



CENTRE NATIONAL D'ÉTUDES SPATIALES

POSEIDON3 Instrument Investigations Corrections and Upgrades

**OSTST meeting – Seattle
June 2009**

Jean-Damien DESJONQUERES (CNES)



Contents

- **POSEIDON3 Status**

- **Range Bias**

- **Secondary Signal Tracking Anomaly Correction**

- **DEM (MNT) /Diode Coupling Mode Basics & Upgrades**
 - ◆ Onboard Software
 - ◆ Onboard DEM File

- **Conclusion**

POSEIDON3 Status 1/3

■ Functional Status: OK

- ◆ Working 100% of time, No unavailability (excepted for software and DEM upload)
 - No reinit
 - No Alarm

■ In Flight Estimated Performance is coherent with Ground Measured Performance (1 Hz Range Noise ~1.5cm).

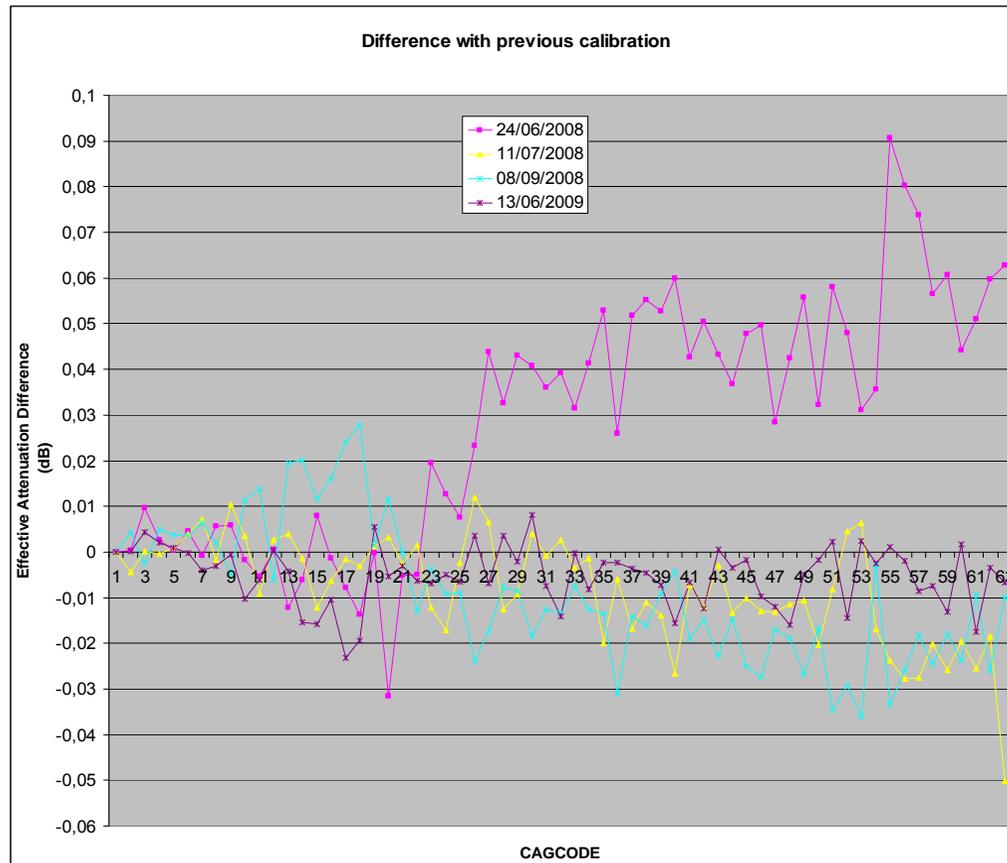
■ Good In-Flight Stability

POSEIDON3 Status 2/3

Gain Control Calibration

Low differences since Launch

Effective Gain Control stabilized in +/- 0.01dB range (for typical CAG)

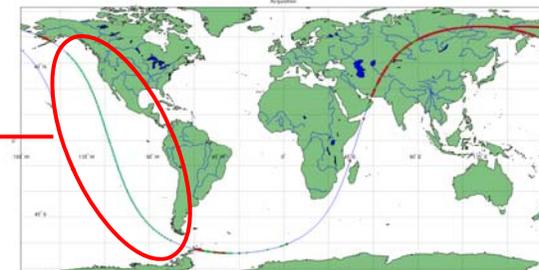
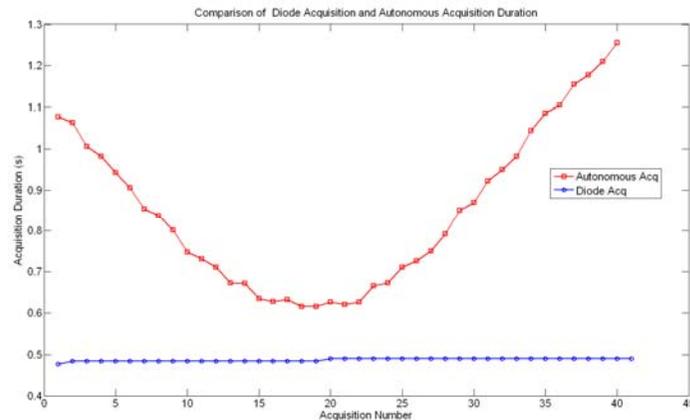


POSEIDON3 Status 3/3

■ Current Operational Mode:

◆ Diode Acquisition & Autonomous Tracking with Median Algorithm

- Median:
 - Good Results over oceans for Brown and non Brown Echoes
 - Good Results over coastal zones and land surfaces
- Diode Acquisition:
 - Acquisition Time limited to 0.5s ->increase the data availability



Bias Investigation

Differences between Poseidon2 and Poseidon3 range measurement

2 major origins

- **Truncate PRF is used in ground segment**

- **Difference in the characterization parameter set (from ground measurement)**
 - ◆ **For POSEIDON2, 2 sets of parameters have been restored (unfortunately without the corresponding procedure)**
 - One is very close from Poseidon3 parameters
 - The other has been used for JASON1 characterization!

Bias Investigation 2/4

Parameter	JASON1	JASON2	JASON1/JASON2 Difference
Altimeter PRF	2059,679205 Hz	2058,513239 Hz	
PRF used in ground processing	2059,6792 Hz	2058,5132 Hz	
PRF truncate effect	-0,316 cm	-2,471 cm	-2,156 cm
Alti correction for Ku band (from measurement)	4,151466 m	4,268487142 m	11,70211423cm
Total difference for Ku band	9.5 cm		

Ground Parameters Differences

Bias Investigation 3/4

Results

Parameter	JASON1/JASON2 Difference
CalVal Estimated Difference for Ku Band	8.3 cm
Total Parameters Difference for Ku band	9.5 cm
Remaining Difference in Ku Band	1.2 cm

Bias Investigation 4/4

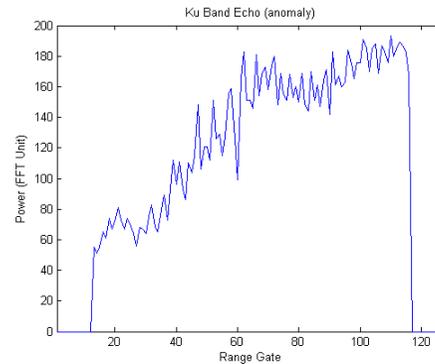
Conclusion

- Poseidon2 and Poseidon3 are very close in term of hardware, the difference of range between JASON1 and JASON2 is artificial and explained.
- >The difference in Ku band for the Raw measurement is ~1cm
- Investigations are still in progress to explain the difference between Jason1/2 and Topex

Secondary Signal Tracking Anomaly Correction 1/3

■ Observation

- ◆ Tracking of low signal echoes with « Brown like » but « distorted » shape.



■ Analysis

- ◆ Detection Threshold to Sensitive, Makes Possible the Acquisition on Attenuated Replica of the Echo

Secondary Signal Tracking Anomaly Correction 2/3

■ Correction

- ◆ Modification of Poseidon Onboard Parameters

■ Correction effects

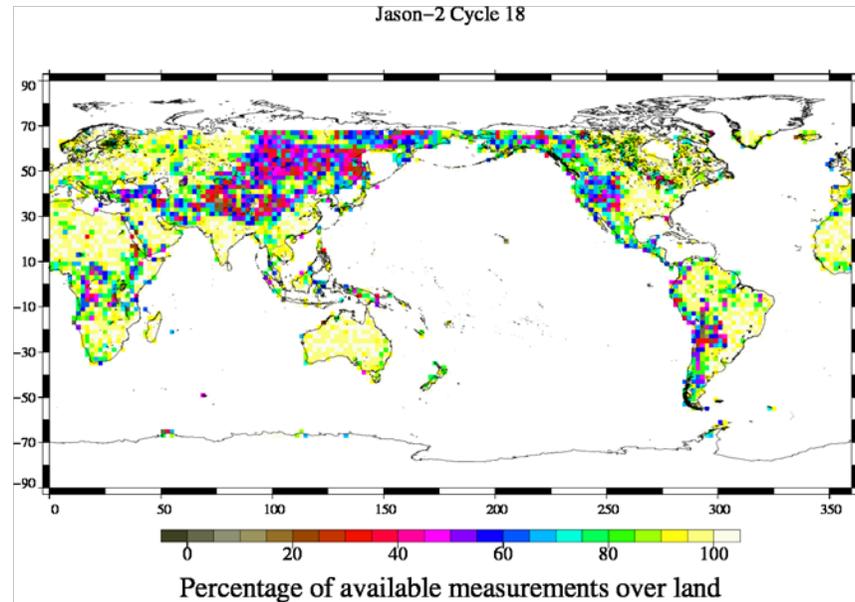
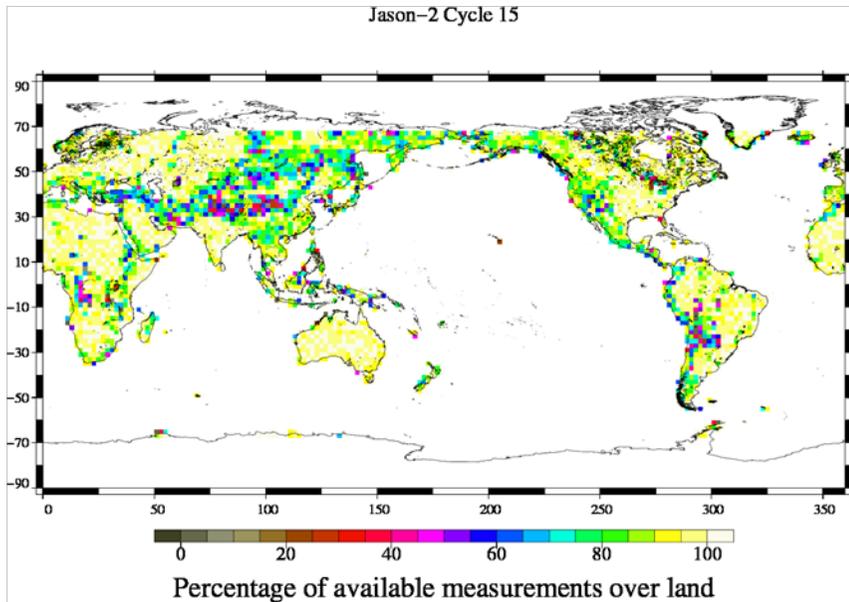
◆ Over land:

- slight decrease of the percentage of available measurements over low SigmaO surface

◆ Over Ocean:

- The anomaly has not been detected since the modification
- Acquisition Success over Ocean Surfaces: 100%

Secondary Signal Tracking Anomaly Correction 3/3

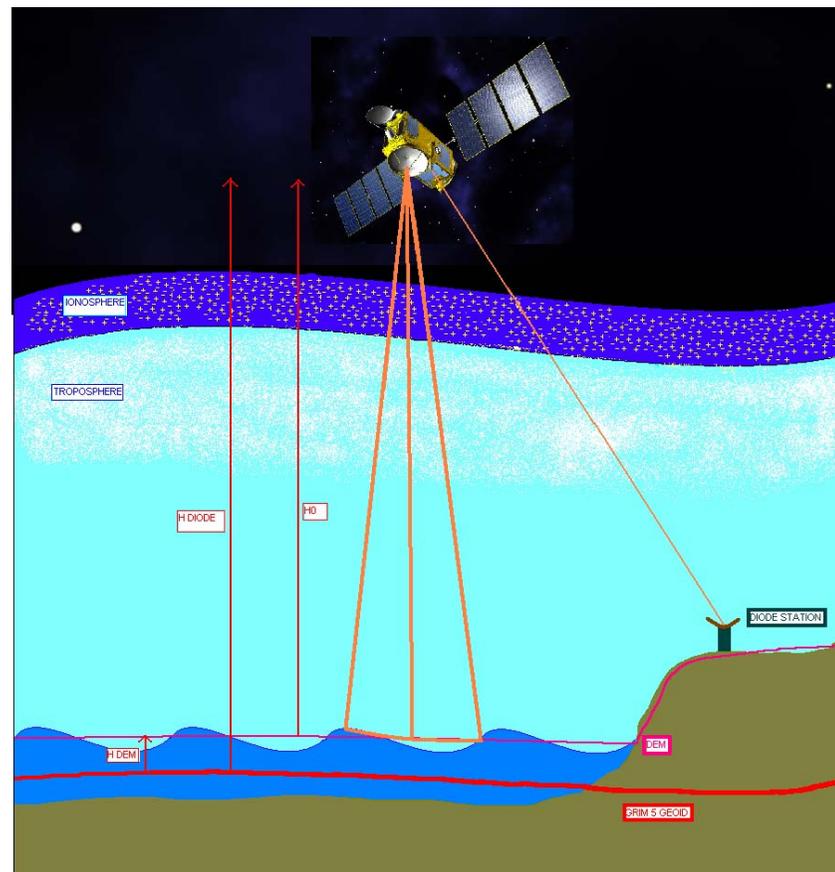


Courtesy CLS

Diode/DEM Coupling Mode Basics 1/2

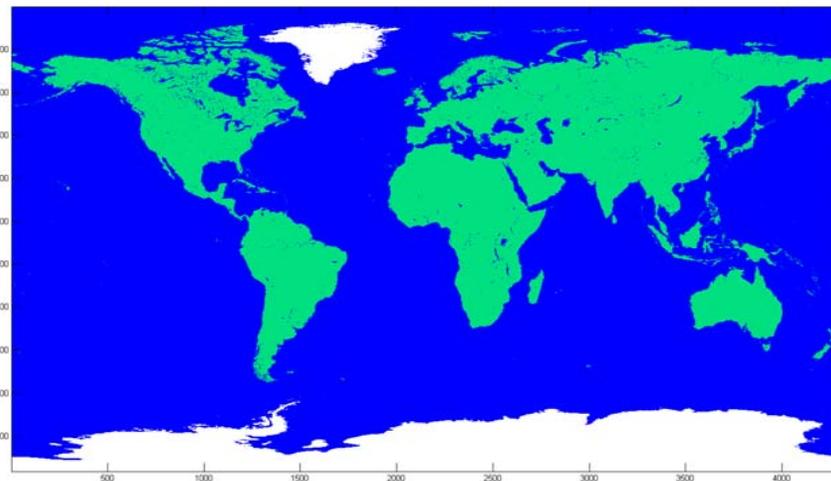
Diode->Satellite Altitude

Onboard DEM: Ground elevation



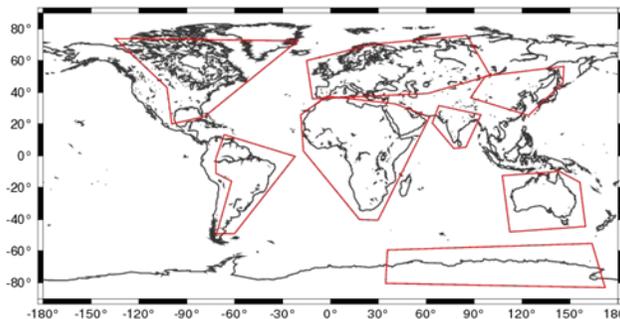
Diode/DEM Coupling Mode Basics 2/2

No restriction for Water Surfaces (priority) included Inland Water (every blue point in the GMT Mask)



GMT MASK

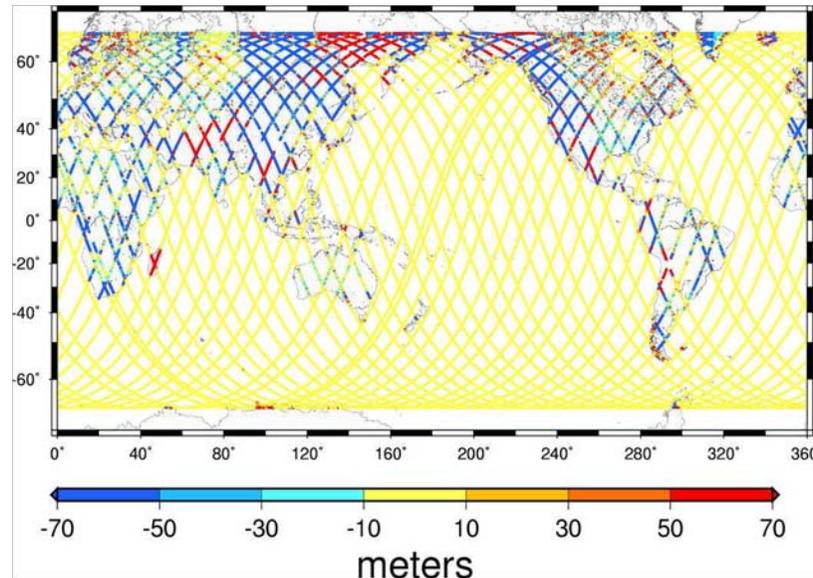
Land surfaces can not be all included in the DEM->land selection



Land Selection

Diode/DEM Coupling Mode Upgrades 1/2

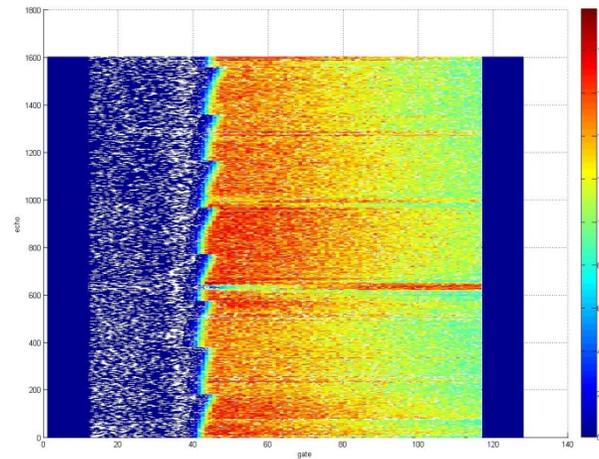
- New version of the On board DEM.
- The LEGOS Database has been completed with data from JASON2 in autonomous mode
 - ◆ for Inland Surface, the Diode/DEM Mode takes advantage of Median Mode
- **No Modification for Ocean and Coastal Areas**



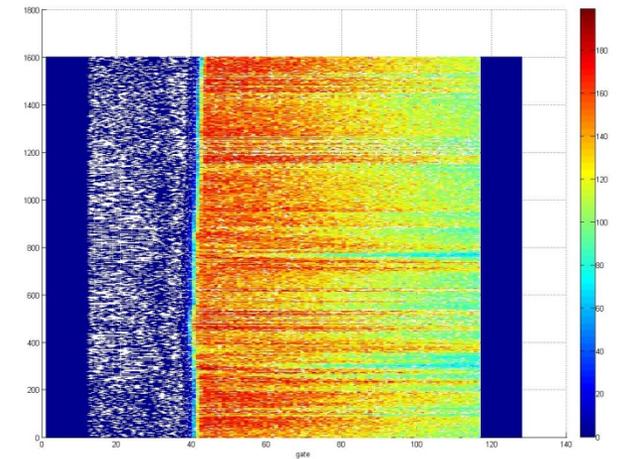
Diode/DEM Coupling Mode Upgrades 2/2

■ Onboard Software upgrade:

- ◆ Modification of the Onboard software to increase the stability of the echo in the reception window
- ◆ Second order extrapolation of the altitude from Diode



Before
Correction



After
Correction

Conclusion

- **Altimeter performances are very good.**

- **Diode/DEM and Median Modes are now equivalent over Oceans**
 - ◆ No anomaly of acquisition in Median Mode
 - ◆ No jitter of the Echo Position in Diode/DEM Mode

- **New DEM is still in investigation (for Inland Water)**
 - ◆ -> Decision for the operational mode

- **POSEIDON2 and POSEIDON3 give the same raw range with 1cm error**
 - ◆ Investigations are still in progress for JASON1/2 wrt Topex