



TOPEX/Poseidon MGRD Quality Assessment Report

Cycle 400

24-07-2003 03-08-2003

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1 Introduction. Document overview

The purpose of this document is to report the major features of the data quality from the Topex/Poseidon mission. The document is associated with data dissemination on a cycle by cycle basis.

The objectives of this document are :

- To provide a data quality assessment
- To provide users with necessary information for data processing
- To report any change likely to impact data quality at any level, from instrument status to software configuration
- To present the major useful results for the current cycle

It is divided into the following topics:

[Cycle overview](#)

[CALVAL main results](#)

2 Cycle overview

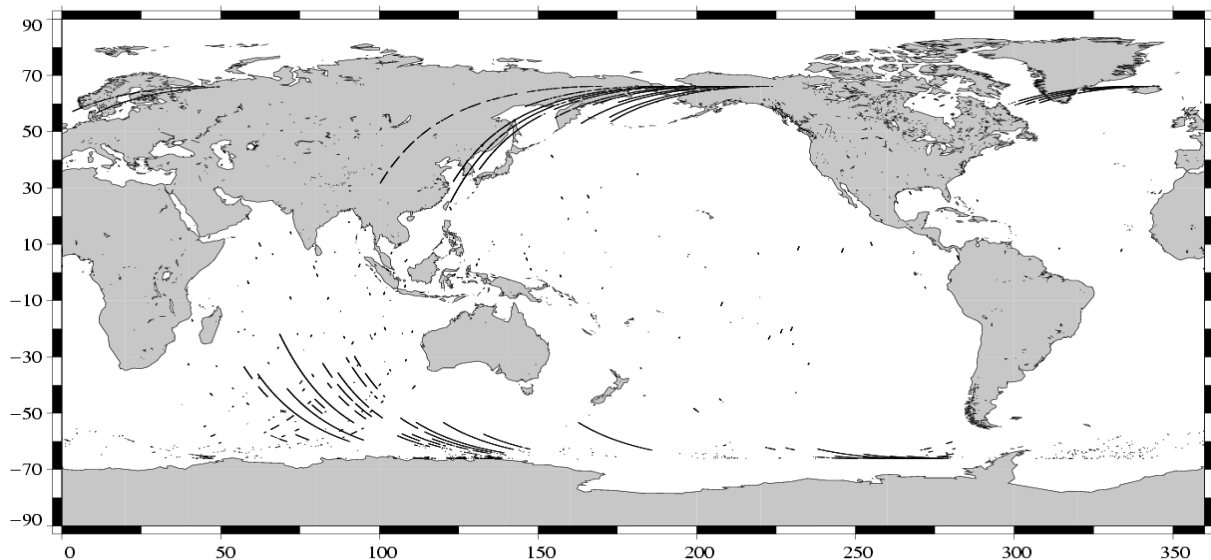
2.1 Cycle quality and performances

Data quality for this cycle appears to be nominal. For this cycle, the crossover standard deviation is 6.95 cm rms, and the standard deviation of Sea Level Anomalies (SLA) relative to a Mean Sea Surface is 9.46 cm.

2.2 Warnings and recommendations

- Missing measurements :
There is a lot of data gaps due to tape recorder anomalies, especially in the Indian Ocean and in the South Pacific Ocean close to the South America coasts
- Measurements edited by the TMR parameters :
The following anomalies are explained by the problems in the interpolation of the TMR parameters due to tape recorder failures :
 - 2.76% of the measurements are removed by the TMR correction criterion (see the following figure).
 - Some measurements have radiometer earth flag set to valid over earth. A new criterion has been added to the editing procedure to remove all these measurements (see [Editing](#)) .

Edited parameter : Radiometer wet tropospheric correction
T/P Cycle 400 (24/07/2003 / 03/08/2003)



3 CALVAL main results

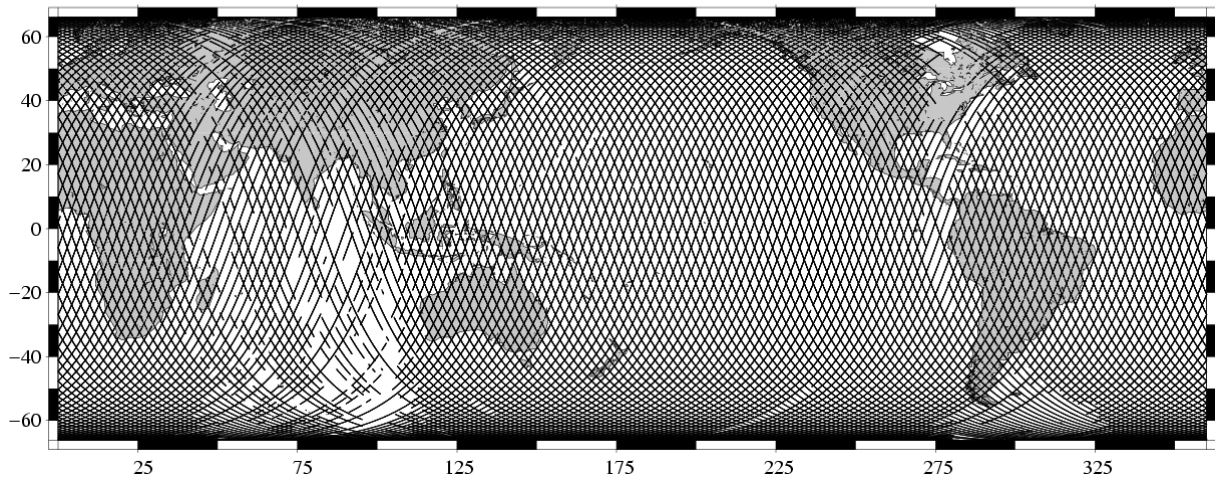
This section presents results that illustrate data quality during this cycle. These verification products are produced operationally so that they allow systematic monitoring of the main relevant parameters.

3.1 Missing measurements

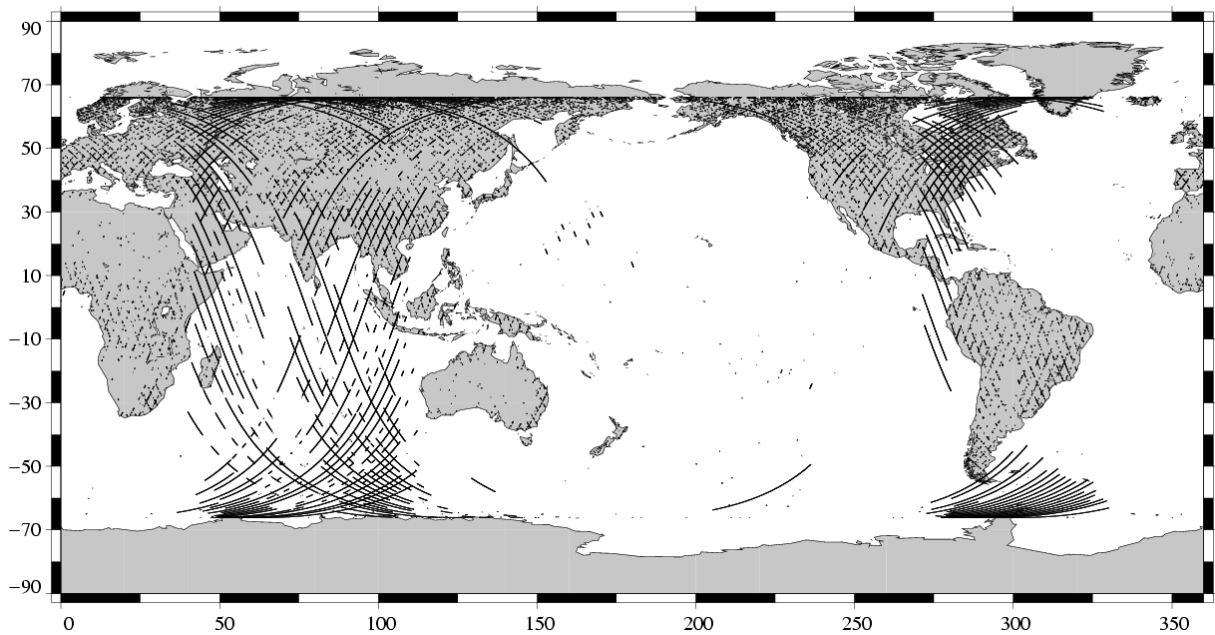
690974 altimeter measurements are present, and 103587 are missing.

The map below shows all the available measurements for this cycle and illustrates the tape recorder problems. The latter figure shows missing 1Hz measurements in the GDRs, with respect to a 1 Hz sampling of a nominal repeat track.

Available measurements
TOPEX Cycle 400 (24/07/2003 / 03/08/2003)



Missing measurements
TOPEX/Poseidon Cycle 400 (24/07/2003 / 03/08/2003)



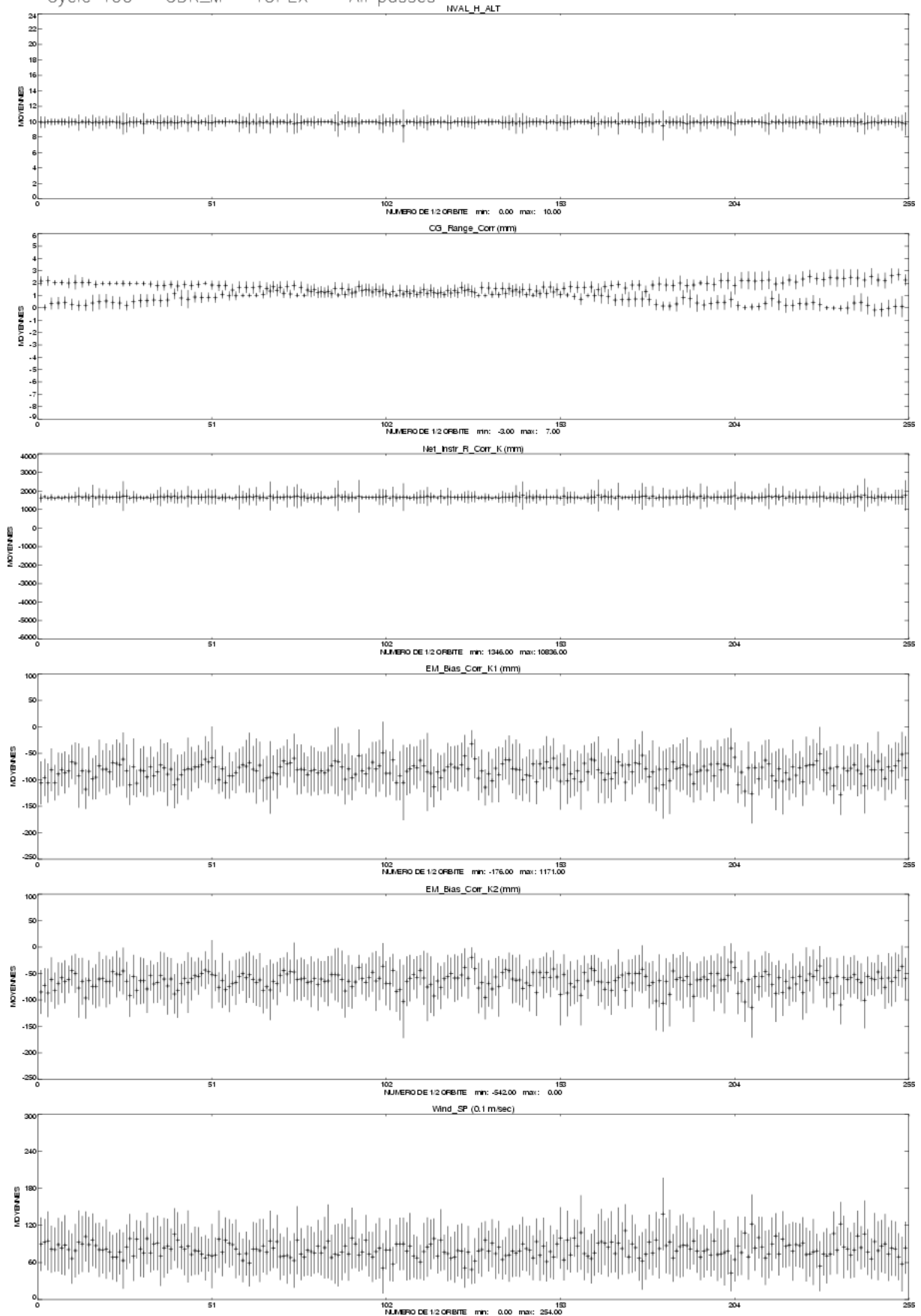
3.2 M-GDR quality flags

The following table indicates the percentage of measurements for which those flags are set.

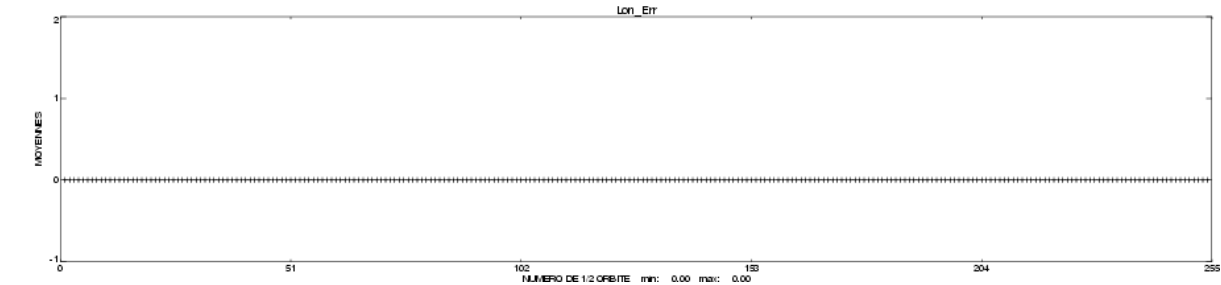
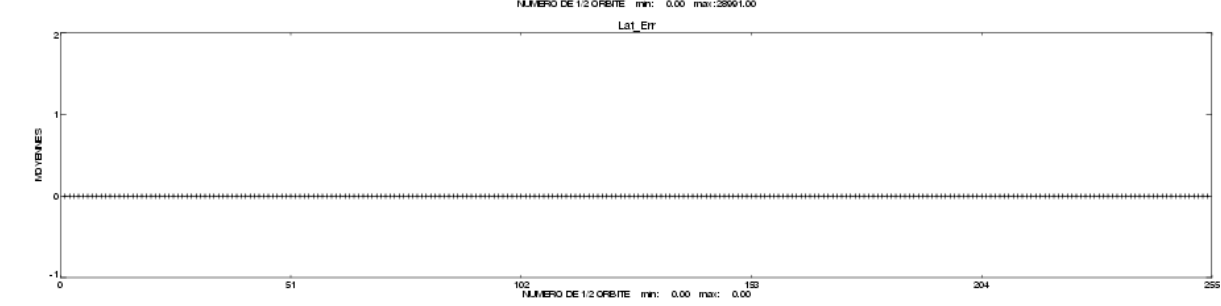
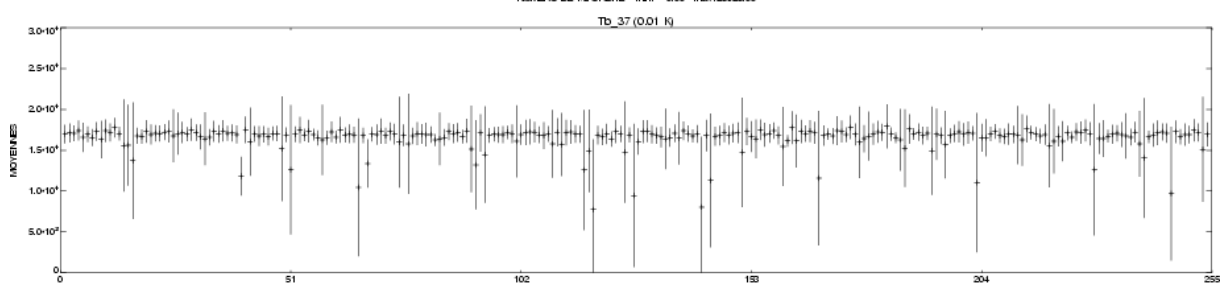
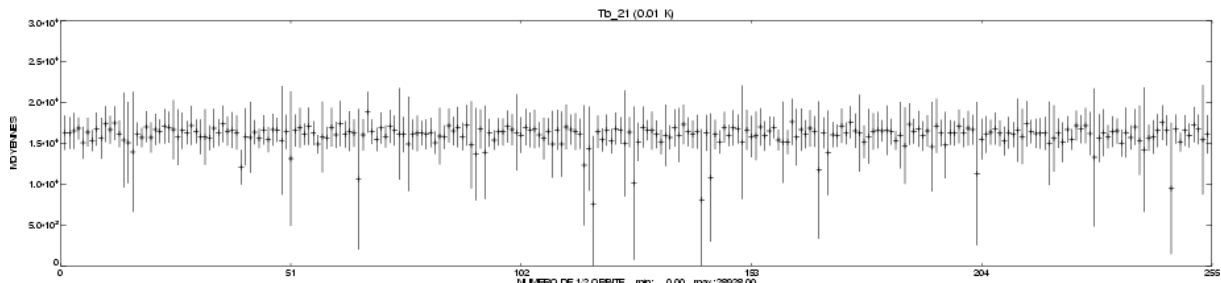
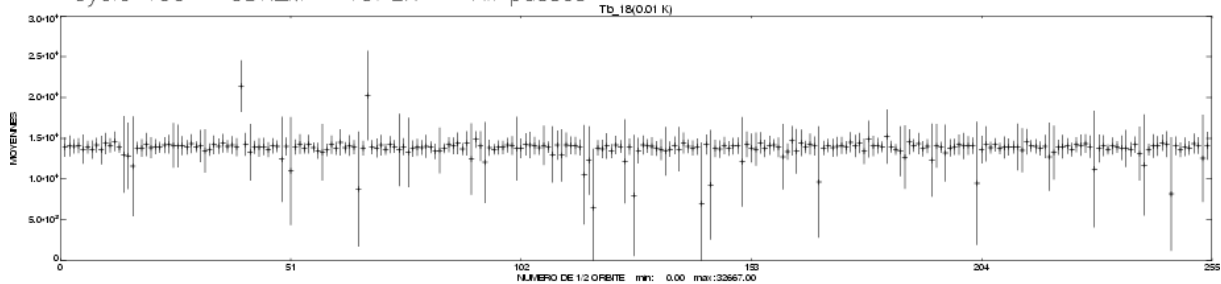
Name	Description	% bad
Geo_Bad_1	altimeter land flag	25.42
Geo_Bad_1	ice flag	8.40
Geo_Bad_1	radiometer land flag	27.09
Alt_Bad_1	conditions 1 altimeter	5.36
Alt_Bad_2	conditions 2 altimeter	5.22
Geo_Bad_2	rain (liquid water in excess)	5.59
Geo_Bad_2	less than 4 points for CSR3.0 tide calculation	0.43
Geo_Bad_2	less than 4 points for FES95.2.1 tide calculation	2.99
TOPEX	TOPEX not valid	0.00
TMR	TMR not valid	0.00
TMR_Bad	Brightness temperatures not valid	5.59
DORIS	DORIS not valid	0.00

3.3 M-GDR parameter plots

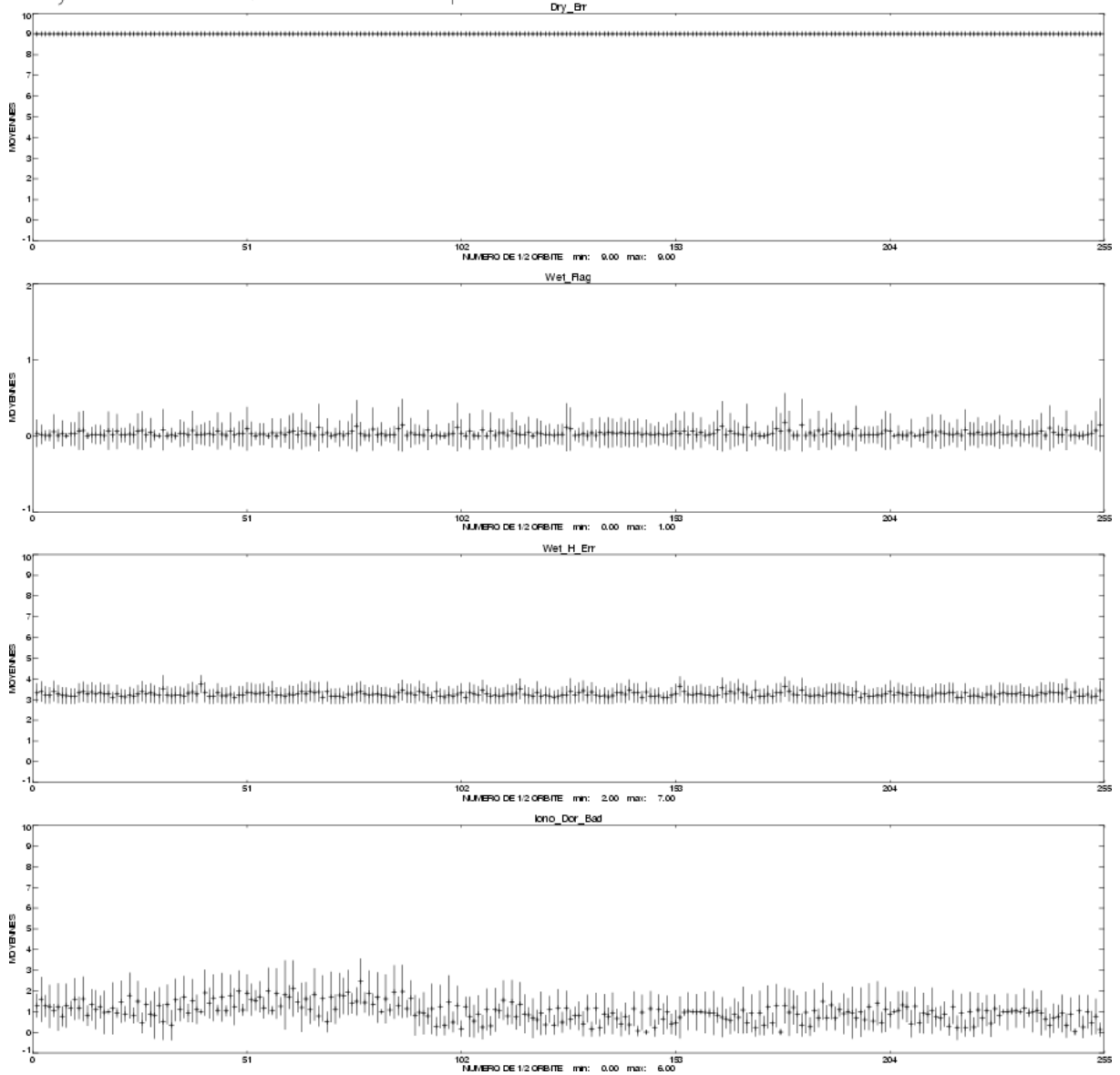
Cycle 400 – GDR_M – TOPEX – All passes –



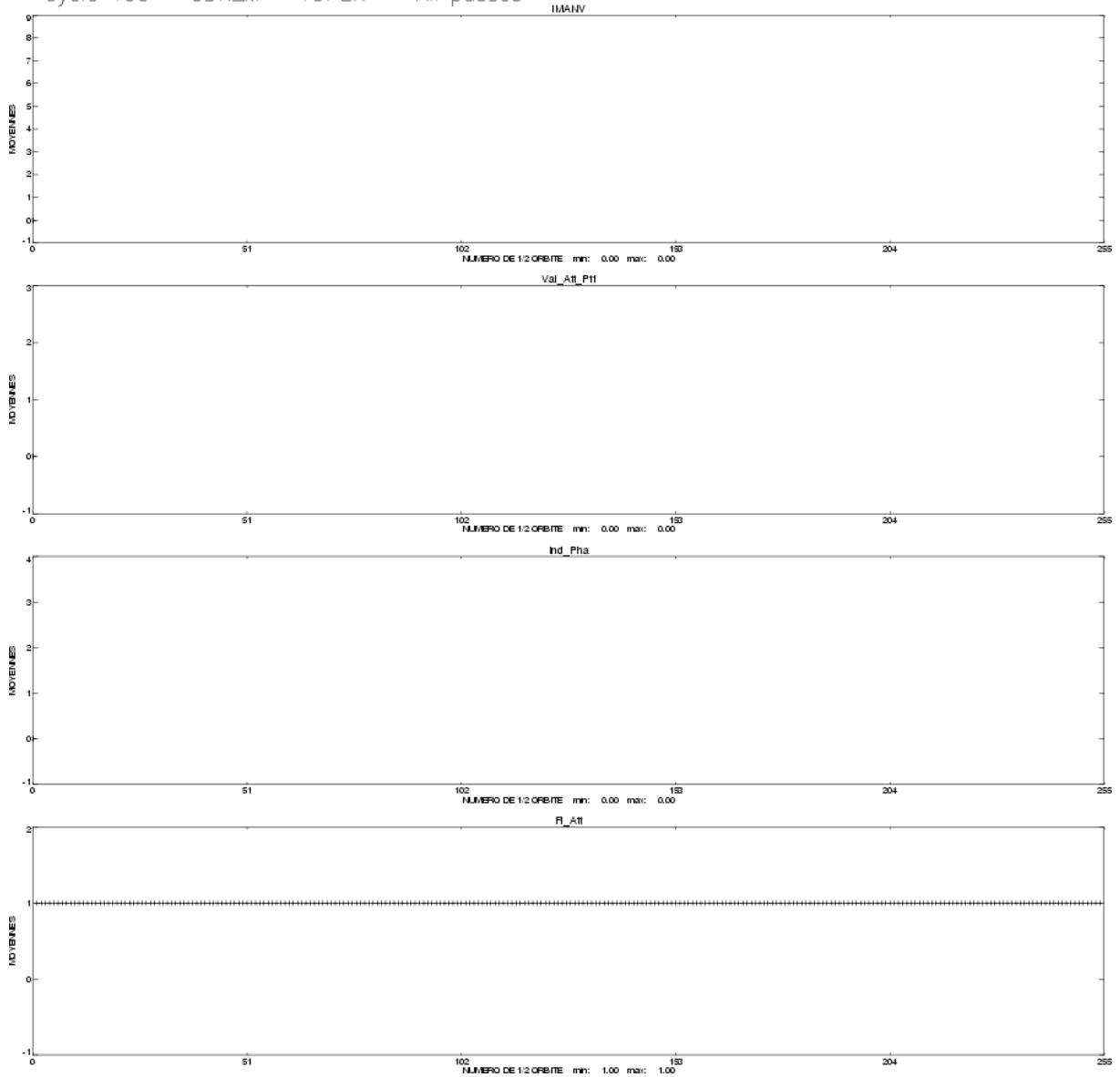
Cycle 400 – GDR_M – TOPEX – All passes –

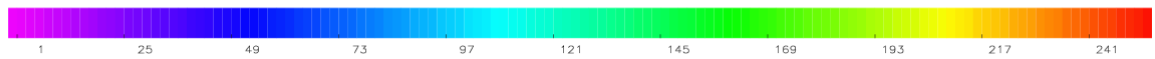
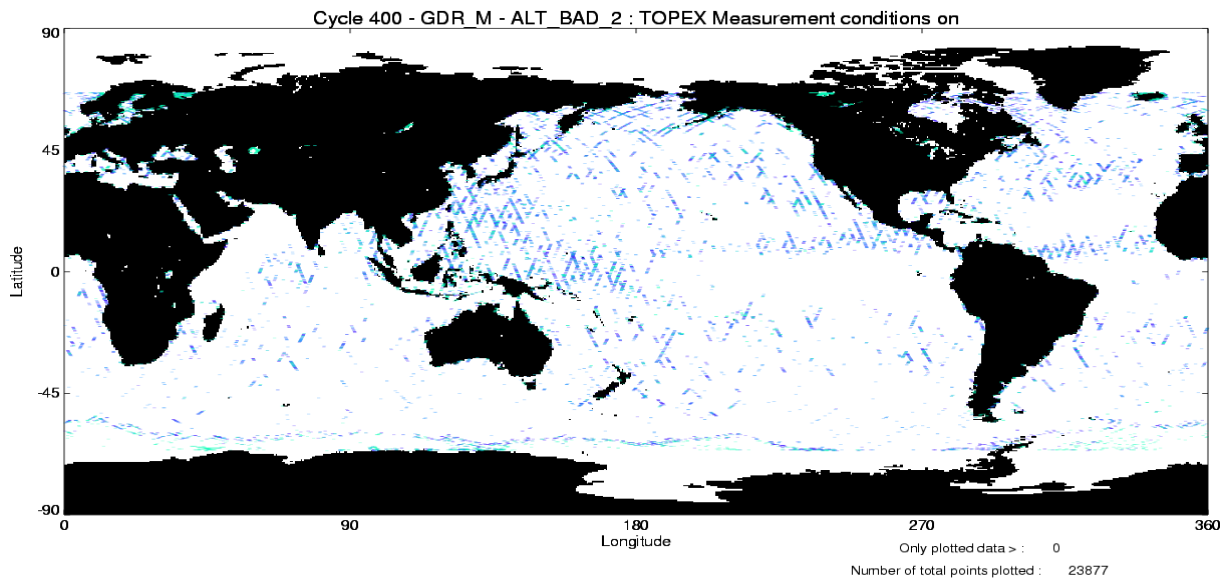
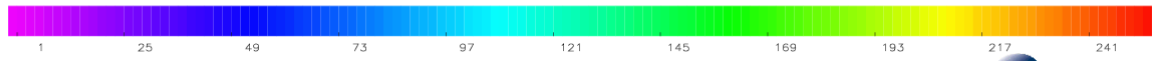
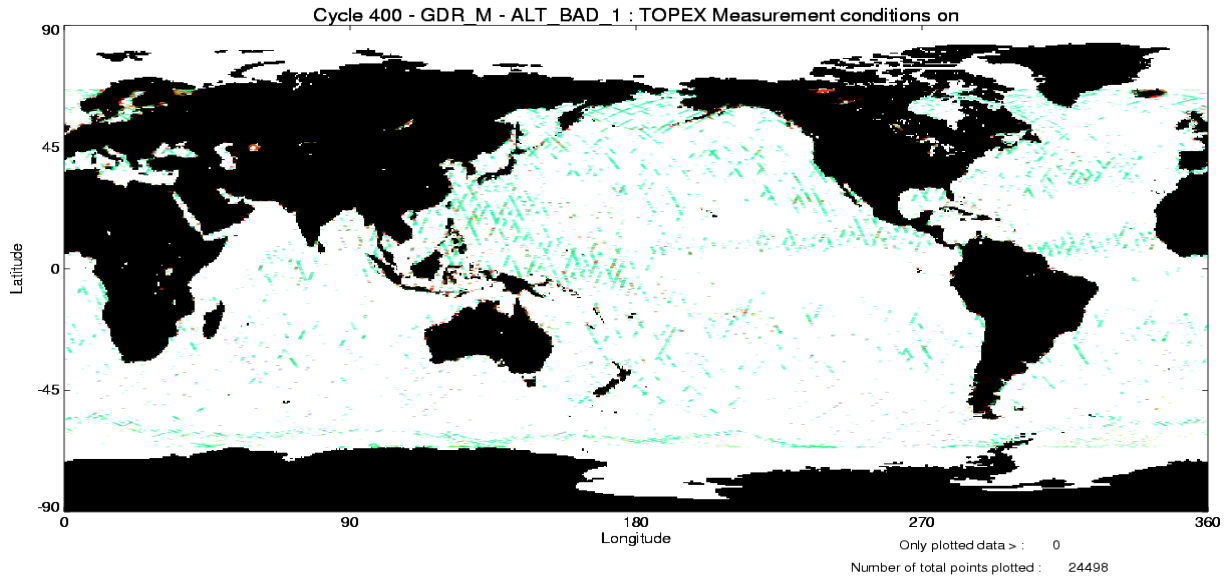


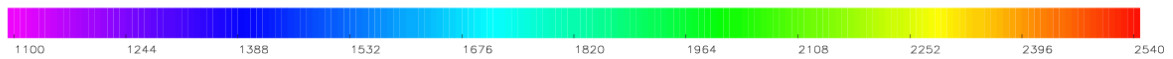
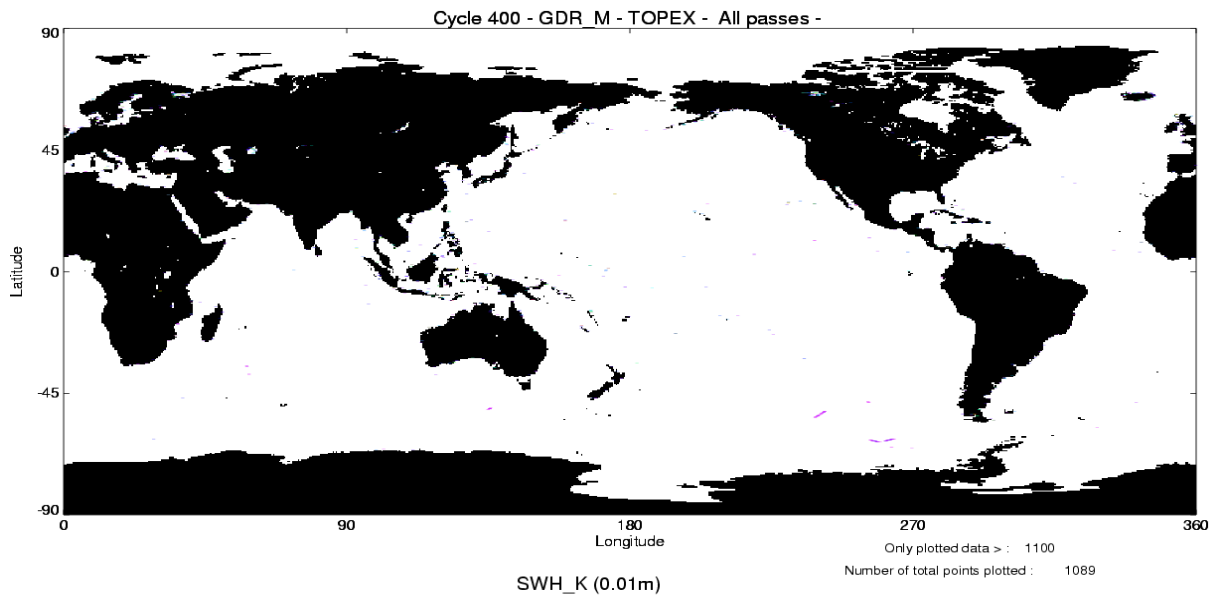
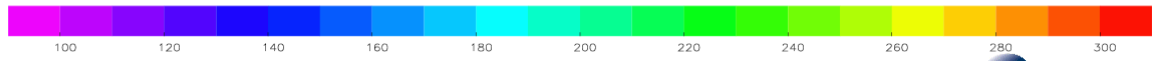
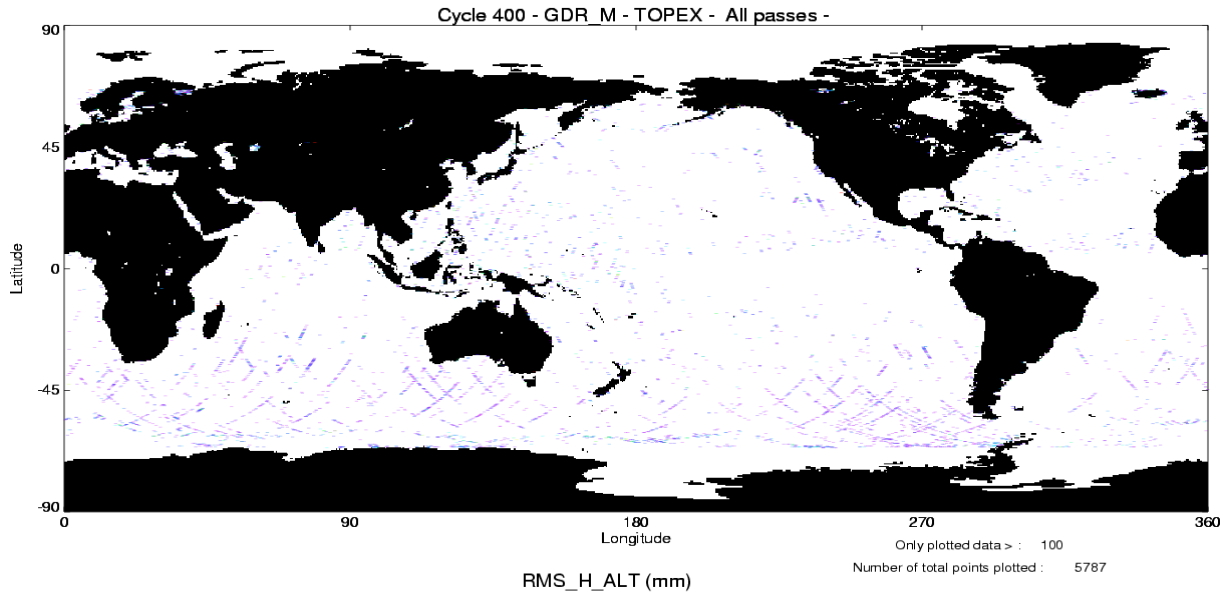
Cycle 400 – GDR_M – TOPEX – All passes –

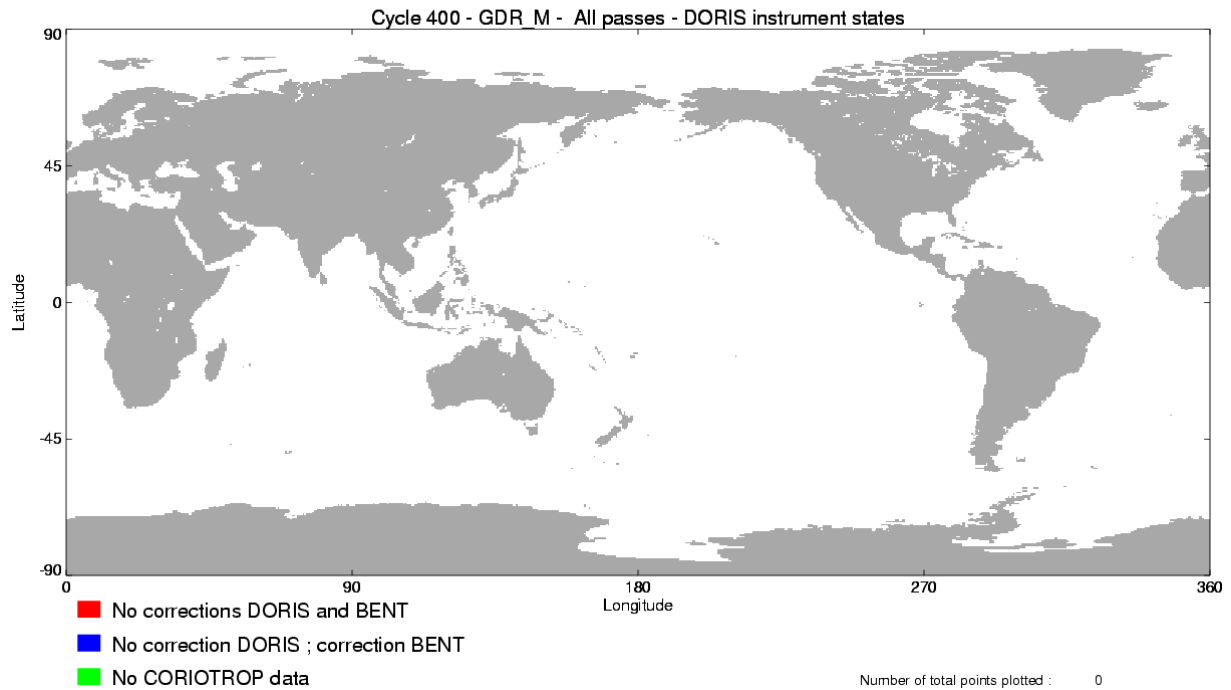


Cycle 400 – GDR_M – TOPEX – All passes –









3.4 Editing

The following table gives for each tested parameter, minimum and maximum thresholds, the number and the percentage of points removed. As a comparison, the mean percentage over one year (1997) is also given.

There are problems in the interpolation of the TMR parameters since cycle 371 when there are missing measurements (tape recorder failures). These bad measurements are removed by the TMR correction criterion but some of them have been kept. Thus a new criterion has been added to the editing procedure since the cycle 376 to remove all the measurements where the absolute value of the difference between the TMR correction and the ECMWF model wet tropospheric correction is greater than 20 cm.

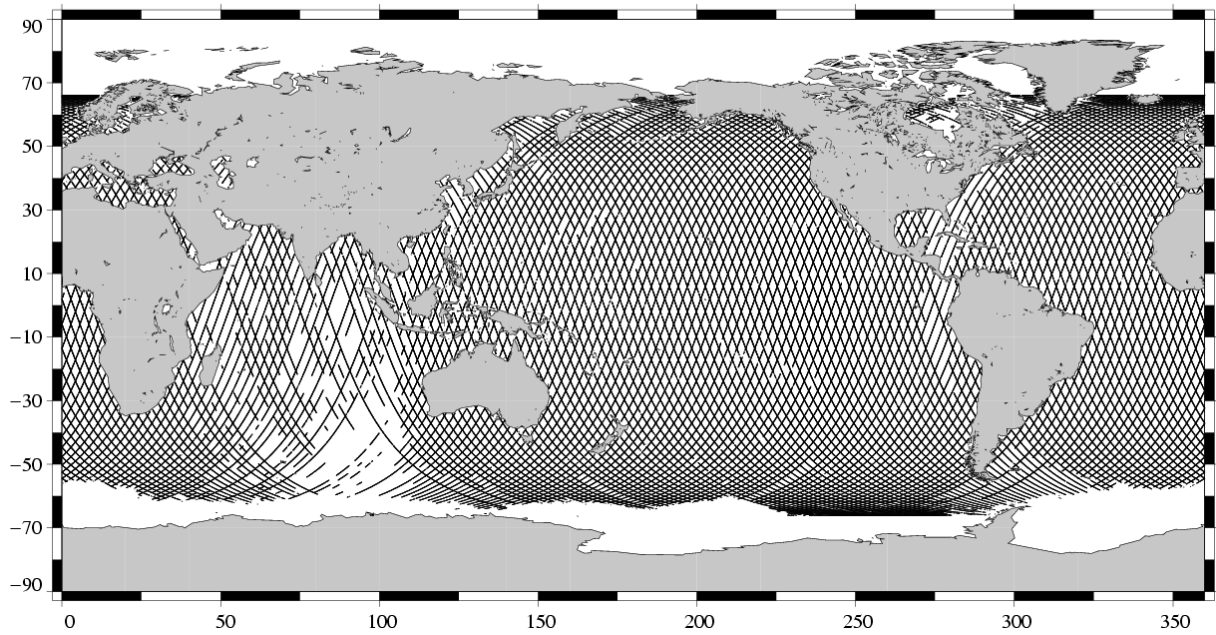
Probably due to the interpolation problem with the TMR, some measurements have radiometer land flag unset over land. This has no impact on the valid data because these measurements have been edited by the altimetric parameter criteria. Nevertheless, this anomaly leads to wrong statistics of the edited measurements. Therefore a new criterion has been added in the editing procedure to remove all the measurements for which the radiometer land flag is set to ocean and the altimeter land flag is set to land.

The number and percentage of points removed by each criterion is given on the following table. Note that these statistics are obtained with measurements already edited for radiometer land flag (27.09 % of points removed) and ice flag (8.40 % of points removed).

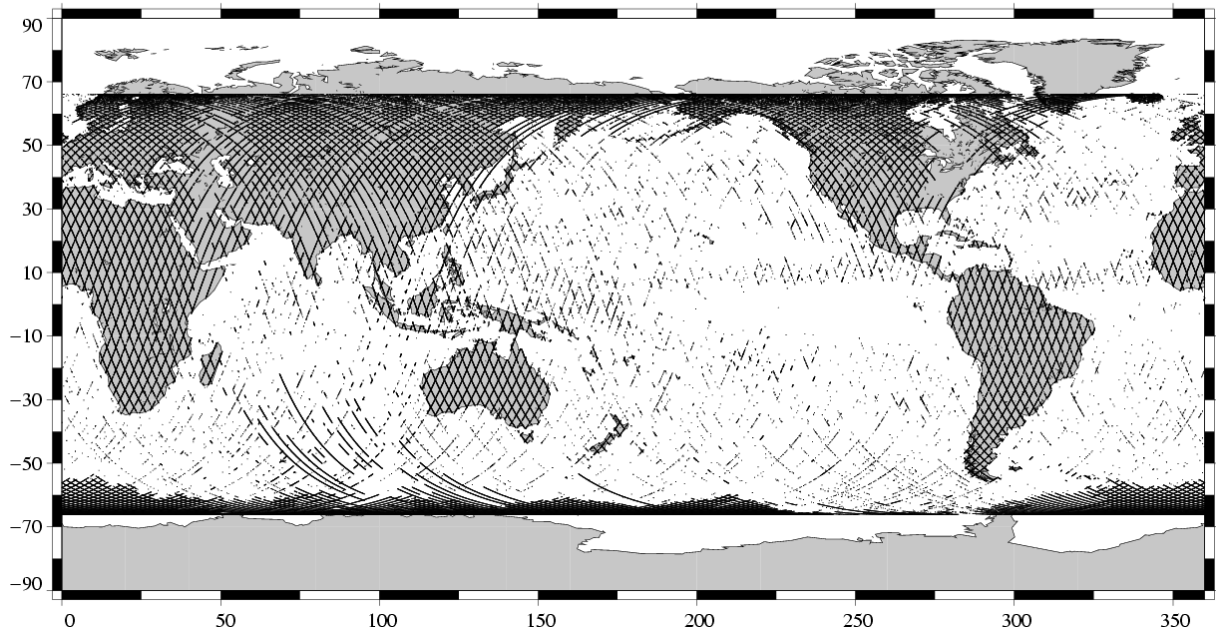
Parameters	Min Thres.	Max Thres.	Unit	Mean % removed in 1997	% removed
Sea surface height	-130.000	100.000	m	1.37	0.12
Number of 20/10Hz valid points Poseidon/TOPEX	5.000	-		1.37	0.22
Std. deviation of range	0.000	0.100	m	1.85	1.27
Off nadir angle from waveform	0.000	0.400	deg	1.36	3.67
Dry tropospheric correction	-2.500	-1.900	m	0.00	0.00
Invert barometer correction	-2.000	2.000	m	0.00	0.00
TMR wet tropospheric correction	-0.500	-0.001	m	0.34	2.76
Ionospheric correction (Poseidon:Doris, TOPEX:Dual)	-0.400	0.040	m	0.00	0.00
Significant wave height	0.000	11.000	m	1.46	0.10
Sea state Bias	-0.500	0.000	m	1.39	0.14
Backscatter coefficient	7.000	30.000	dB	1.44	0.12
Ocean tide height	-5.000	5.000	m	0.01	0.15
Earth tide	-1.000	1.000	m	0.00	0.00
Pole tide	-15.000	15.000	m	0.00	0.00
TMR and ECMWF tropospheric differences	-0.200	0.200	m	NaN	0.32
Spline fitting					0.01

The following three maps are complementary: they show respectively the removed, the selected measurements and the percentage of selected measurements in the editing procedure.

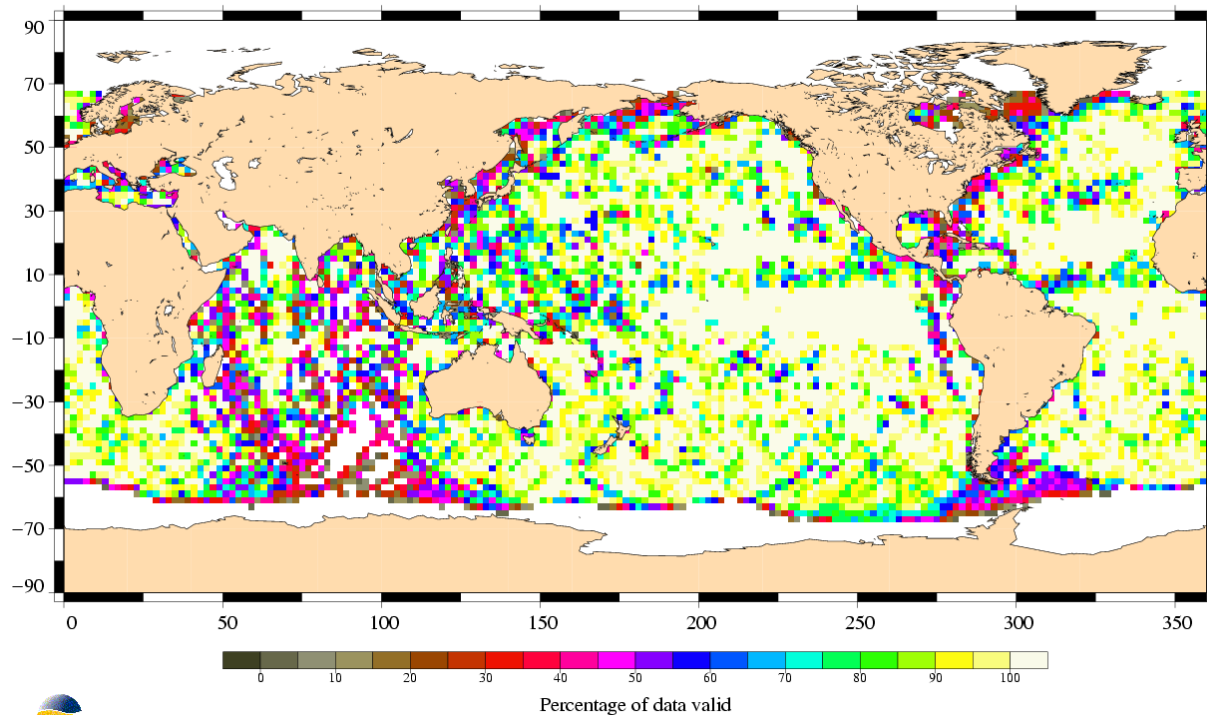
Valid data
TOPEX/Poseidon Cycle 400 (24/07/2003 / 03/08/2003)



Edited measurements
TOPEX Cycle 400 (24/07/2003 / 03/08/2003)

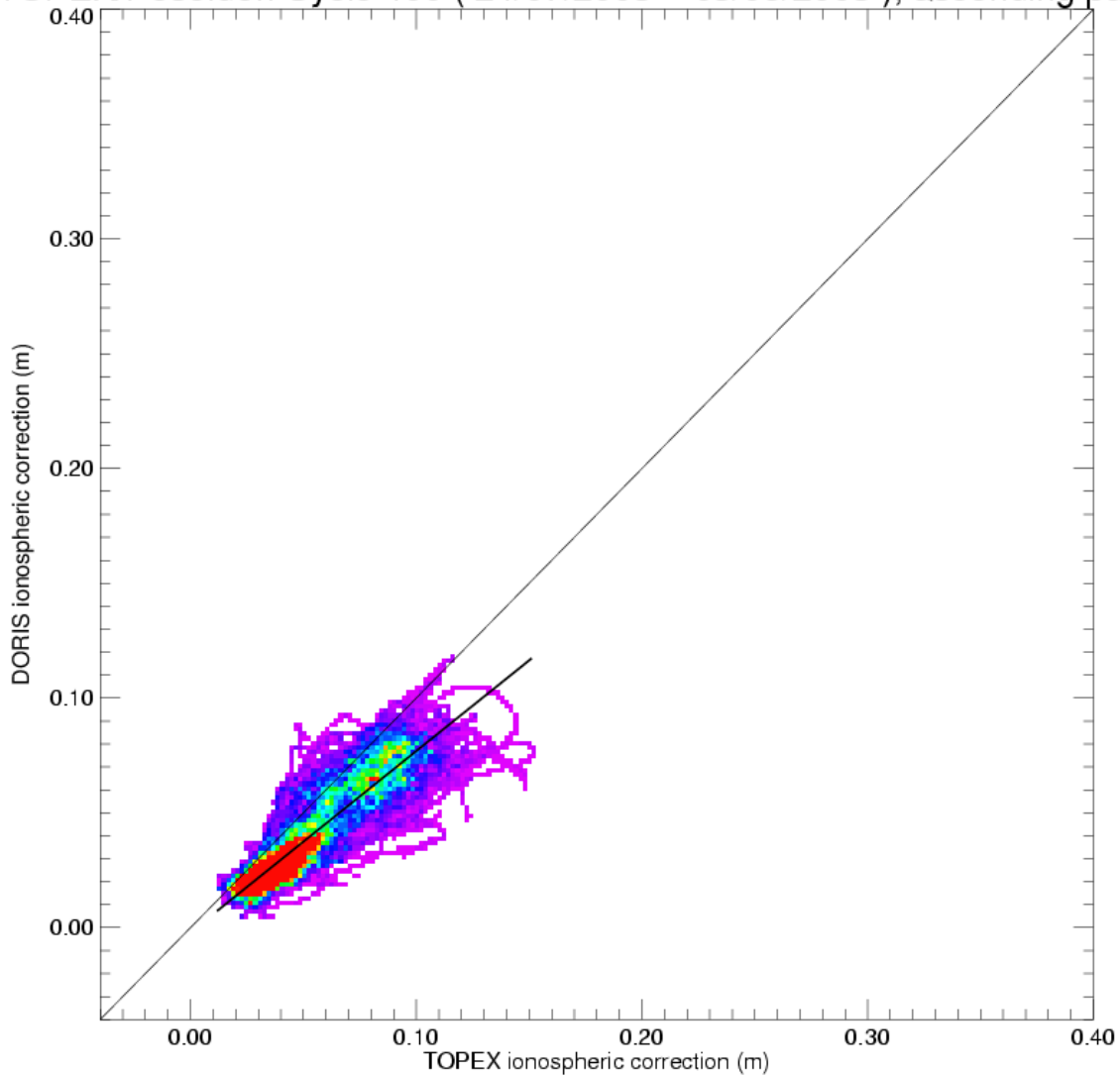


Percentage of valid data relative to the nominal pass
TOPEX/Poseidon Cycle 400 (24/07/2003 / 03/08/2003)

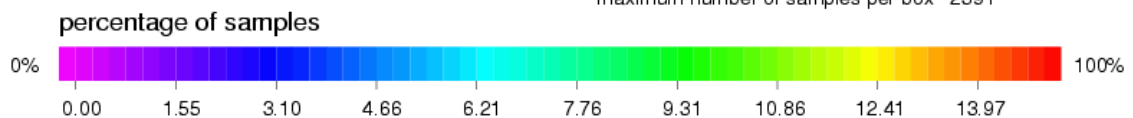


3.5 Ionospheric correction

TOPEX/Poseidon Cycle 400 (24/07/2003 – 03/08/2003), ascending passes



minimum number of samples per box 1
maximum number of samples per box 2391



Statistics Y-X

mean = -0.01258
rms = 0.01646
std = 0.01061

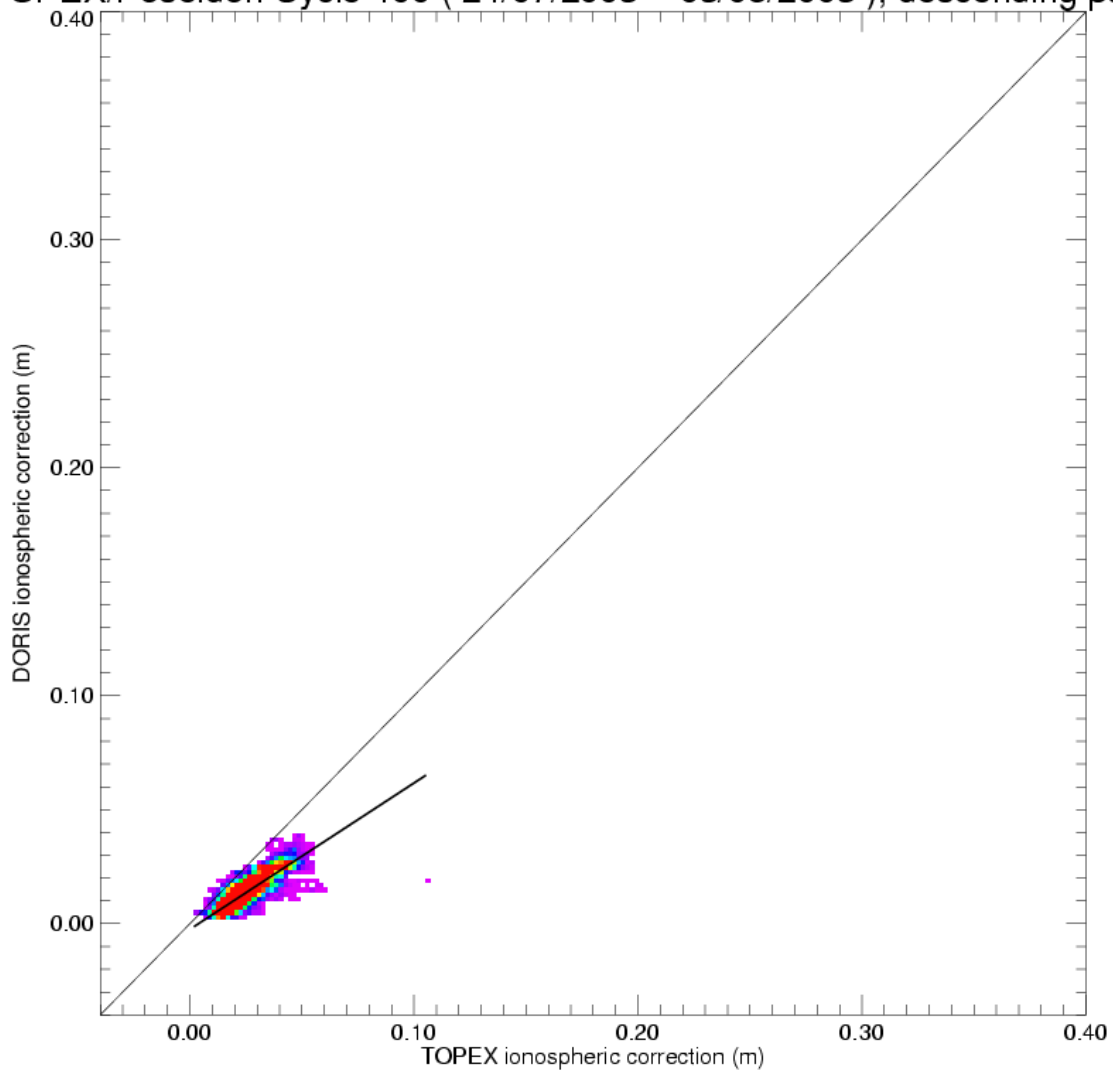
Order 1 fit polynomial

$y = a x + b$
a = 0.78959453
b = -0.00202807

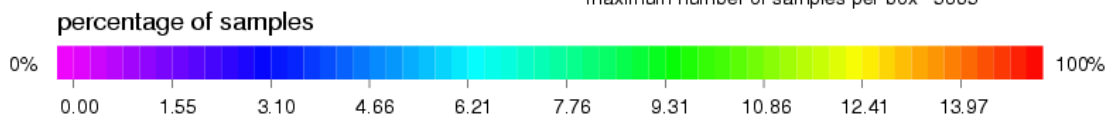
Legend

— Order 1 fit polynomial
— Bisectrix

TOPEX/Poseidon Cycle 400 (24/07/2003 – 03/08/2003), descending passes



minimum number of samples per box 1
 maximum number of samples per box 5865



Statistics Y-X

mean = -0.01098
 rms = 0.01187
 std = 0.00449

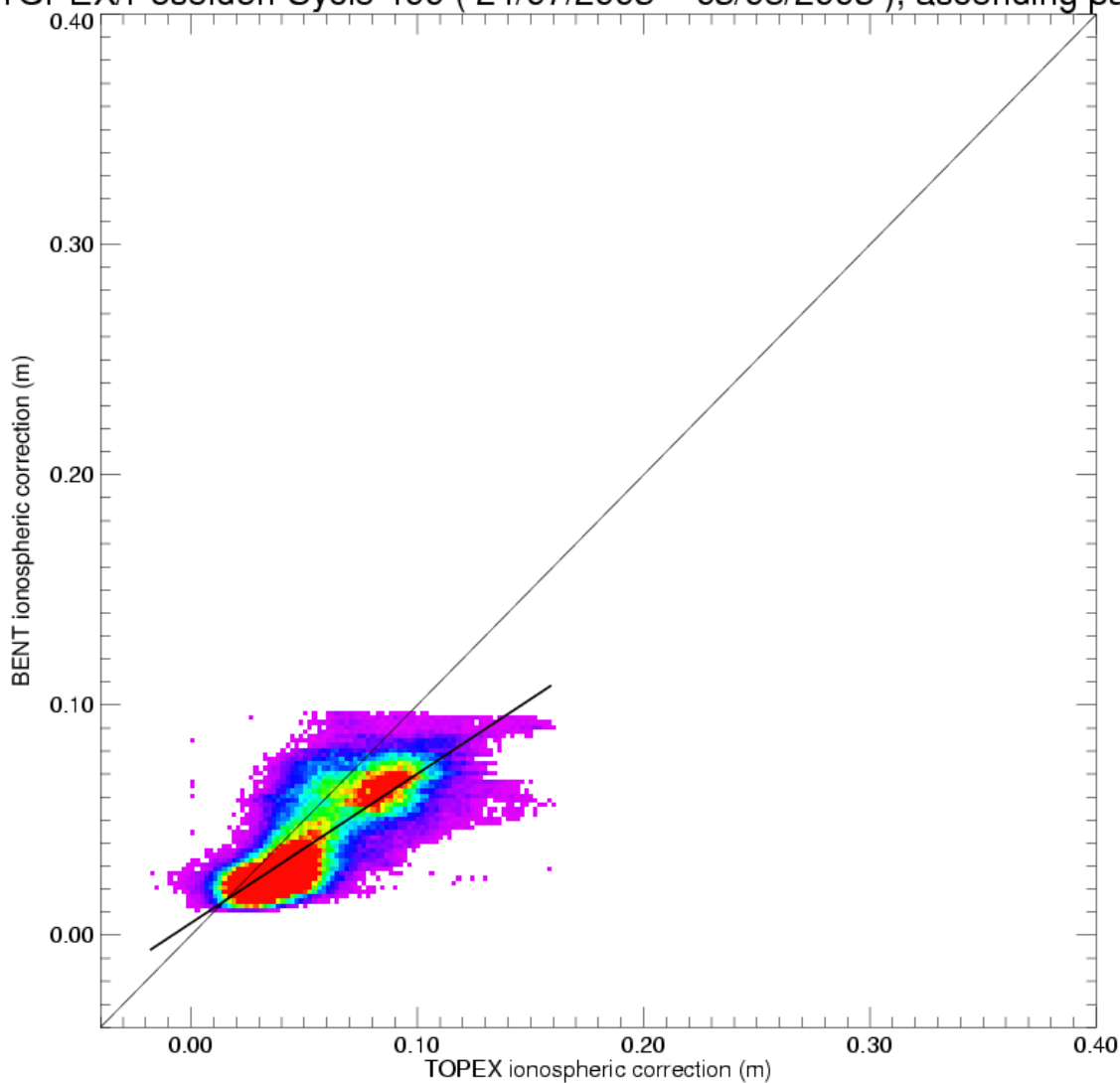
Order 1 fit polynom

$y = a x + b$
 $a = 0.64155954$
 $b = -0.00247240$

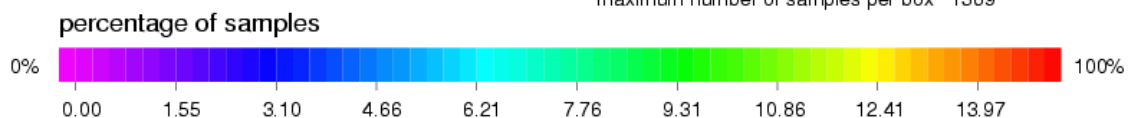
Legend

— Order 1 fit polynom
 — Bisectrix

TOPEX/Poseidon Cycle 400 (24/07/2003 – 03/08/2003), ascending passes



minimum number of samples per box 1
 maximum number of samples per box 1369



Statistics Y-X

mean = -0.01249
 rms = 0.01902
 std = 0.01434

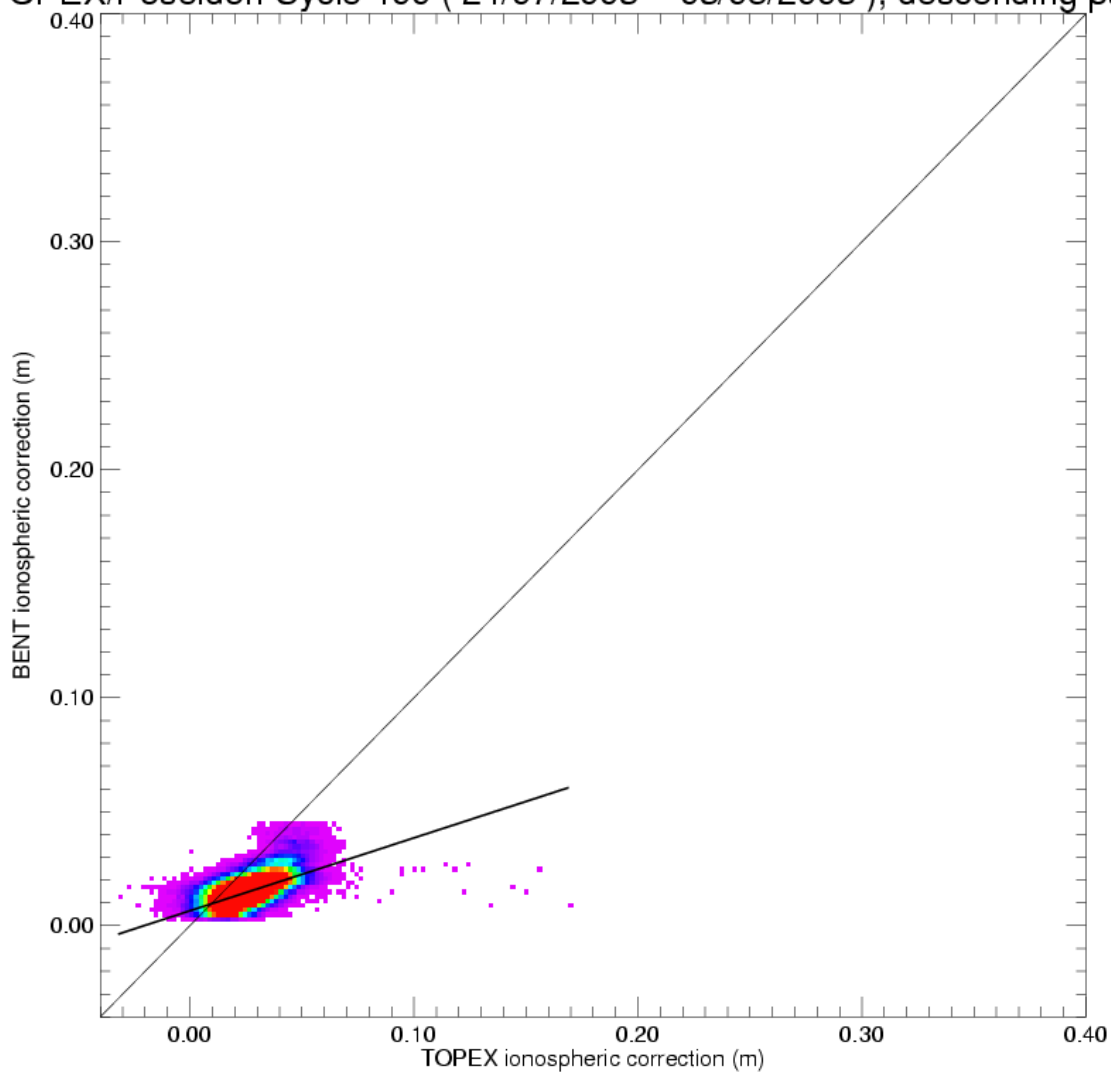
Order 1 fit polynom

$y = a x + b$
 $a = 0.64830154$
 $b = 0.00531376$

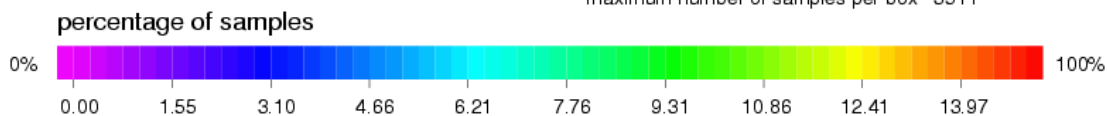
Legend

— Order 1 fit polynom
 — Bisectrix

TOPEX/Poseidon Cycle 400 (24/07/2003 – 03/08/2003), descending passes



minimum number of samples per box 1
 maximum number of samples per box 3511



Statistics Y-X

mean = -0.00996
 rms = 0.01301
 std = 0.00837

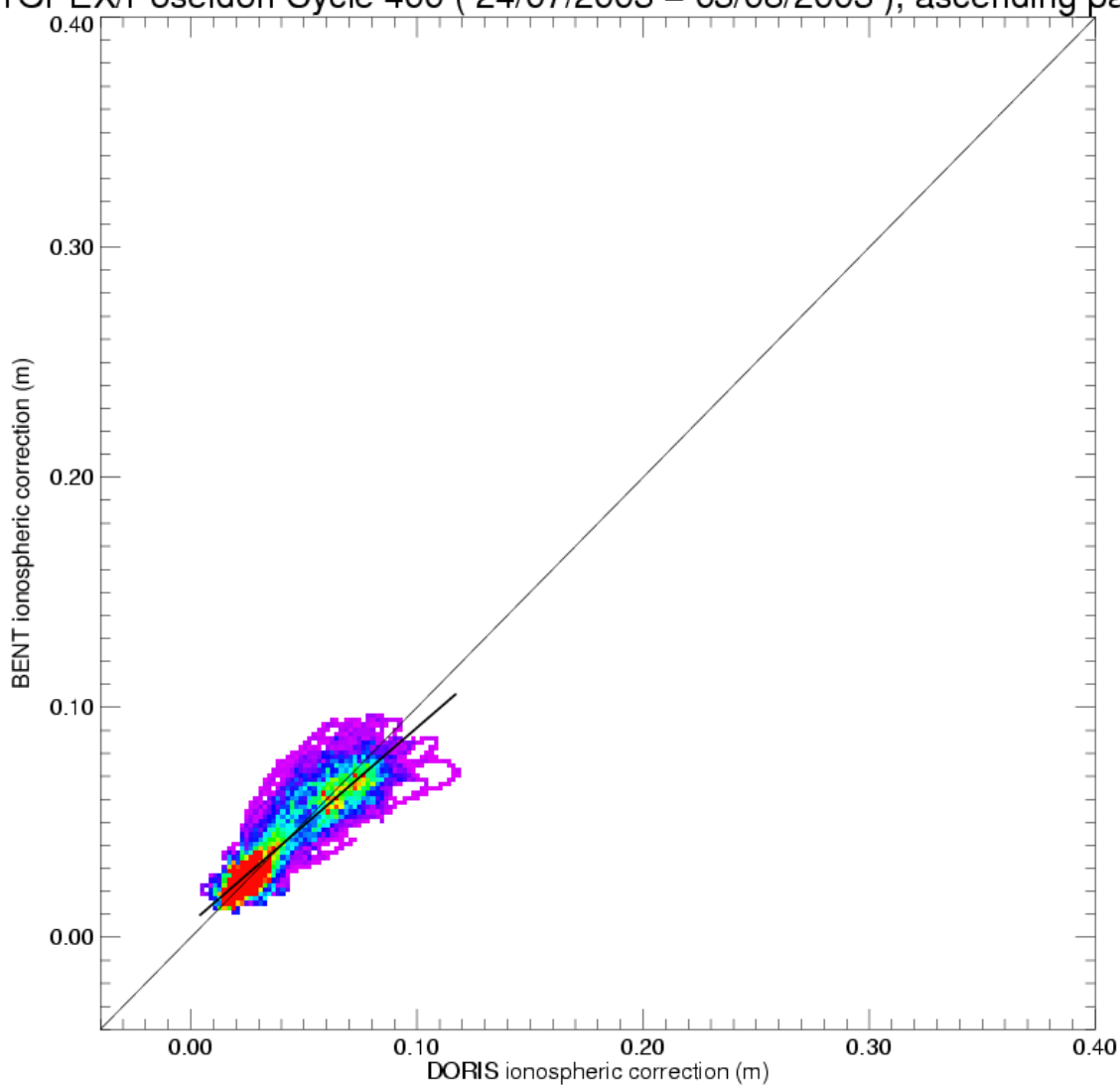
Order 1 fit polynom

$y = a x + b$
 $a = 0.31971702$
 $b = 0.00652453$

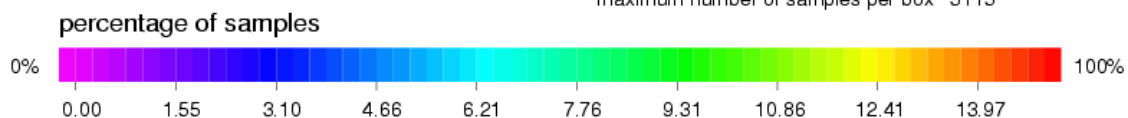
Legend

— Order 1 fit polynom
 — Bisectrix

TOPEX/Poseidon Cycle 400 (24/07/2003 – 03/08/2003), ascending passes



minimum number of samples per box 1
 maximum number of samples per box 3115



Statistics Y-X

mean = 0.00057
 rms = 0.00878
 std = 0.00876

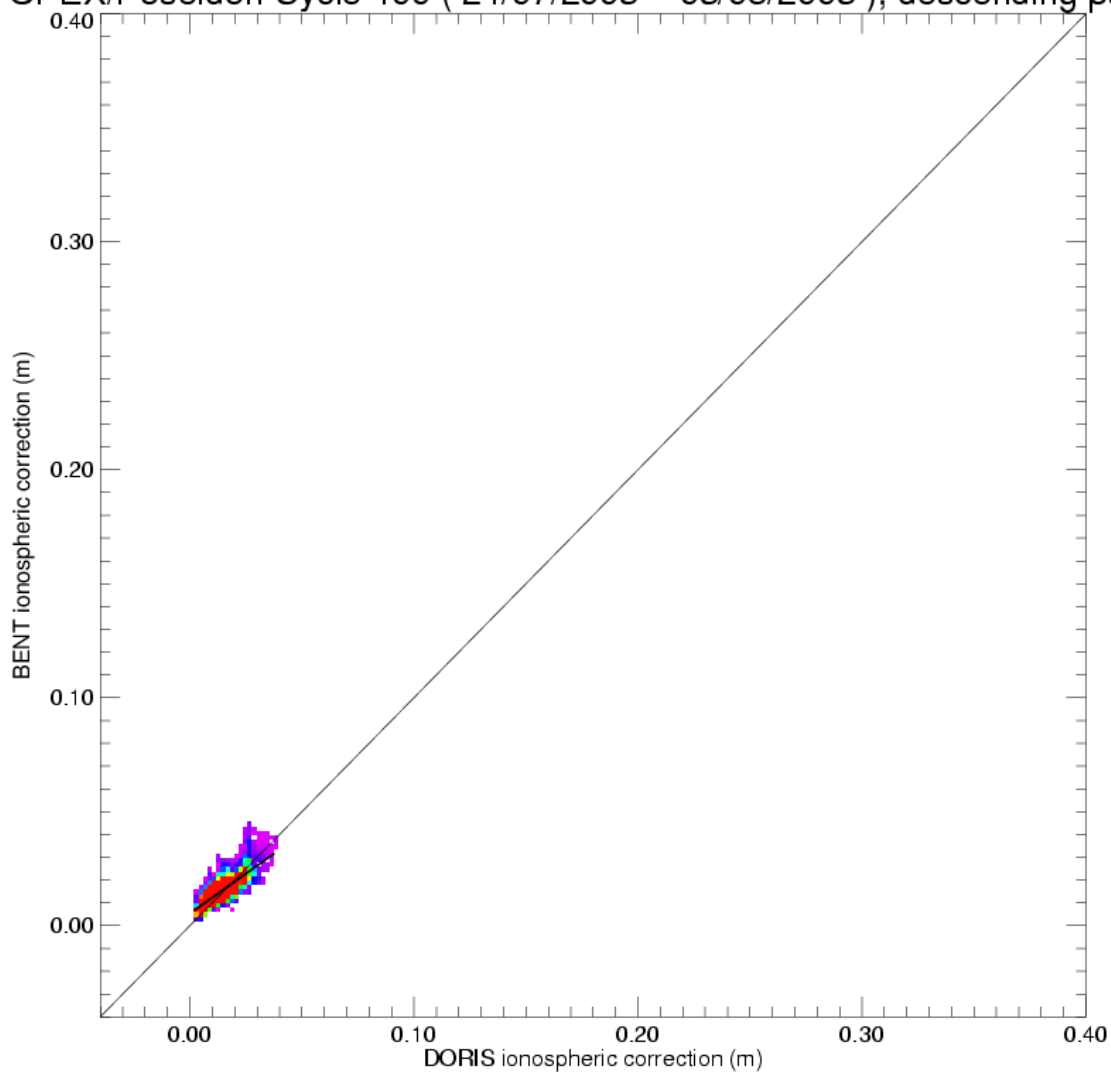
Order 1 fit polynom

$y = a x + b$
 $a = 0.84965301$
 $b = 0.00621387$

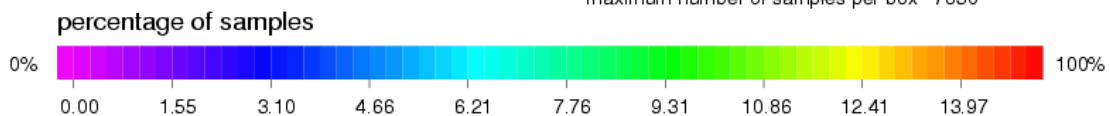
Legend

— Order 1 fit polynom
 — Bisectrix

TOPEX/Poseidon Cycle 400 (24/07/2003 – 03/08/2003), descending passes



minimum number of samples per box 1
 maximum number of samples per box 7830



Statistics Y-X

mean = 0.00151
 rms = 0.00417
 std = 0.00389

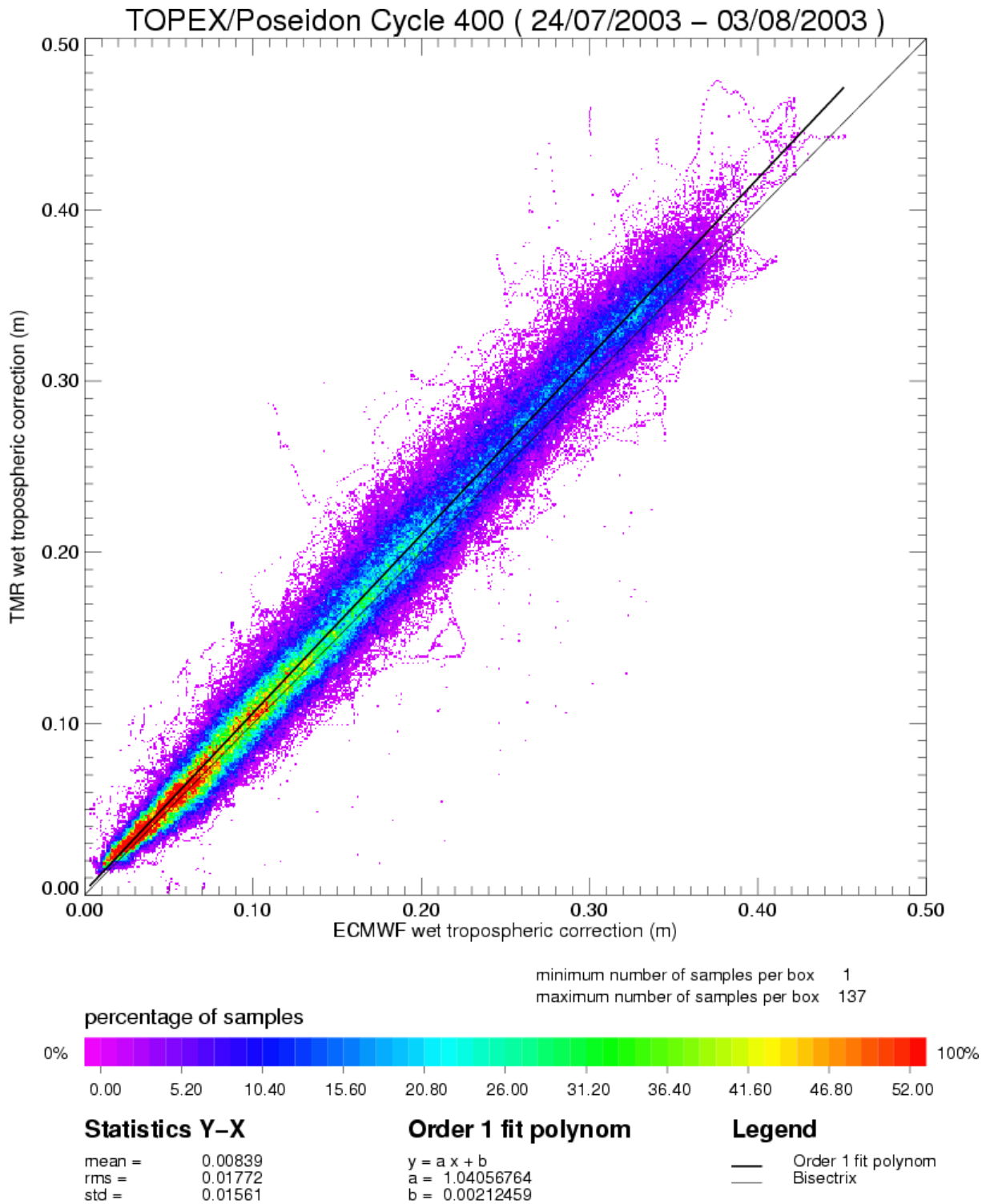
Order 1 fit polynom

$y = a x + b$
 $a = 0.69995636$
 $b = 0.00533829$

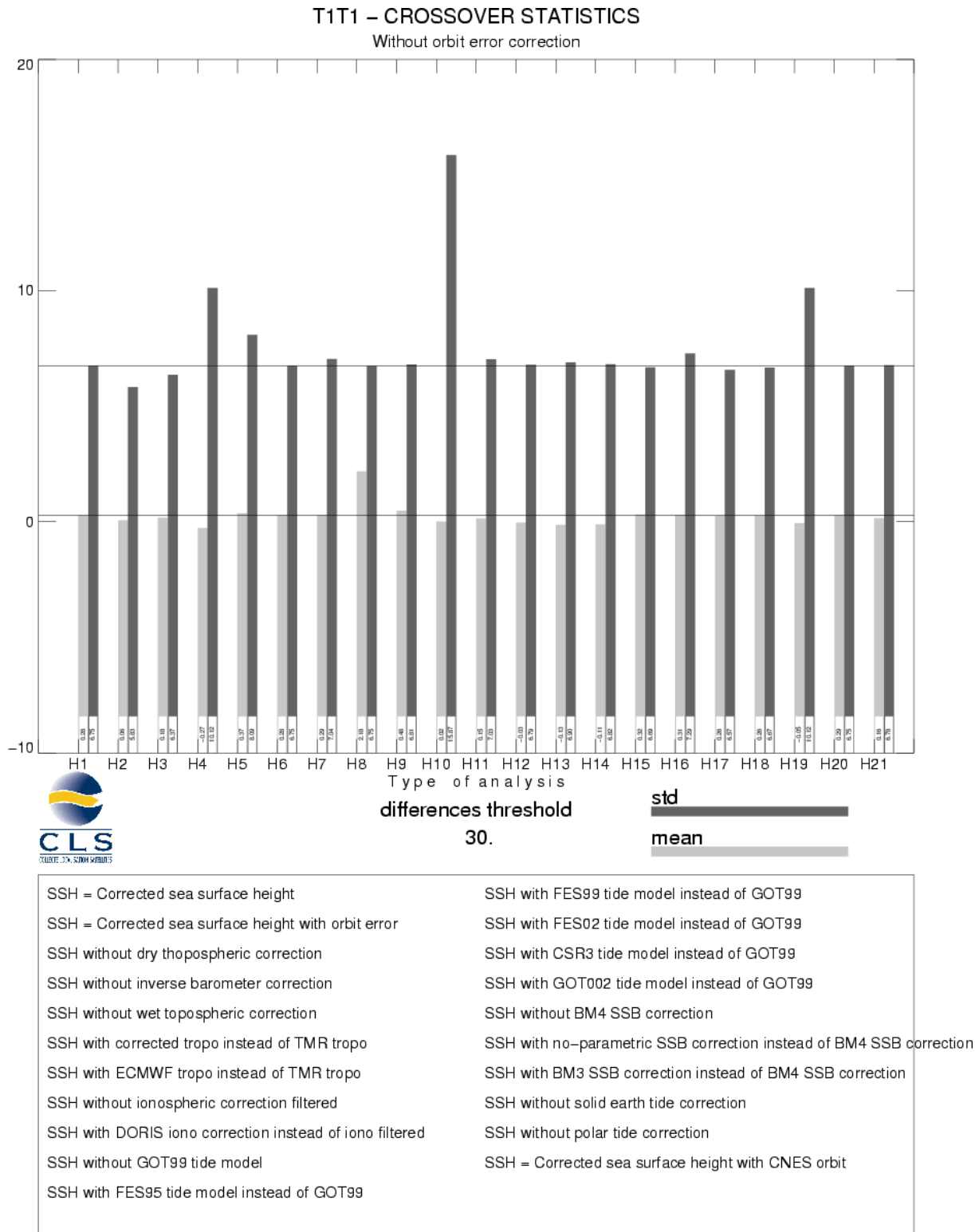
Legend

— Order 1 fit polynom
 - - - Bisectrix

3.6 Wet tropospheric correction



3.7 Crossover statistics



T1T1 – CROSSOVER STATISTICS

Without orbit error correction

SSH = Corrected sea surface height

RAPPEL DES SELECTIONS

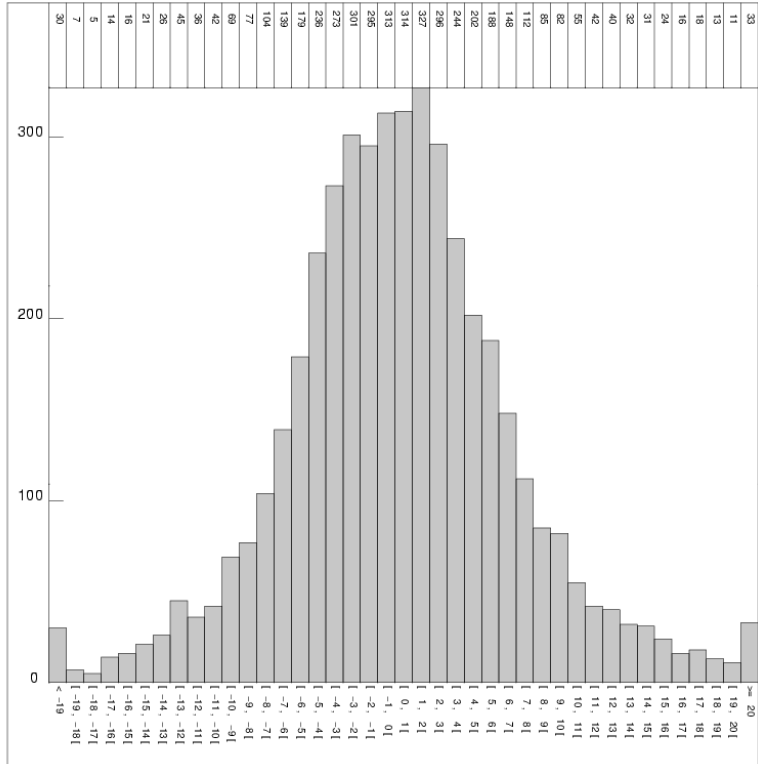
Type de points de croisement: T1T1
 Zone géographique (deg): -90 / 90 , 0 / 360
 Seuil sur les écarts d'analyse 0.00 (moy) 30.00 (seuil)
 Selection(s) sur les champs :
 CL Arc 1 :=INTERP_SPLN
 CL Arc 2 :=INTERP_SPLN
 Seuil Min +: 0.0000000
 Seuil Max : 0.0000000

Selection(s) sur les écarts :
 Aucune

RESULTATS STATISTIQUES

Valeur minimale : -29.5500
 Valeur maximale : 29.5200
 Différence Max – Min: 59.0700
 Nombre de points lus: 4655
 Nombre de points sélectionnés: 4541
 Moyenne : 0.283303
 Écart-type : 6.75061
 Moyenne Quadratique : 6.75655

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T1T1 – CROSSOVER STATISTICS

With orbit error correction

SSH = Corrected sea surface height

RAPPEL DES SELECTIONS

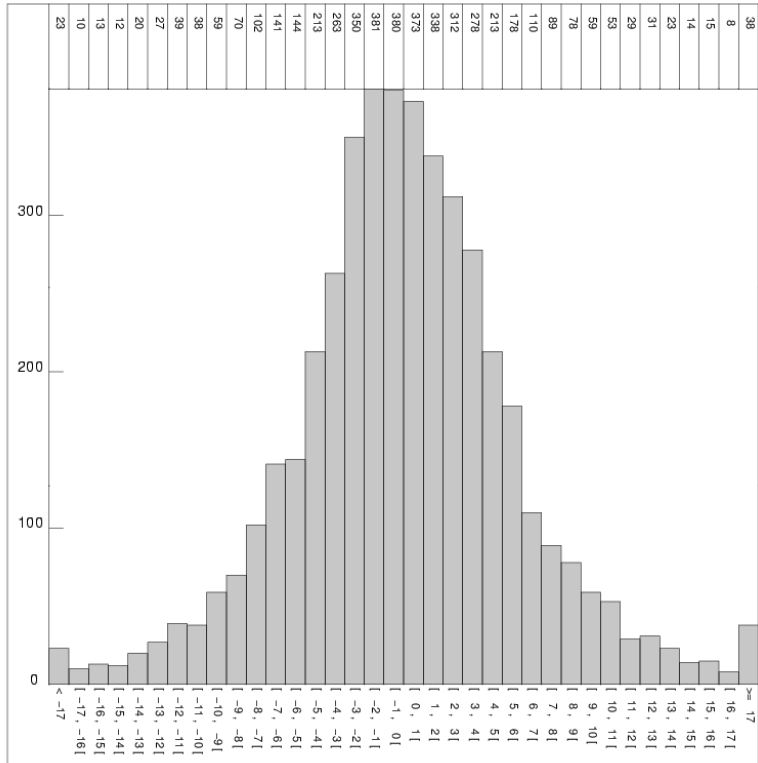
Type de points de croisement: T1T1
 Zone géographique (deg): -90 / 90 , 0 / 360
 Seuil sur les écarts d'analyse 0.00 (moy) 30.00 (seuil)
 Selection(s) sur les champs :
 CL Arc 1 :=INTERP_SPLN
 CL Arc 2 :=INTERP_SPLN
 Seuil Min +: 0.0000000
 Seuil Max : 0.0000000

Selection(s) sur les écarts :
 Aucune

RESULTATS STATISTIQUES

Valeur minimale : -26.4700
 Valeur maximale : 28.9400
 Différence Max – Min: 55.4100
 Nombre de points lus: 4655
 Nombre de points sélectionnés: 4524
 Moyenne : 0.0642370
 Écart-type : 5.83259
 Moyenne Quadratique : 5.83294

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T1T1 – CROSSOVER STATISTICS
SSH, BATHY < -1000 m, VAR_OCE < 20 cm, LAT [-50°, +50]
SSH = Corrected sea surface height before orbit error

RAPPEL DES SELECTIONS

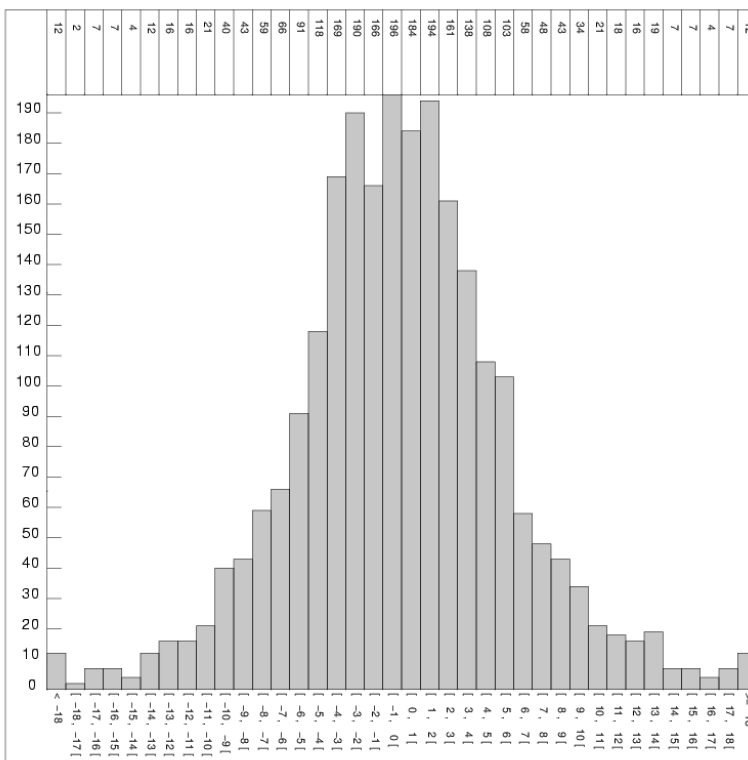
Type de points de croisement: T1T1
 Zone géographique (deg): -50 / 50 , 0 / 360
 Seuil sur les écarts d'analyse : aucun
 Selection(s) sur les champs :
 CL Arc 1 : =BATHY
 CL Arc 2 : =BATHY
 Seuil Min : aucun
 Seuil Max : -100000.00
 CL Arc 1 : =VAR_OCE
 CL Arc 2 : =VAR_OCE
 Seuil Min : aucun
 Seuil Max : 20.000000
 [...]

 Selection(s) sur les écarts :
 Aucune

RESULTATS STATISTIQUES

Valeur minimale : -75.0900
 Valeur maximale : 36.0300
 Différence Max – Min: 111.120
 Nombre de points lus: 2630
 Nombre de points selectionnes: 2417
 Moyenne : -0.0805920
 Ecart-type : 6.12891
 Moyenne Quadratique : 6.12944

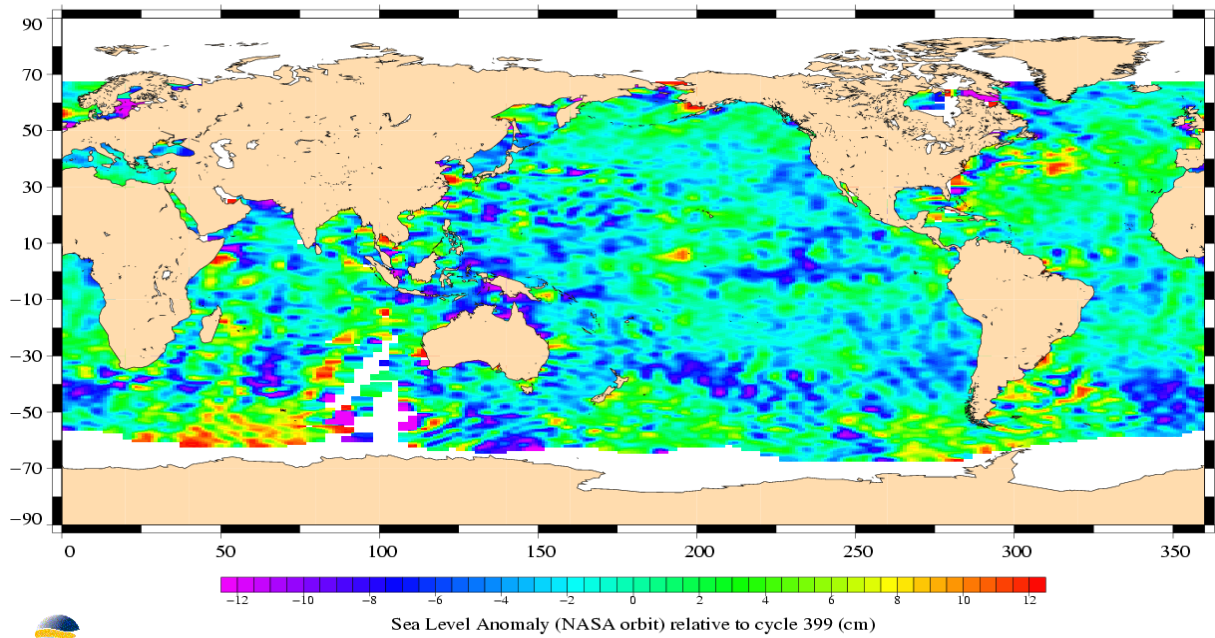
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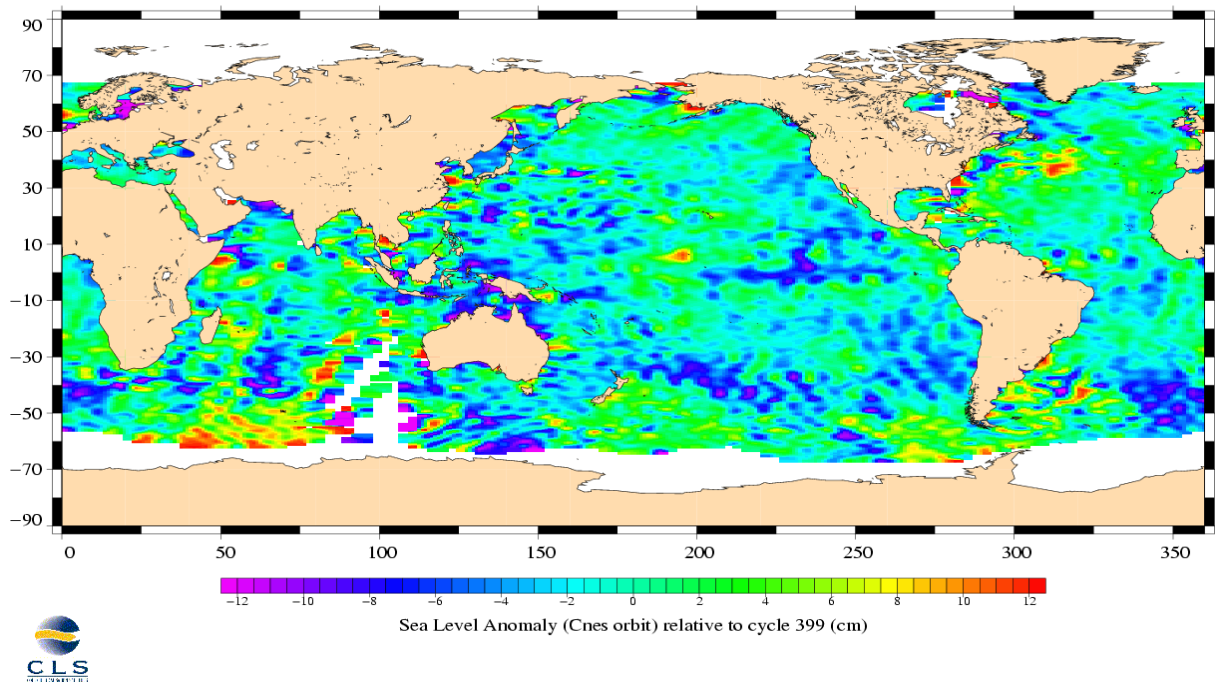
3.8 SSH variability

3.8.1 Sea Level Anomaly

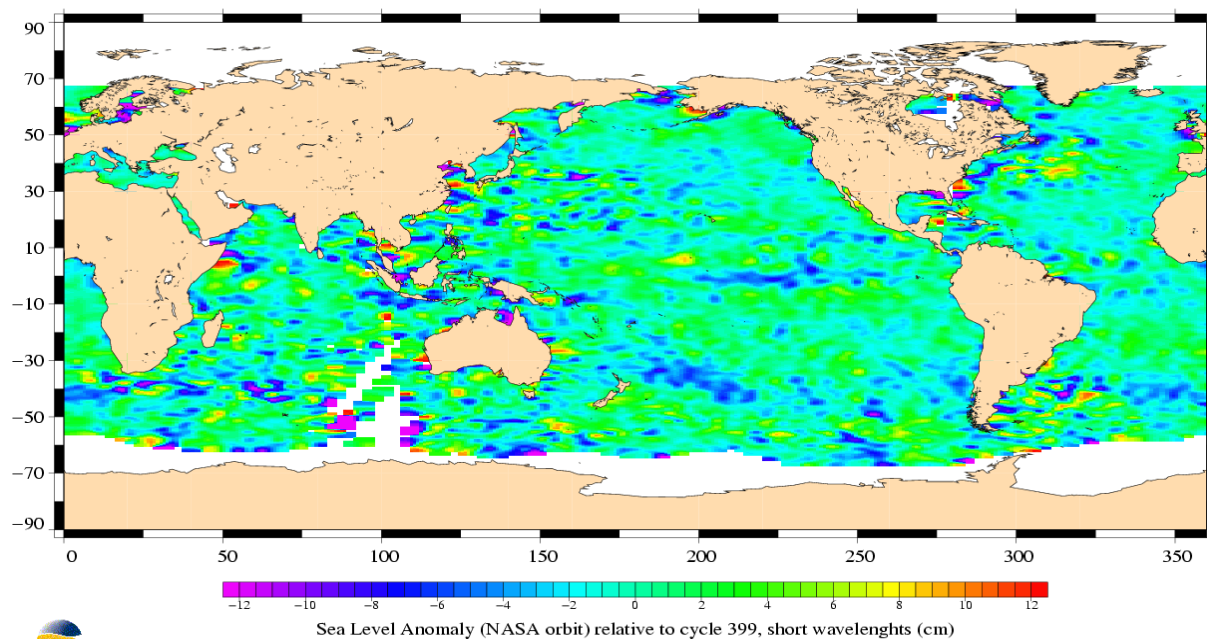
TOPEX/Poseidon, cycle 400
Period : 24/07/2003 – 03/08/2003



TOPEX/Poseidon, cycle 400
Period : 24/07/2003 – 03/08/2003



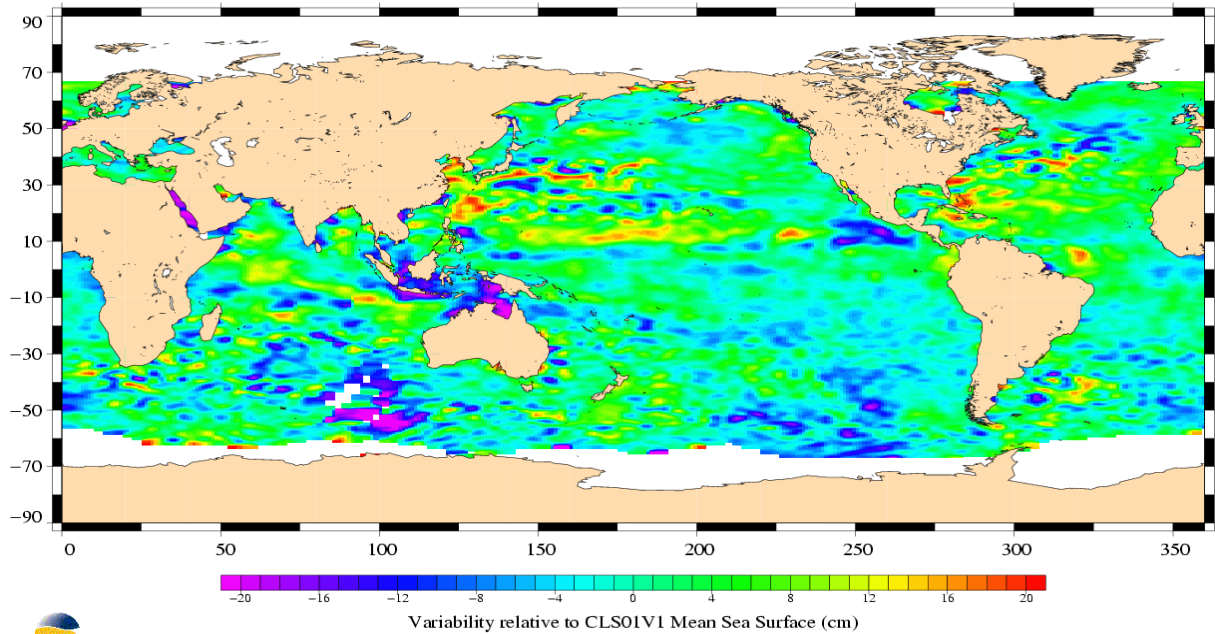
TOPEX/Poseidon, cycle 400
Period : 24/07/2003 – 03/08/2003



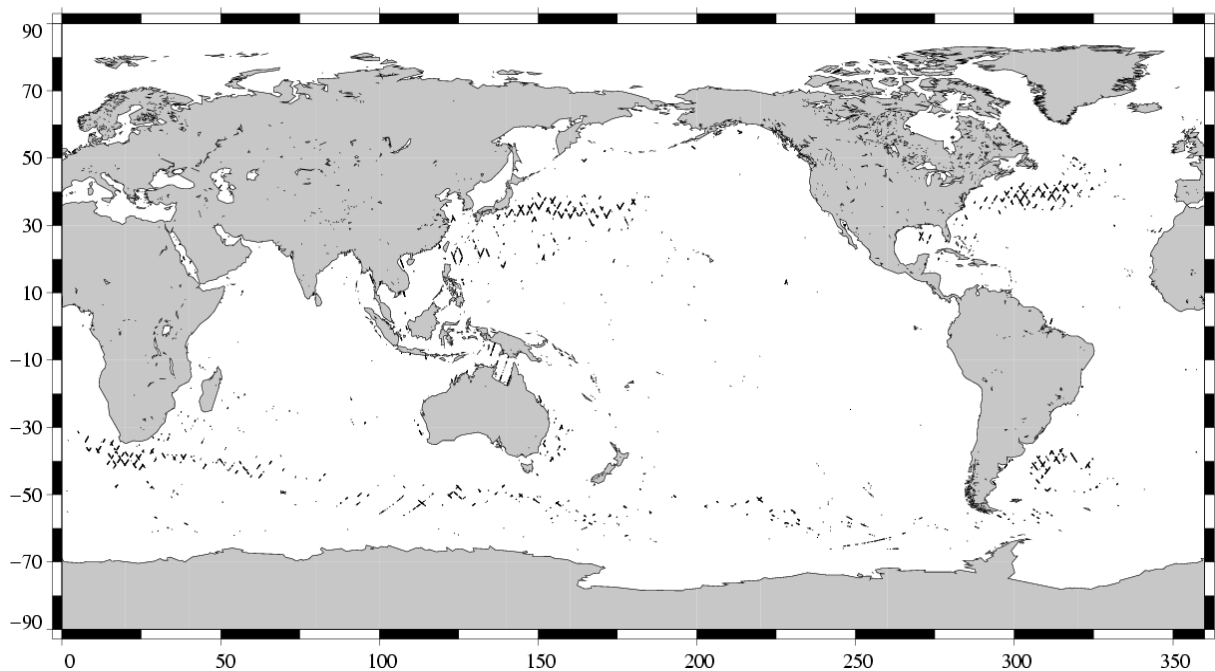
3.8.2 Comparison to a precise Mean Sea Surface

The CLS (2001) MSS model is used as a reference to compute SLA. The two following maps respectively show the map of Topex SLA relative to the MSS and differences higher than a 30 cm threshold (after centering the data). The latter figure shows that higher differences are located in high ocean variability areas, as expected.

TOPEX/Poseidon, cycle 400
Period : 24/07/2003 – 03/08/2003

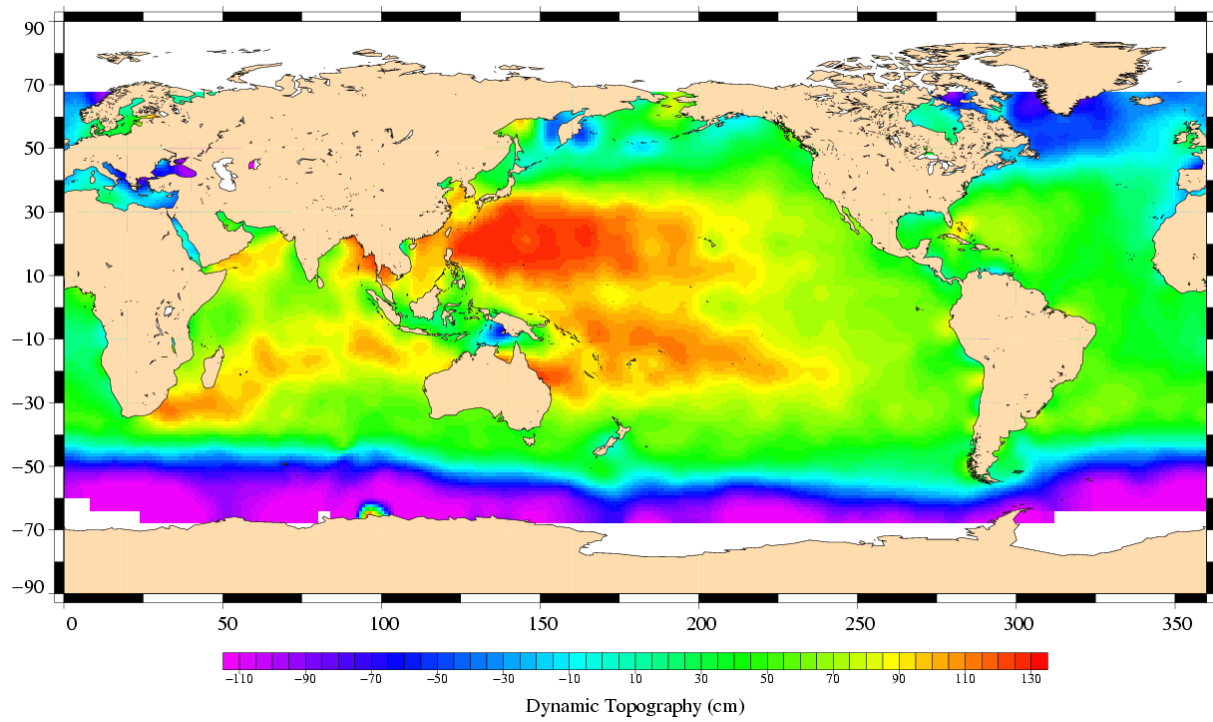


(SSH - MSS) differences greater than 0.3 m
TOPEX/Poseidon Cycle 400 (24/07/2003 / 03/08/2003)



3.9 Dynamic topography

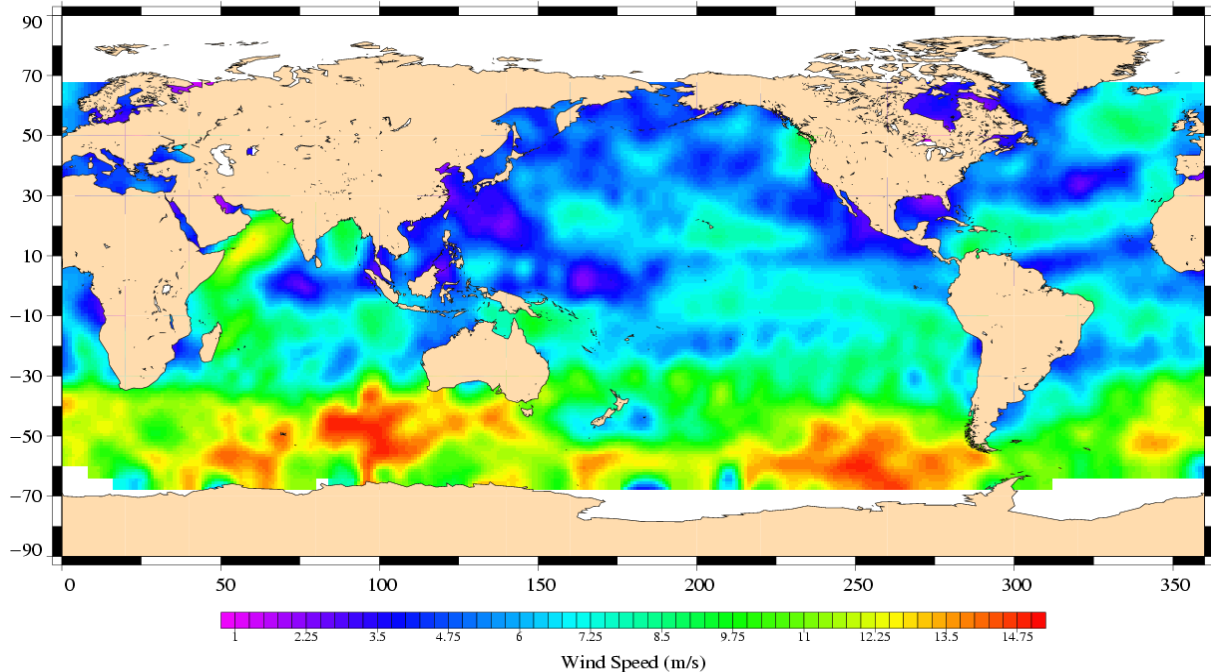
TOPEX/Poseidon, cycle 400
Period : 24/07/2003 – 03/08/2003



3.10 Wind and wave maps

These two figures show wind and wave estimations derived from 10 days of altimeter measurements.

TOPEX/Poseidon, cycle 400
Period : 24/07/2003 – 03/08/2003



TOPEX/Poseidon, cycle 400
Period : 24/07/2003 – 03/08/2003

