Jason-2 Version 'D' Geophysical Data Records: Public Release

Dear Altimetry Data Users,

We are pleased to announce the release of the Jason-2/OSTM Geophysical Data Records (GDRs), version 'D'. The version 'D' has been prepared following the recent OSTST meetings. The reprocessing of the Jason-2 mission in Gdr-D version started in May 2012. **Cycles 1-36 (except 19) and 117-140 are currently available.** We will continue reprocessing backward and we expect to complete the reprocessing before end of 2012.

As previously announced, the transfer in operations of the GDR-D standard for the OGDR (http://www.eumetsat.int/Home/Main/News/ProductServiceNews/819046?l=en) and IGDR production has also been performed.
First OGDR product generated with GDR-D standard is :

JA2_OPN_2PdS150_078_20120731_120200_20120731_133930.nc

IGDR product generated with GDR-D standard will start with the first pass of cycle 150.

Users are invited to proceed with analyses based on this version 'D' release of the Jason-2 GDRs. Jason-2 version 'D' GDRs are available from the following two sources:

1. CNES/AVISO's site: ftp://avisoftp.cnes.fr/AVISO/pub/jason-2
2. NOAA's CLASS site: http://www.class.noaa.gov

Instructions for data access are included in the Jason-2 User's Handbook which can also be found at the following sources:

1. ftp://avisoftp.cnes.fr/AVISO/pub/jason-2/documentation/handbook
2. http://www.class.ncdc.noaa.gov/release/data_available/jason/userhandbook.pdf

The User's Handbook also provides recommended criteria to edit the data. You will find below:

- a description of the evolutions included in GDR-D standards (see : Jason-2 GDR-D standard). Further details are available in the Jason-2 User Handbook document.
- a summary of the CalVal analysis performed on the formation flying cycles (see : Jason-2 GDR-D analysis). A more detailed report is also available on the CNES/AVISO's site: ftp://avisoftp.cnes.fr/AVISO/pub/jason-2/documentation/gdr_d_calval_report/JA2_GDR_D_validation_report_cycles1to20_V1_1.pdf

Best Regards,

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Jason-2 GDR-D standard

Model	Product Version "T"	Product Version "D"
Orbit	EIGEN-GL04S with time-varying gravity (annual and semi-annual terms up to deg/ord 50) + ITRF 2005 DORIS+SLR+GPS	EIGEN-GRGS_RL02bis_MEAN_FIELD with time varying gravity (annual, semi-annual, and drifts up to deg/ord 50) + ITRF 2008 DORIS+SLR+GPS (increased weight for GPS)
Altimeter Retracking	MLE[1]4 + 2nd order Brown model : MLE4 simultaneously retrieves the 4 parameters that can be inverted from the altimeter waveforms: epoch, SWH, Sigma0 and mispointing angle. This algorithm is more robust for large off-nadir angles (up to 0.8°).	MLE4 retracking altimeter parameters identical to version "T" except for impact from update of altimeter characterization and LTM parameters (see below). MLE3 retracking altimeter parameters also included
Altimeter Instrument **Corrections**	Consistent with MLE4 retracking algorithm	Consistent with MLE4 retracking algorithm
Jason-2 Advanced Microwave Radiometer (AMR) Parameters	Using calibration parameters derived from long term calibration tool developed and operated by NASA/JPL	Using calibration parameters derived from long term calibration tool developed and operated by NASA/JPL + enhancement in coastal regions + correction of anomaly around 34 GHz channel Addition of radiometer rain and ice flag Addition of radiometer 18.7 GHz/23.8 GHz/ 34 GHz antenna gain weighted land fraction in main beam

[1] MLE = Maximum of Likelihood Estimator

Dry Troposphere Range Correction	From ECMWF atmospheric pressures and model for S1 and S2 atmospheric tides	Identical to version "T"
Wet Troposphere Range Correction from Model	From ECMWF model	Identical to version "T"
Back up model for Ku-band ionospheric range correction	Derived from JPL's Global Ionosphere Model (GIM) maps	Identical to version "T"
Sea State Bias	Empirical model derived from 3 years of MLE4 Jason-1 altimeter data with version "b" geophysical models	Empirical model derived from 8 cycles of Jason-2 data with version "D" altimeter data. Derived separately for MLE3 and MLE4 altimeter data
Mean Sea Surface	CLS01	CNES-CLS-2011
Mean Dynamic Topography	Rio 05 solution	CNES-CLS-2009 solution
Geoid	EGM96	Identical to version "T"
Bathymetry Model	DTM2000.1	Identical to version "T"
Inverse Barometer Correction	Computed from ECMWF atmospheric pressures after removing S1 and S2 atmospheric tides	Identical to version "T"
Non-tidal High-frequency **Dealiasing Correction**	Mog2D High Resolution ocean model. Ocean model forced by ECMWF atmospheric pressures after removing S1 and S2 atmospheric tides	Identical to version "T"
Tide Solution 1	GOT00.2 + S1 ocean tide . S1 load tide ignored	GOT4.8. S1 ocean tide and load tide is now included.
Tide Solution 2	FES2004 + S1 and M4 ocean tides. S1 and M4 load tides ignored	Identical to version "T"
Equilibrium long-period **ocean tide model**	From Cartwright and Taylor tidal potential	Identical to version "T"
Non-equilibrium long-period ocean tide model	Mm, Mf, Mtm, and Msqm from FES2004	Mm, Mf, Mtm, and Msqm from FES2004 + correction for a bug
Solid Earth Tide Model	From Cartwright and Taylor tidal potential	Identical to version "T"
Pole Tide Model	Equilibrium model	Equilibrium model + correction of error which was present over lakes and enclosed seas
Wind Speed from Model	ECMWF model	Identical to version "T"

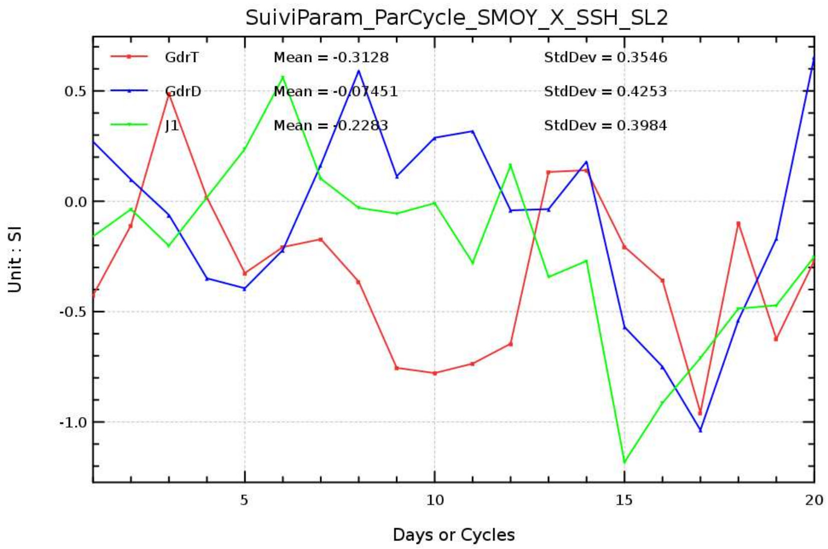
Altimeter Wind Speed	Table derived from Jason-1 GDR data	Table is identical to version "T", but the input sigma0 is calibrated to Jason-1 for consistency. Bias of 0.32 db added
Altimeter Rain Flag	Set to default values	Derived Jason-2 sigma naught MLE3 values
Altimeter Ice Flag	Flag based on the comparison of the model wet tropospheric correction and of a radiometer bifrequency wet tropospheric correction (derived from 23.8 GHz and 34 GHz), accounting for a back up solution based on climatologic estimates of the latitudinal boundary of the ice shelf, and from altimeter wind speed.	Identical to version "T"
Update of the altimeter characterization file		PRF value is no longer truncated (2058.513239 Hz) Bias of 18.092 cm applied for Ku-band and C-band range (corrects the value of the distance between center of gravity and the reference point of the altimeter antenna) Antenna aperture angle (at 3 dB) changed to 1.29 deg MQE[2] setting is applied during 20 Hz to 1 Hz compression Tracker_ranger_res at a more precise value
Other	LTM[3] calculated over 1 day	LTM calculated over 7 days (sliding window) The origin of the constant part of the time tag bias was found and is directly corrected in the GDR-D datation

[2] MQE = Mean Quadratic Error between the measured waveform and the best fitted Brown model
[3] LTM = Long Term Monitoring

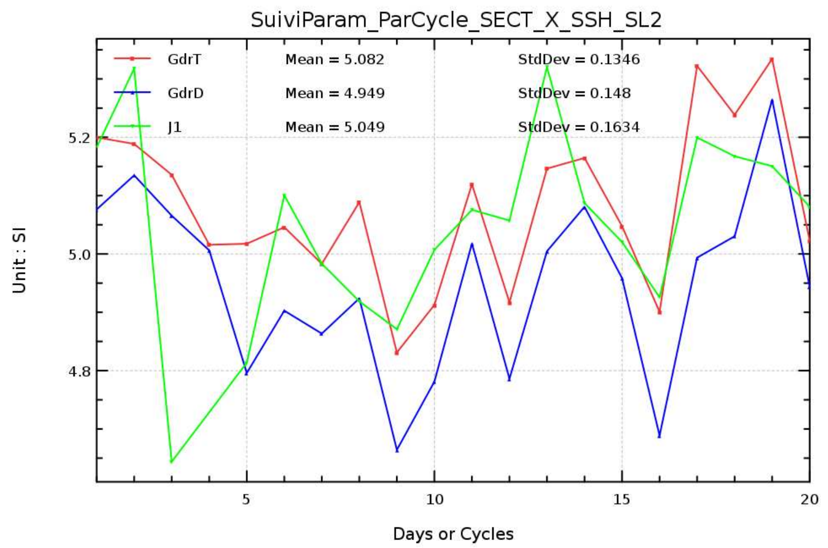
Jason-2 GDR-D analysis

Crossover performances:

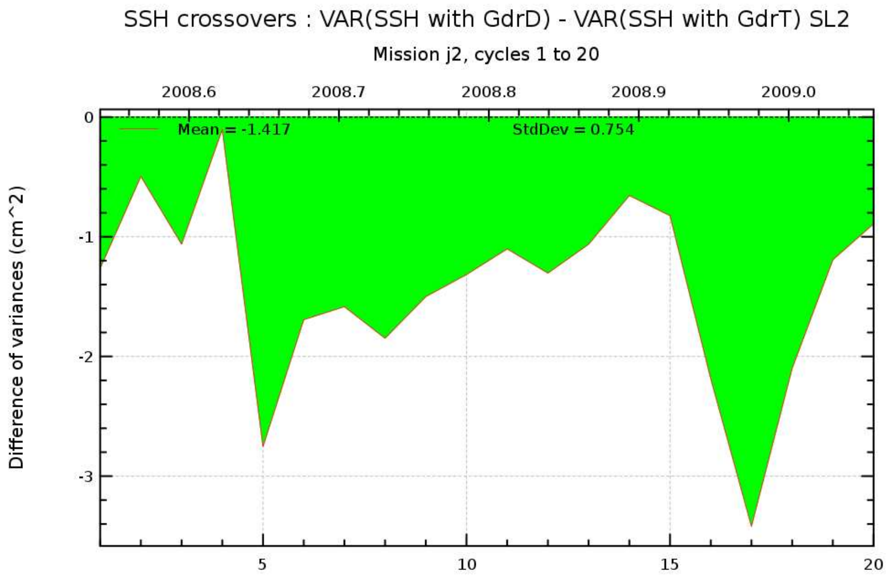
The standard deviation of SSH differences is systematically lower for GDR-D than GDR-T data, thus improving the coherence between ascending and descending passes.
Note that Crossovers are only selected for open ocean (latitude less than 50°, bathymetry less than -1000 m and oceanic variability less than 20 cm).



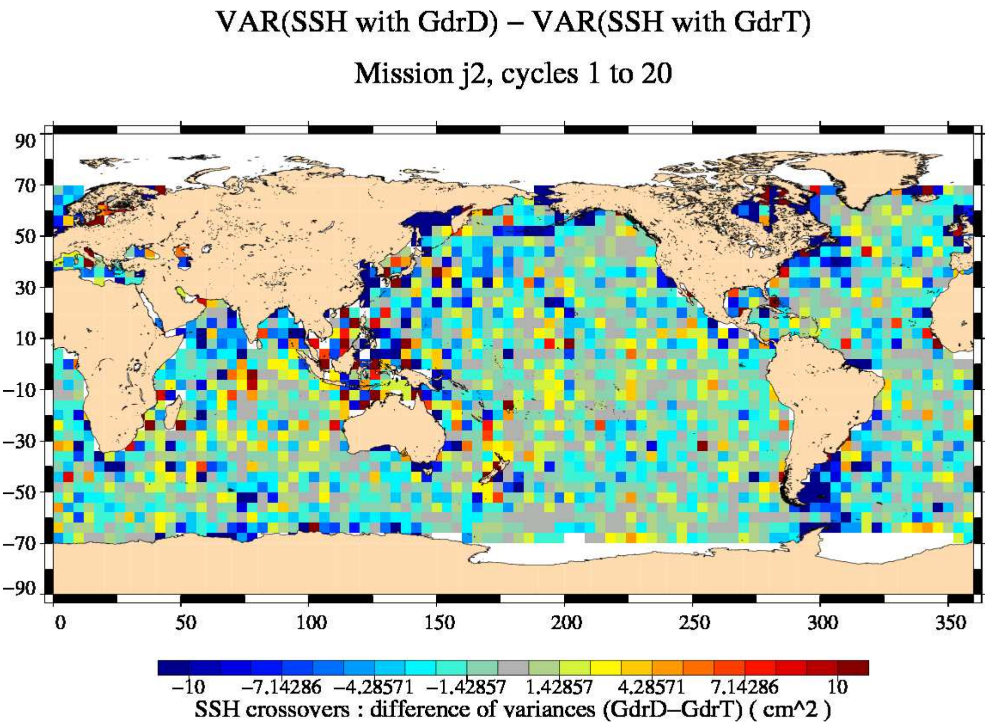
Mean of SSH difference at crossovers with GDR-D (blue), GDR-T (red) standards and Jason-1 GDR-C standards (green).



Standard deviation of SSH difference at crossovers with GDR-D (blue), GDR-T (red) standards and Jason-1 GDR-C standards (green).



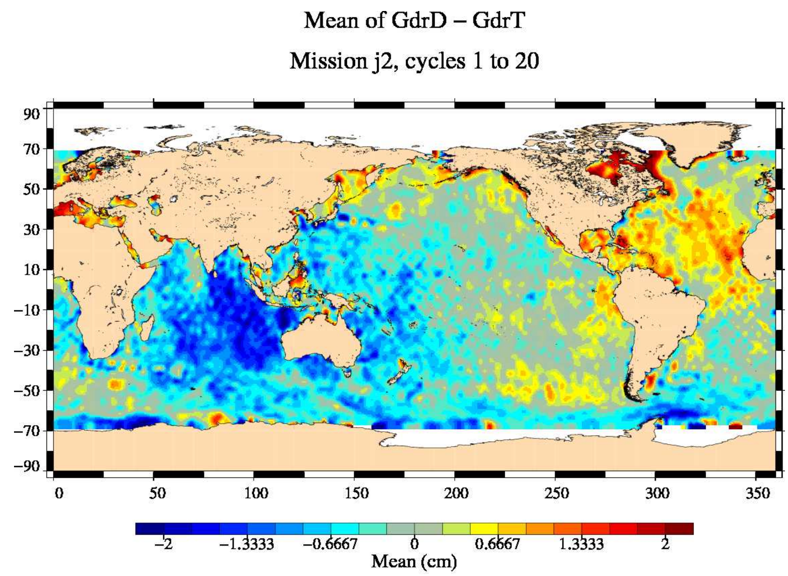
Difference of SSH variance at crossovers between GDR-D and GDR-T.



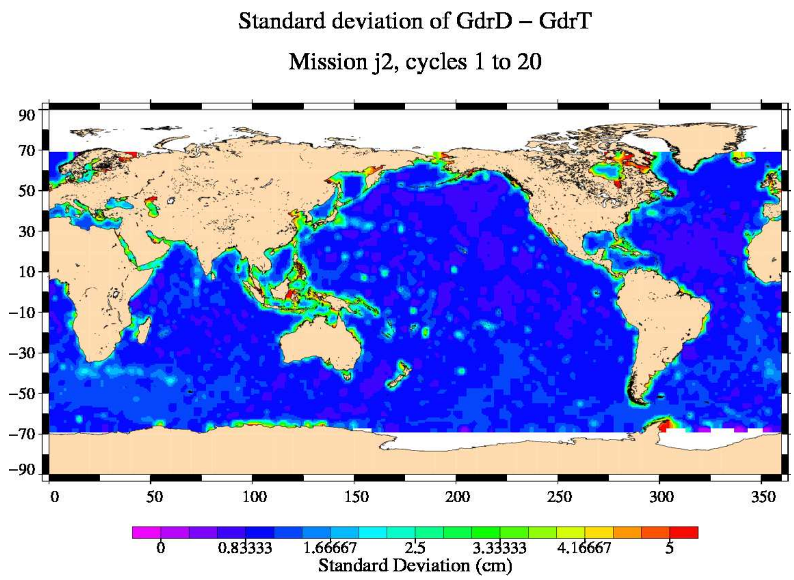
Map of difference of SSH variances (variance SSH(GDR-D) - variance SSH (GDR-T)).

SLA performances:

The global difference between GDR-D and GDR-T SLA is -18.3 cm. Besides the global bias, there are also geographical differences, which come mainly from orbit and sea state bias. This difference is mainly due to the datation bias correction and the use of a more precise value for the PRF (Pulse Repetition Frequency).



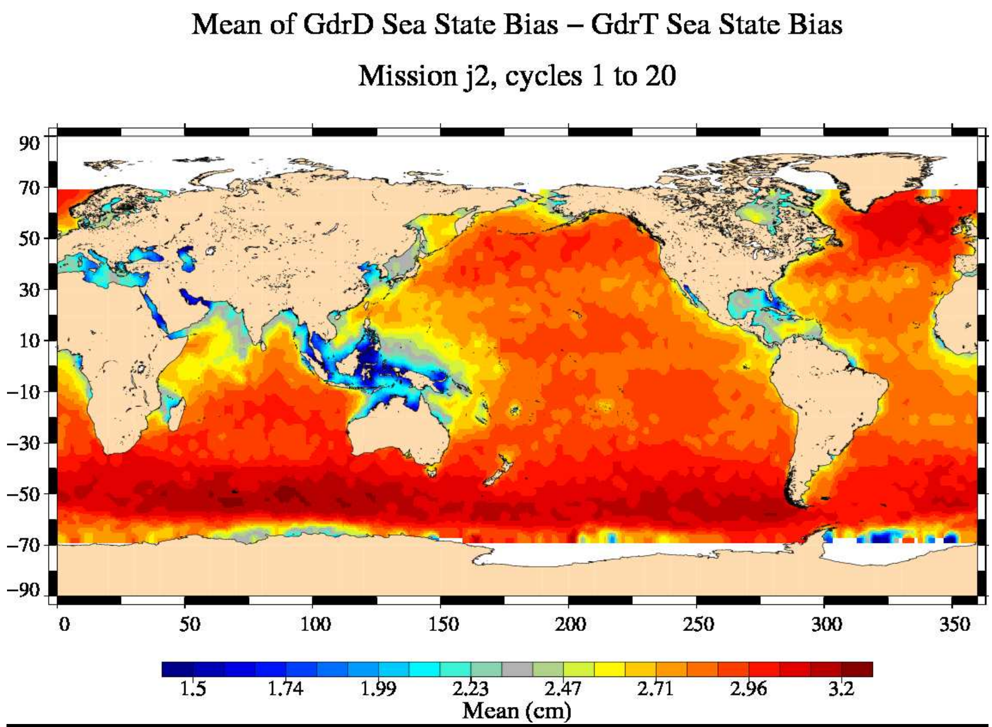
Nb of data	:	9183	St. Dev	:	2.94	Skewness	:	1.10	Minimum	:	−133.99
Mean	:	−18.27	Rms	:	18.51	Kurtosis	:	519.90	Maximum	:	84.13



When comparing Jason-2 and Jason-1 SLA over the formation flight phase (cycle 001 to 020), using on the one hand Jason-2 GDR-D and updated Jason-1 GDR-C standards (top figure) and on the other hand Jason-2 GDR-T and Jason-1 GDR-C standards (without updates) (Sidebottom figure), the differences between Jason-2 and Jason-1 are increased for the reprocessed data. The main geographical correlated differences between the two satellites come from the orbit and the sea state bias.

Sea state bias:

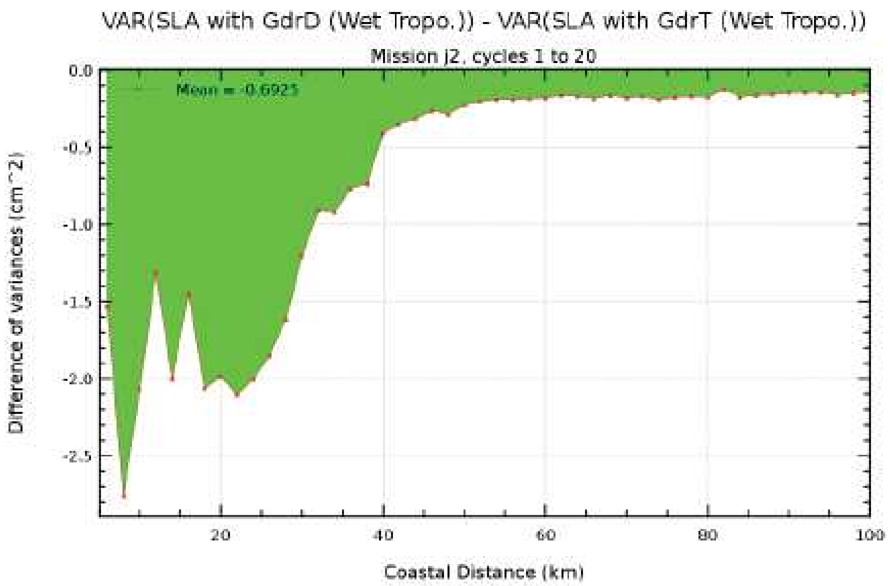
The overall bias between GDR-T and GDR-D over 20 cycles is approximately 3.1 cm. Furthermore, as altimeter parameters (SWH, SIG0) were also modified, sea state bias is additionally modified.



Difference between GDR-D – GDR-T (abaque) Sea State Bias

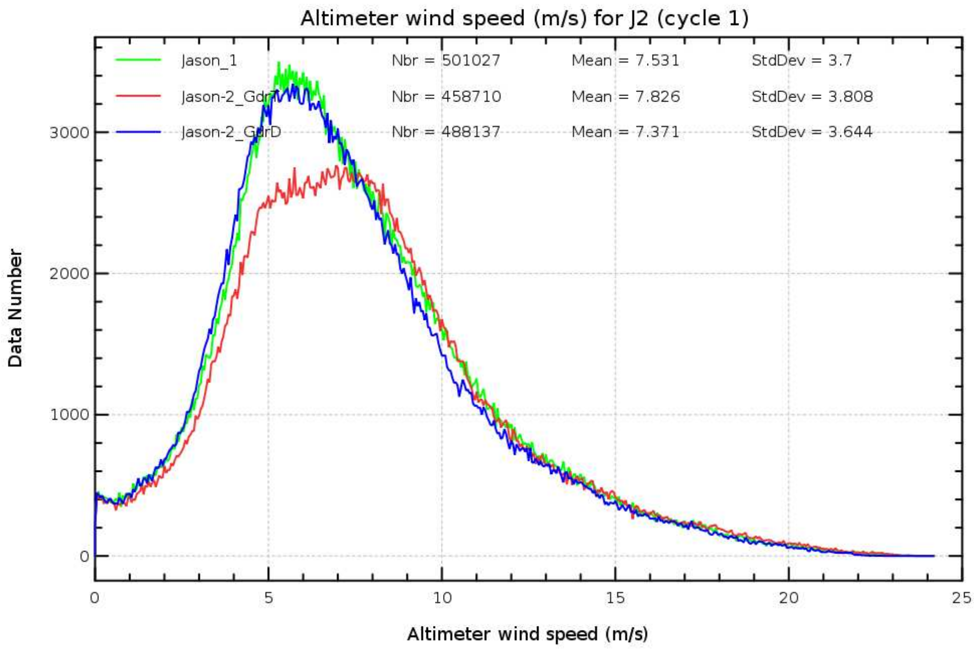
AMR parameters:

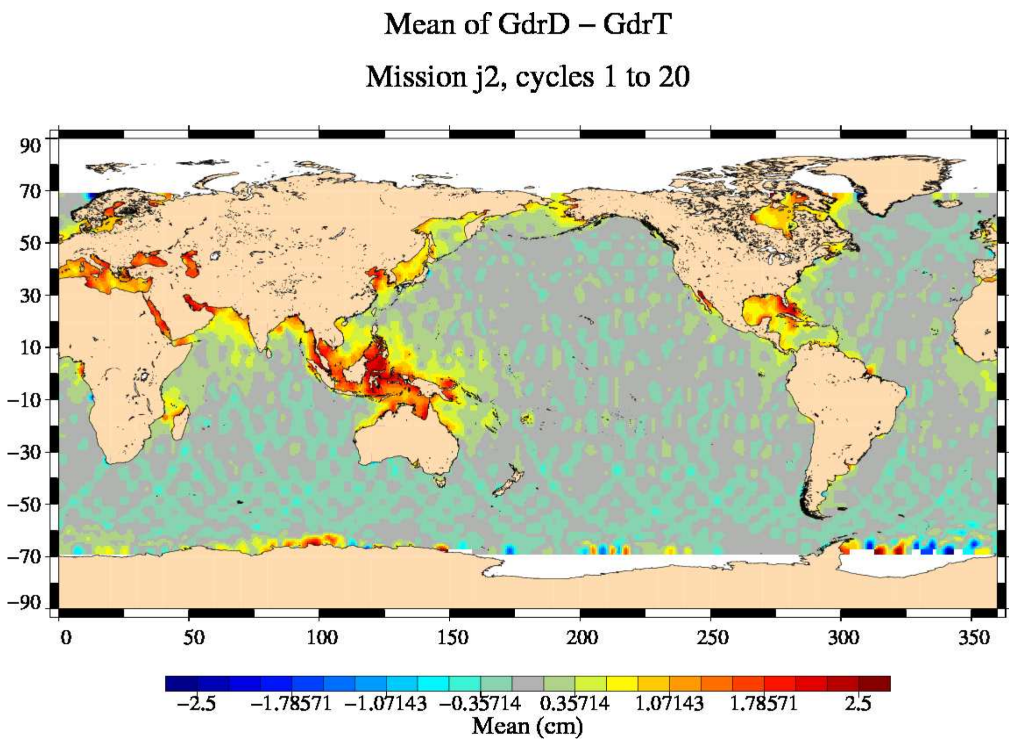
Radiometer wet troposphere correction is modified to include an improved coastal retrieval algorithm and to use updated calibration coefficients. The near coast evolution can be seen on figure below that shows the difference of SLA variances (computed by using successively GDR-D and GDR-T radiometer wet troposphere) plotted in function of coastal distances between 0 and 100 km.



Wind and waves parameters:

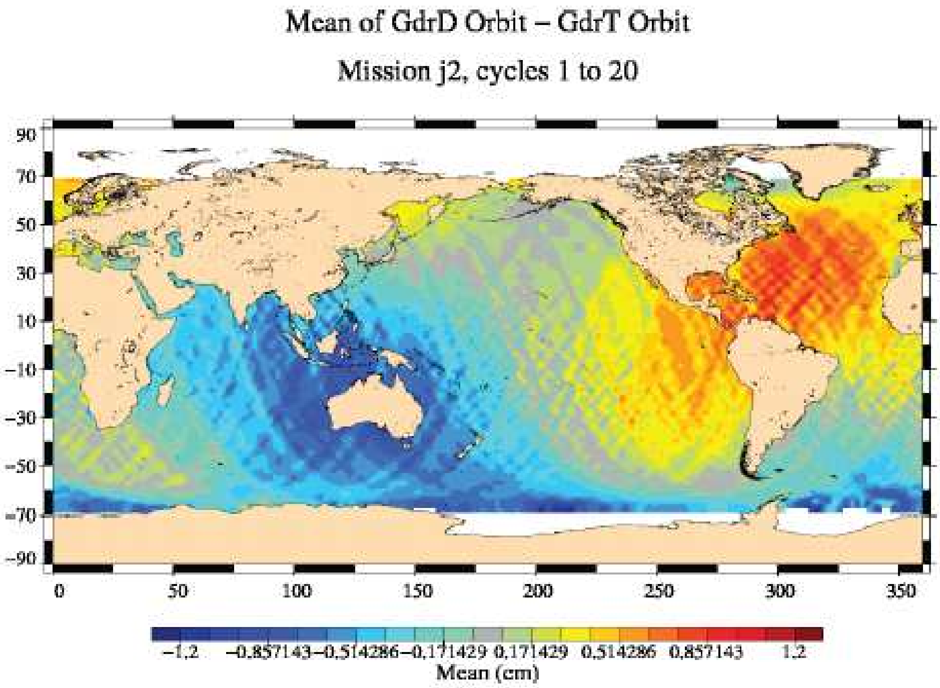
Altimeter wind look-up table has not been modified but the Jason-2 altimeter sigma naught has been aligned to the Jason-1 in order to correctly use this Jason-1 look-up table. As a consequence, the Jason-2 altimeter wind speed is modified.

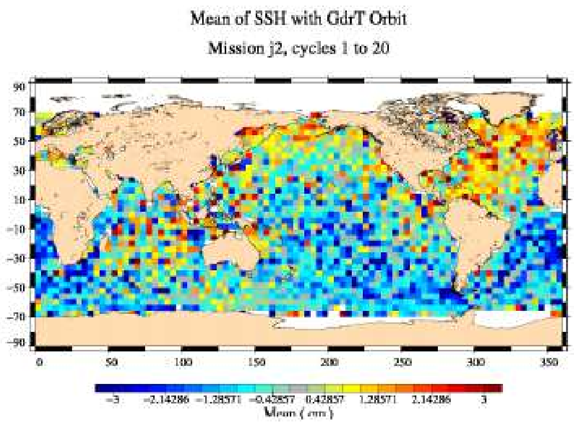


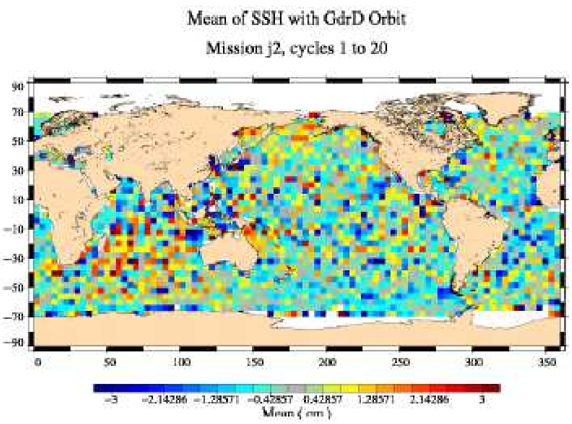


Orbit:

GDR-D orbit uses ITRF2008 and a new gravity field (EIGEN-GRGS RL02bis MEAN FIELD). GDR-D POE improves coherence of ascending/descending SSH differences at crossovers (geographic patterns are largely reduced).







Summary of Jason-2 GDR-D analysis:

The reprocessing of the Jason-2 altimetric mission includes several modifications that correct some problems and improve several standards, following the OSTST community's requests.

- In terms of available and valid data, the coverage is at least as good as in GDR-T version. Slightly more data are edited in the GDR-D version than in the GDR-T version (as due to the MQE setting more measurements than previously are at default value).
- In terms of performance at crossovers, the quality is also improved : the average of mean SSH is more centered, and the standard deviation is reduced. The gain on global SSH variance was estimated to around 1.4cm² with some maximums of 3cm². The GDR-D data improve also the coherence of ascending/descending SSH differences as geographic patterns are reduced (which is due to new orbit solution).