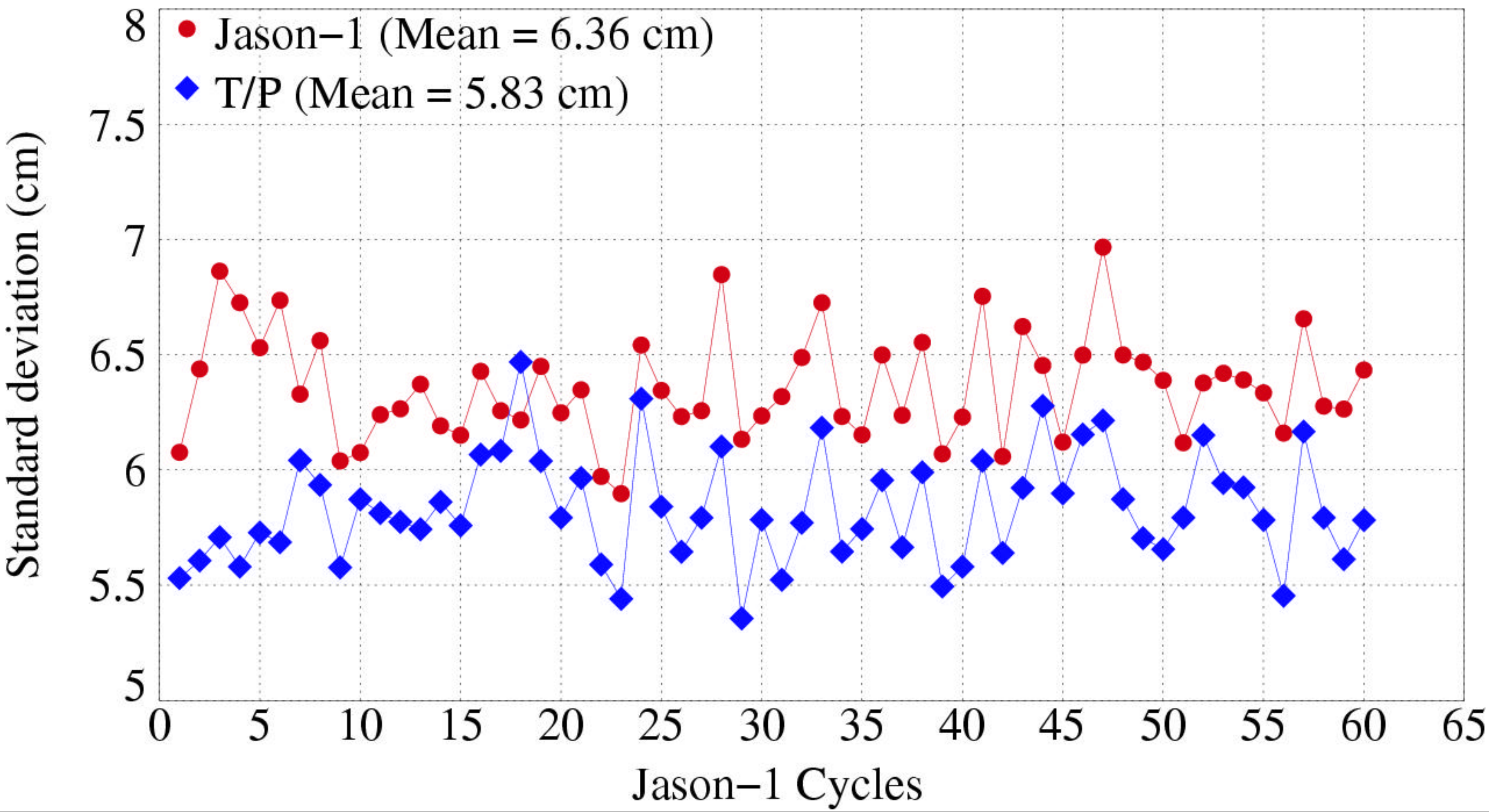
Dual-Frequency ionosphere difference



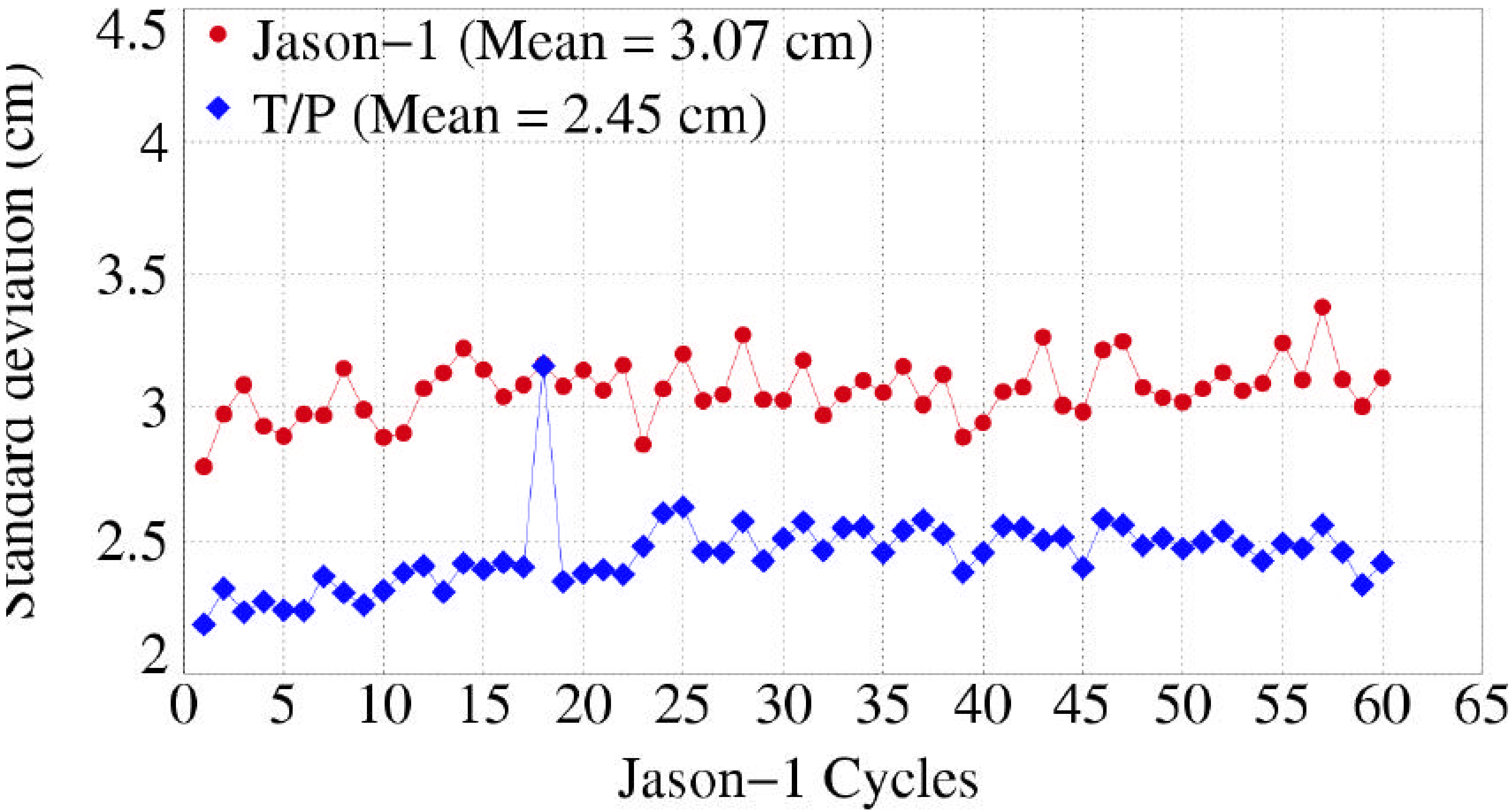
Standard deviation of Sea-Level Anomaly residuals



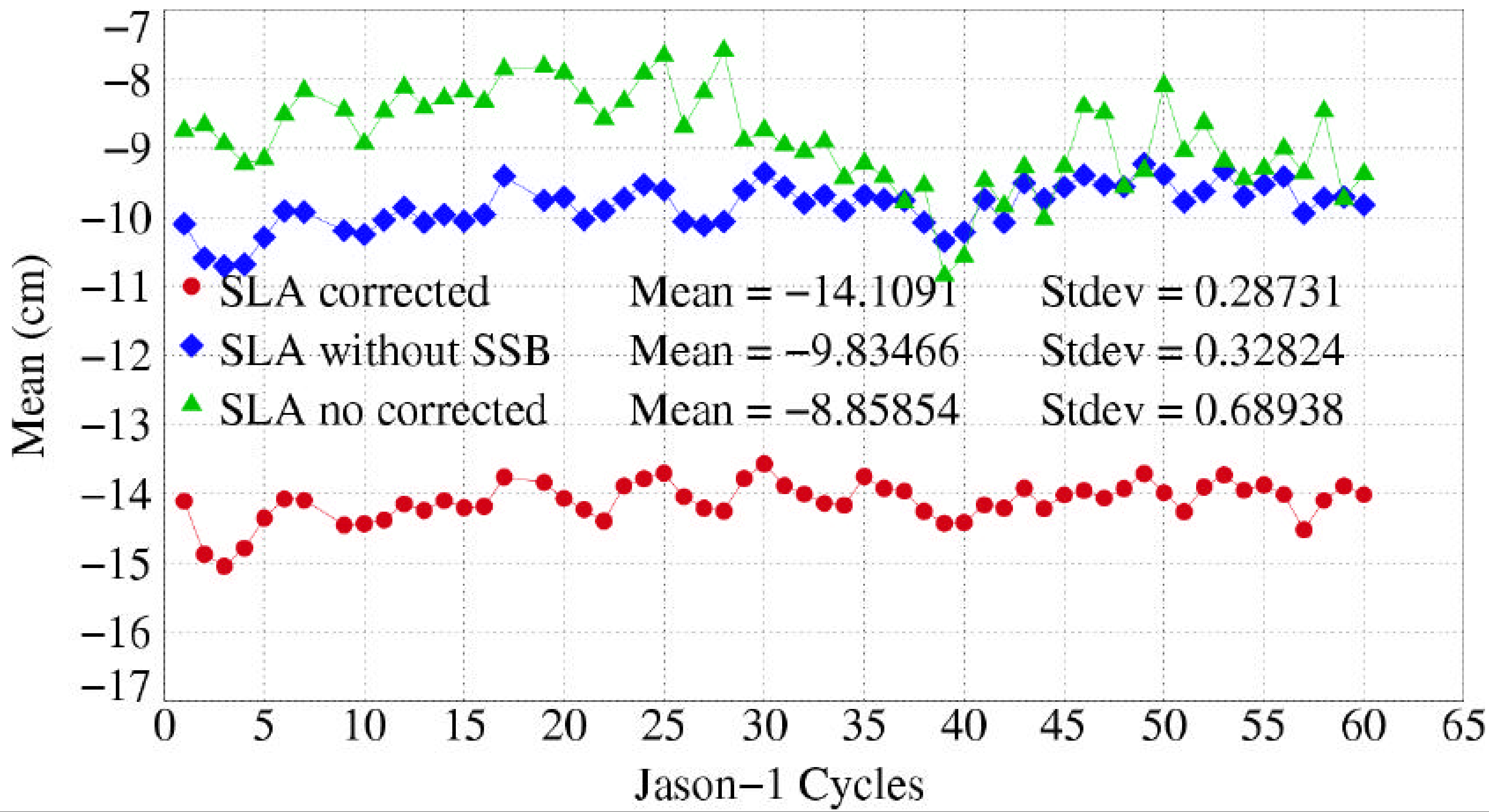
Standard Dev. At Crossovers (Bathy/Lat/Var editing)



High Frequency contribution (<50 km) in the stdev at crossovers



Relative bias in different configurations



Jason-1 – T/P Sea Surface Height:

Ascending & Descending Tracks

Formation Flying Phase
Jason-1 GDR: Cycles 1–21
T/P MDGR + TMR Drift Correction: Cycles 344–364

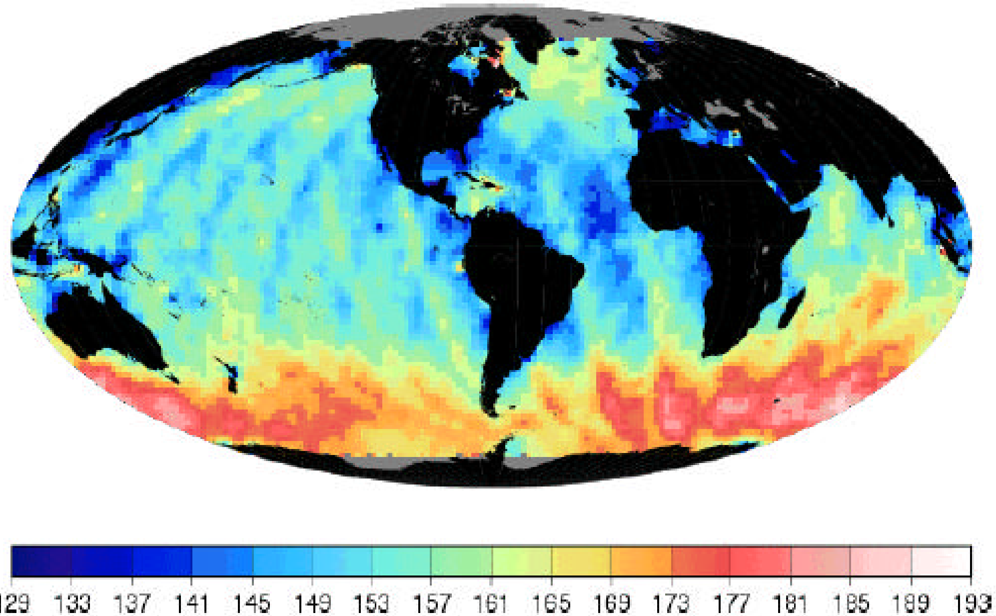
GLOBAL
Mean = 159.3 mm
σ = 12.5 mm

NORTH
Mean = 151.8 mm
σ = 10.7 mm

TROPICS
Mean = 153.0 mm
σ = 9.3 mm

SOUTH
Mean = 168.8 mm
σ = 9.4 mm

USE MGDR SSB FOR TOPEX SIDE B



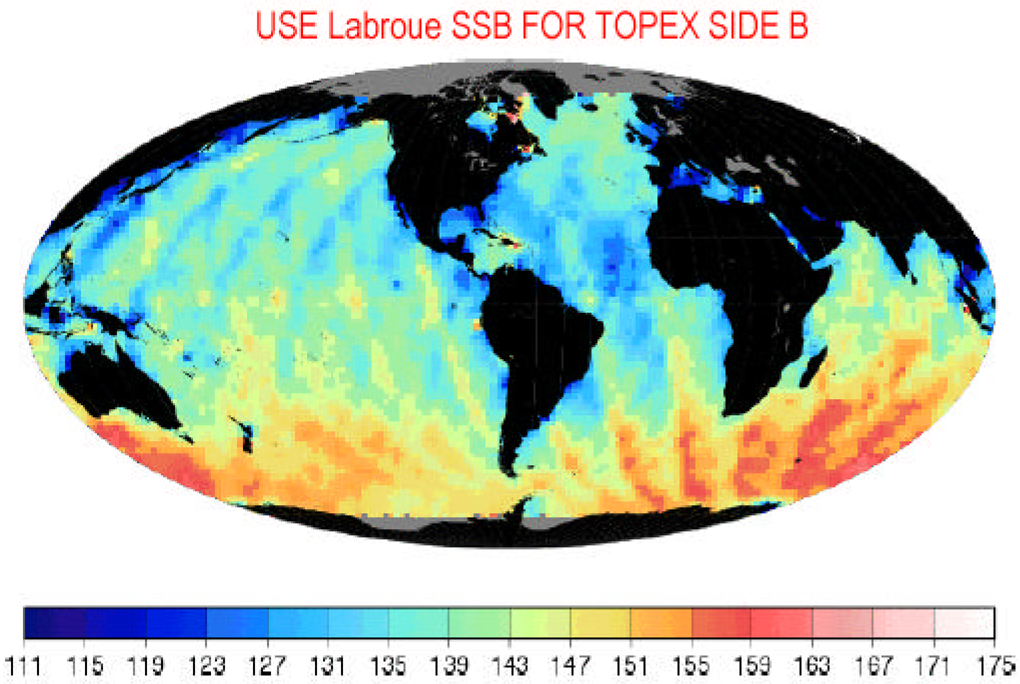
Same as previously except for the Labroue et al. TB SSB

GLOBAL
Mean = 141.6 mm
σ = 10.7 mm

NORTH
Mean = 134.1 mm
σ = 10.0 mm

TROPICS
Mean = 137.8 mm
σ = 9.3 mm

SOUTH
Mean = 148.6 mm
σ = 7.6 mm



Jason-1 – T/P Sea Surface Height:

Ascending Tracks

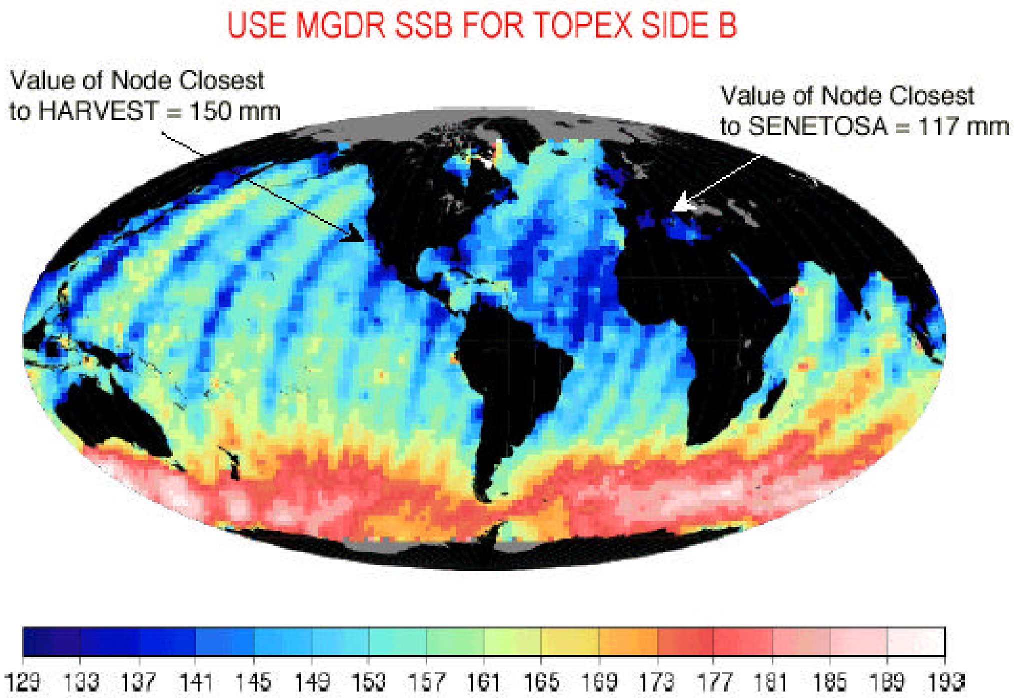
Formation Flying Phase
Jason-1 GDR: Cycles 1–21
T/P MDGR + TMR Drift Correction: Cycles 344–364

GLOBAL
Mean = 160.0 mm
σ = 15.9 mm

NORTH
Mean = 148.1 mm
σ = 12.7 mm

TROPICS
Mean = 152.1 mm
σ = 11.4 mm

SOUTH
Mean = 172.5 mm
σ = 10.9 mm



Jason-1 – T/P Sea Surface Height:
Descending Tracks

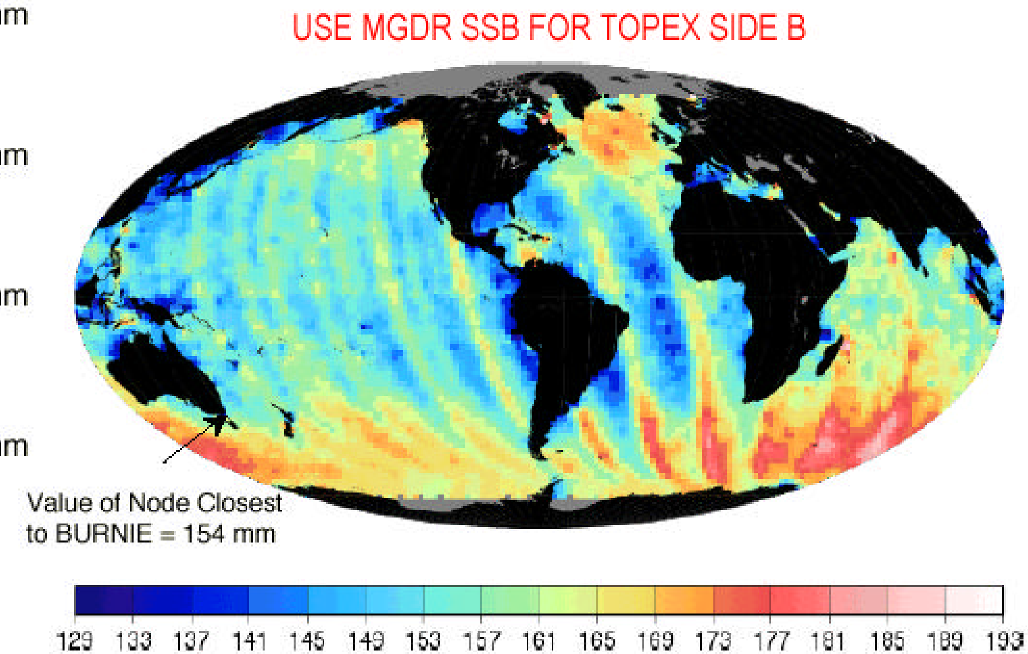
Formation Flying Phase
Jason-1 GDR: Cycles 1–21
T/P MDGR + TMR Drift Correction: Cycles 344–364

GLOBAL
Mean = 159.0 mm
σ = 12.1 mm

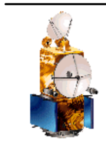
NORTH
Mean = 160.0 mm
σ = 12.0 mm

TROPICS
Mean = 154.1 mm
σ = 10.7 mm

SOUTH
Mean = 164.6 mm
σ = 10.8 mm



Known improvements to be consolidated during splinter meetings and implemented in a further step

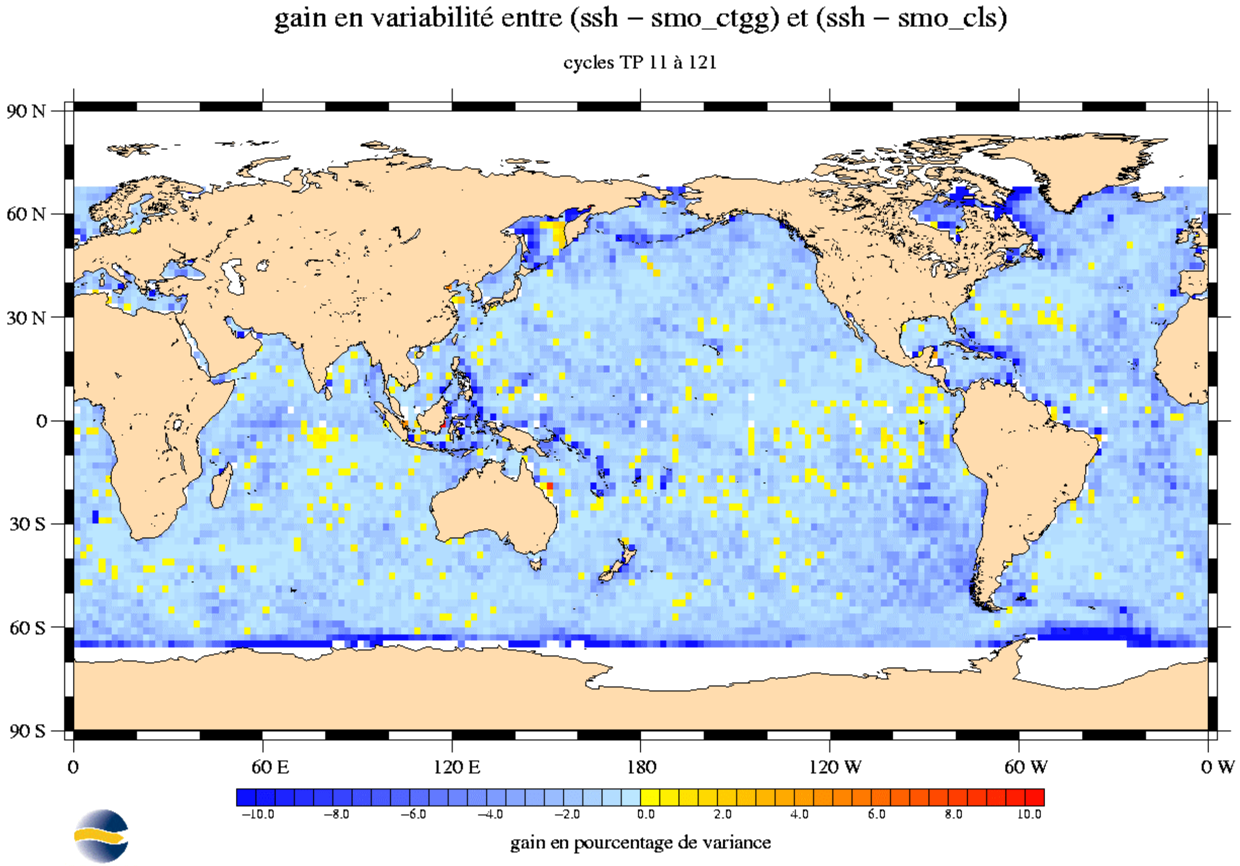


Reference Surfaces - Ocean Tides

- Reference Surfaces : Mean Sea-Surface / Geoid:
  - **<u>Proposed Solutions</u>:**
    - **MSS: Known model from CLS (CLS01)**
    - **Geoid: New model to come including data from CHAMP and GRACE**

- Ocean Tides:
  - **<u>Proposed Solutions</u>:**
    - **Known models GOT2002 (GSFC), FES2002 (LEGOS)**

Cross track geoid gradient correction
Impact on ocean variability



<u>Scale:</u>

* Blue (min): 10 % better

* Yellow: no gain

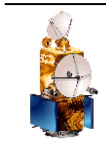
* Red (max): 10% loss

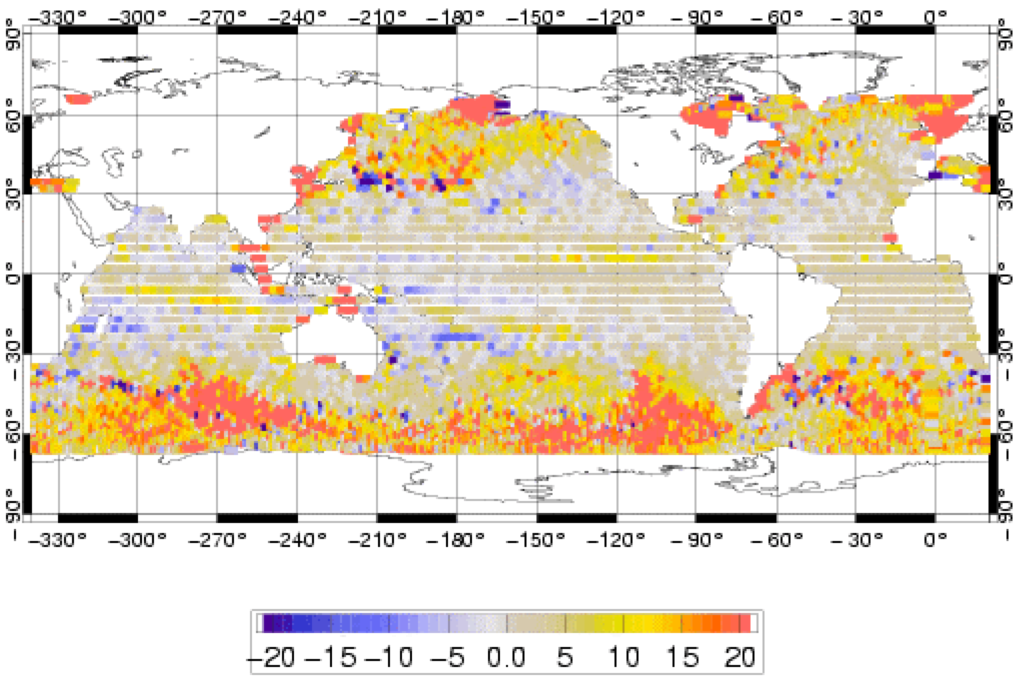
(From Dorandeu et al., 2002)

Atmospheric Tides in ECMWF pressure fields

- Observation:
  - **Atmospheric pressure fields include diurnal (S1) et semi-diurnal (S2) atmospheric tides that are significant in tropical areas - thermal and mechanical effects - O (mm to cm)**
  - **6 hour sampling of ECMWF fields not well suited to correctly reproduce these tides**

- Proposed Solution (following Ponte et al.)
  - **Build an a priori model of the seasonal variability of the atmospheric tides, and take into account a climatology of the atmospheric pressure**
  - **Modify algorithms related to the inverted barometer correction (and also the dry tropospheric correction)**





Correction for the aliasing of the high Frequency variability of the ocean

Expected impact
in terms of quality
(From Carrere et al., 2002)

Variance reduction obtained when applying the MOG2D correction (simulation using T/P crossovers) with respect to a classical IB correction

Year 1999 (cm²) ⇒ reduction is :

- 15 % at high latitudes
- 35 % in shallow water areas

Preparation to face consequences of a possible Star Tracker Degradation on Science Processing (1)

- A degradation of the STRs would inpose having the capability of handling mispointing angles larger than 0.3 degree at science processing level
- The present version of the science processing algorithms (from which current IGDRs and GDRs are derived) are able to correctly handle mispointing effects up to 0.2 - 0.3 degree
- Then, it is required to upgrade the altimeter waveform ground processing algorithms

Preparation to face consequences of a possible Star Tracker Degradation on Science Processing (2)

- Solution in Progress (refer to P. Thibaut ’s presentation, Retracking Splinter Meeting):
  - Implement a higher order (order 2) altimeter echo model
  - Implement the so-called MLE-4 retracking algorithm :
    - allowing to simultaneously retrieve the 4 parameters that can be derived from the altimeter waveforms: epoch, SWH, Sigma0 and mispointing angle
    - minimizing the impact of larger mispointing angles on the quality of I/GDRs

- Comparisons with other algorithms to be discussed during the « Ground retracking/SSB » Splinter Meeting