



TOPEX/Poseidon MGRD Quality Assessment Report

Cycle 437

25-07-2004 02-08-2004

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SALP-RP-P2-EX-21120-CLS437

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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 6.53 cm rms, and the standard deviation of Sea Level Anomalies (SLA) relative to a Mean Sea Surface is 8.91 cm.

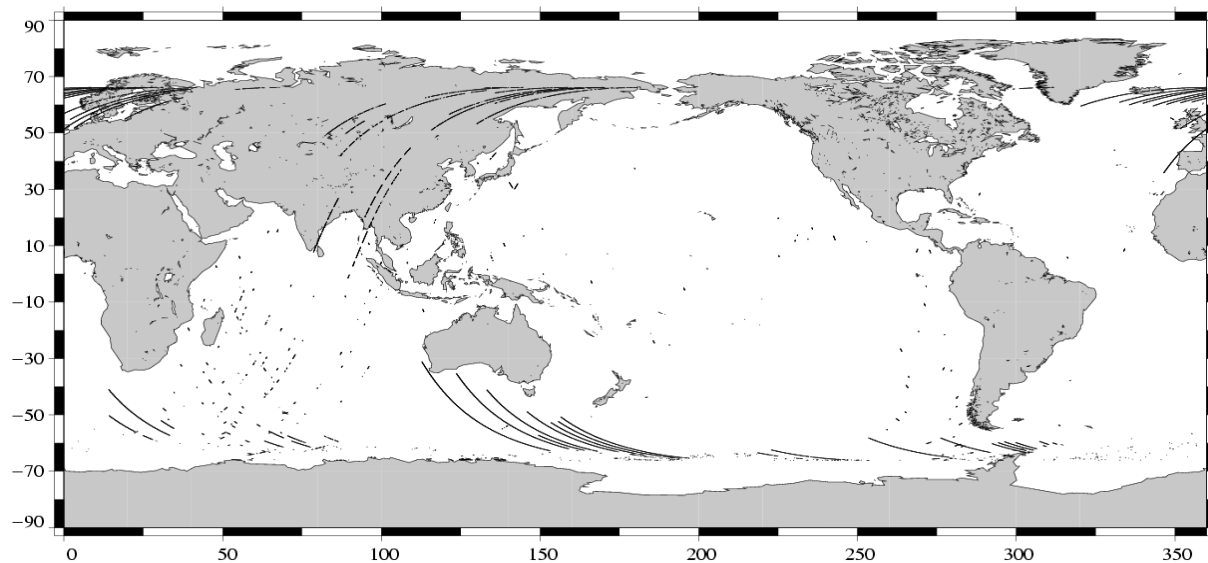
2.2 Warnings and recommendations

- Missing measurements :
 - There is a lot of data gaps due to tape recorder anomalies, especially in the Indian Ocean, in the South Pacific Ocean close to the South and Central America coasts and below the Groenland coasts.
 - Passes 221-254 are missing further to an Orbit Maintenance Maneuver #25 (OMM-25) executed on August 3, performed to test spacecraft thrusters.
- Measurements edited on waveform attitude parameter :
 - A large part of measurements are removed by the waveform attitude parameter on passes 1-19. This is due to the pitch wheel event linked to the T/P safehold mode from cycle 430 to 432 (see electronic communication : T/P Daily Status (26/07/2004)).
- 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 :

 - 3.49% of the measurements are removed by the TMR correction criterion (see the following figure).
 - Passes 93-118 are all removed by the radiometer earth flag.
 - 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 437 (25/07/2004 / 02/08/2004)



3 CALVAL main results

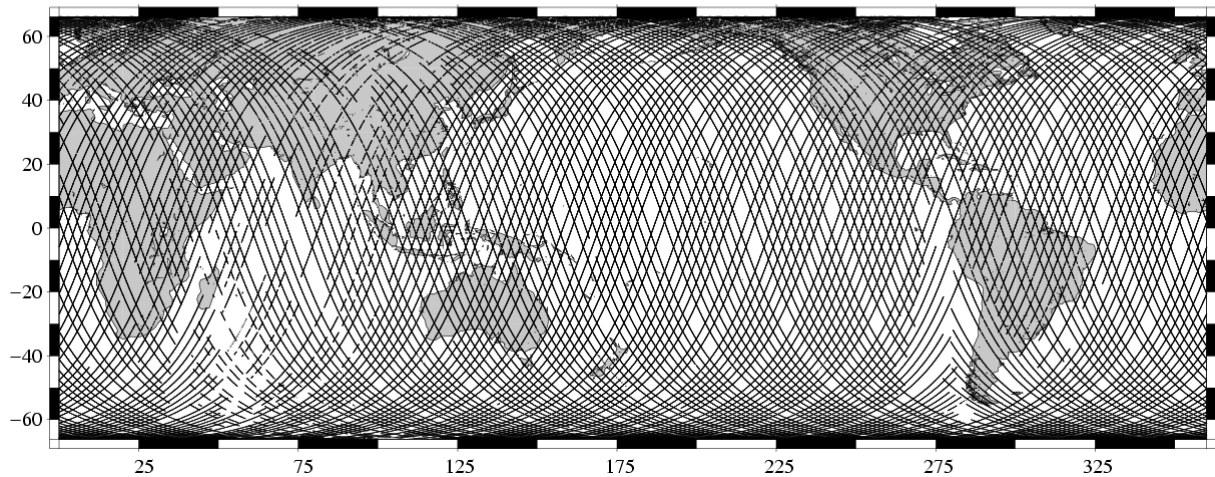
This section presents results that illustrate data quality during this cycle. These verification products are produced operationally so that they allow systematic monitoring of the main relevant parameters.

3.1 Missing measurements

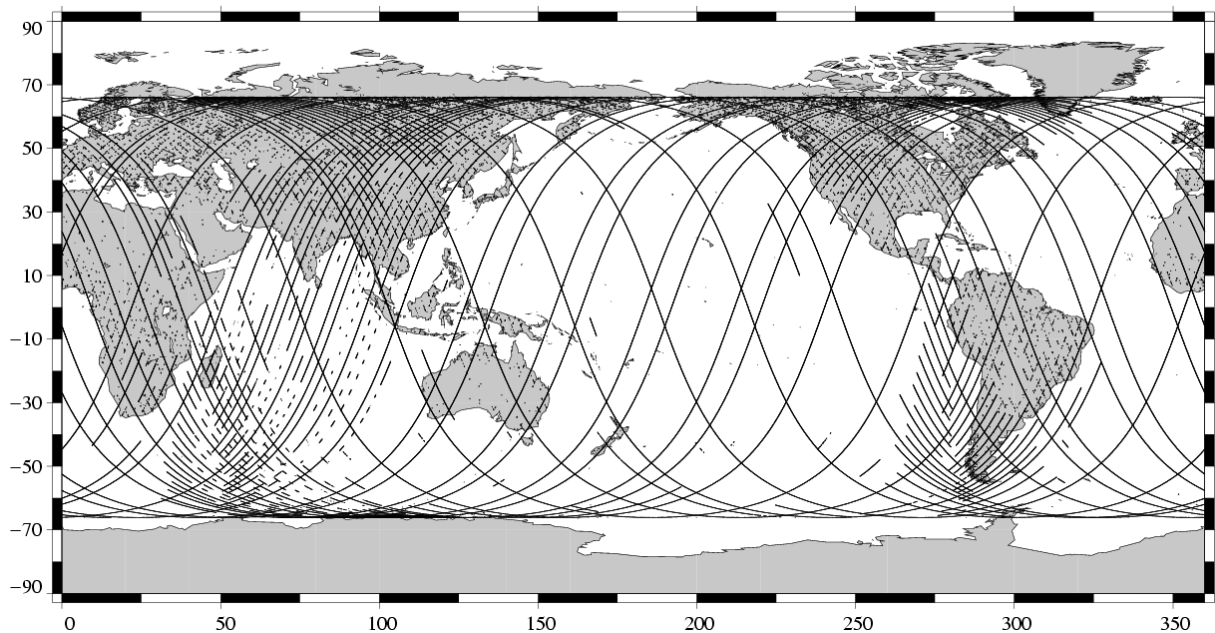
581695 altimeter measurements are present, and 212869 are missing.

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 437 (25/07/2004 / 02/08/2004)

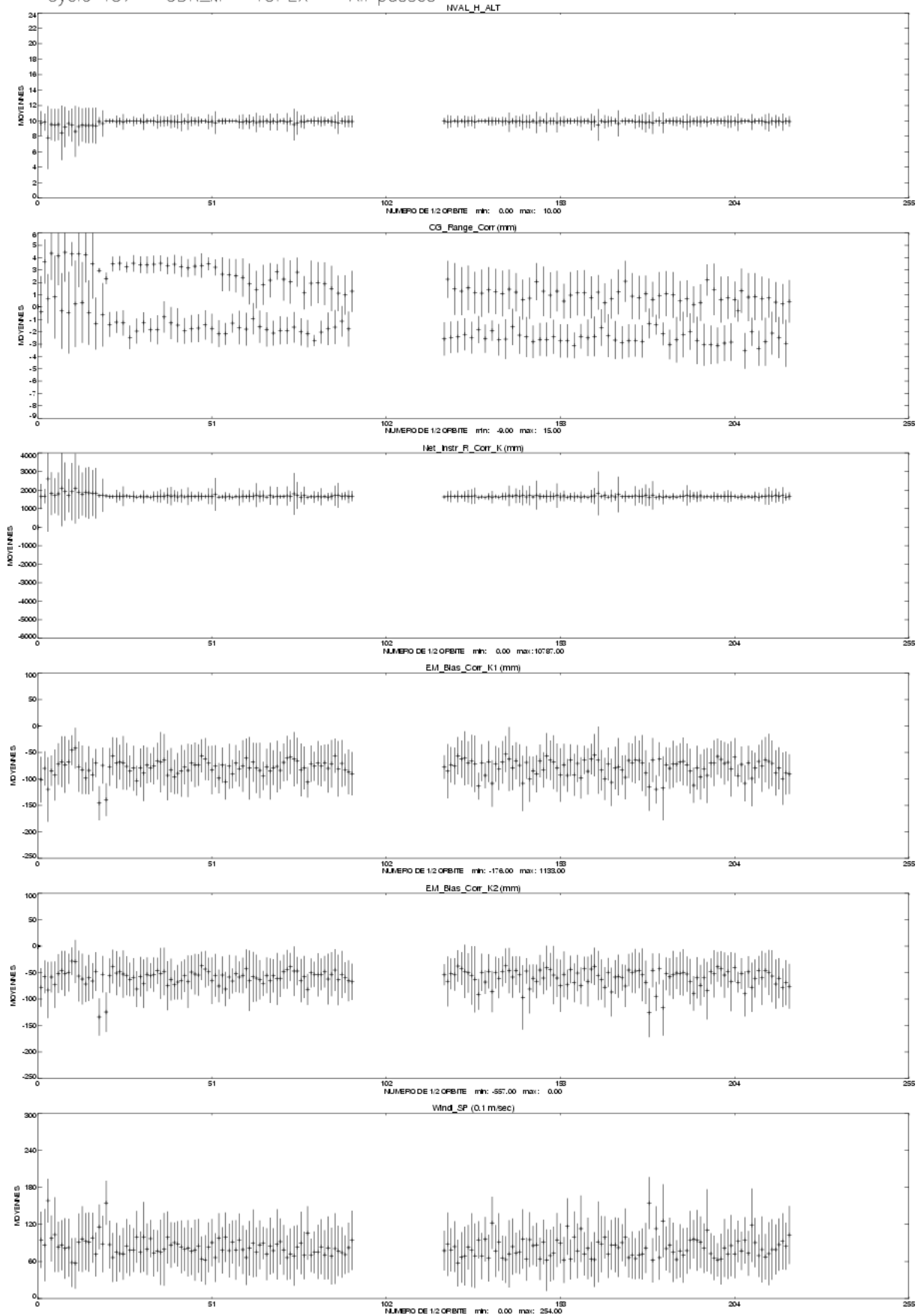


Missing measurements
TOPEX/Poseidon Cycle 437 (25/07/2004 / 02/08/2004)

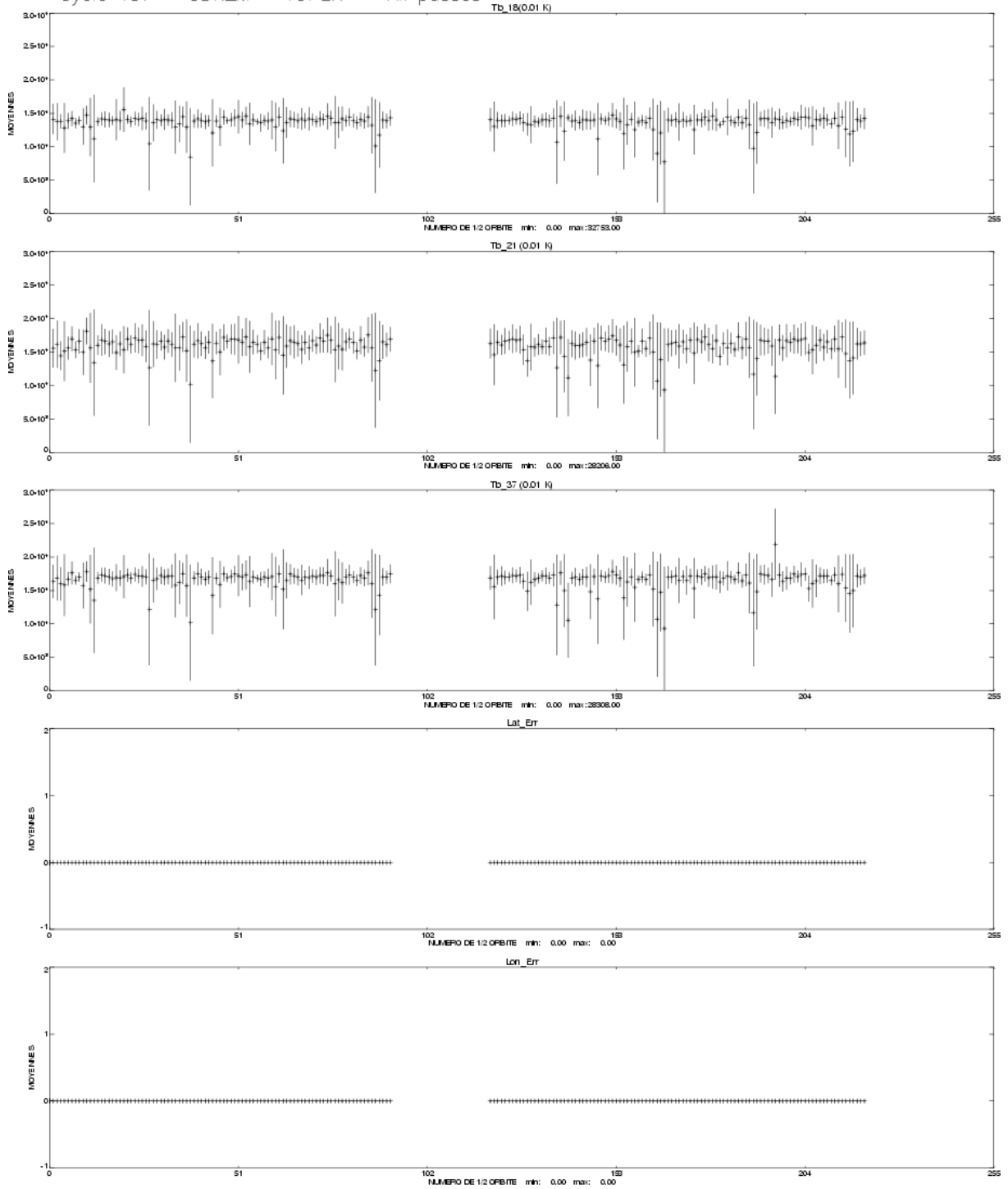


3.2 M-GDR parameter plots

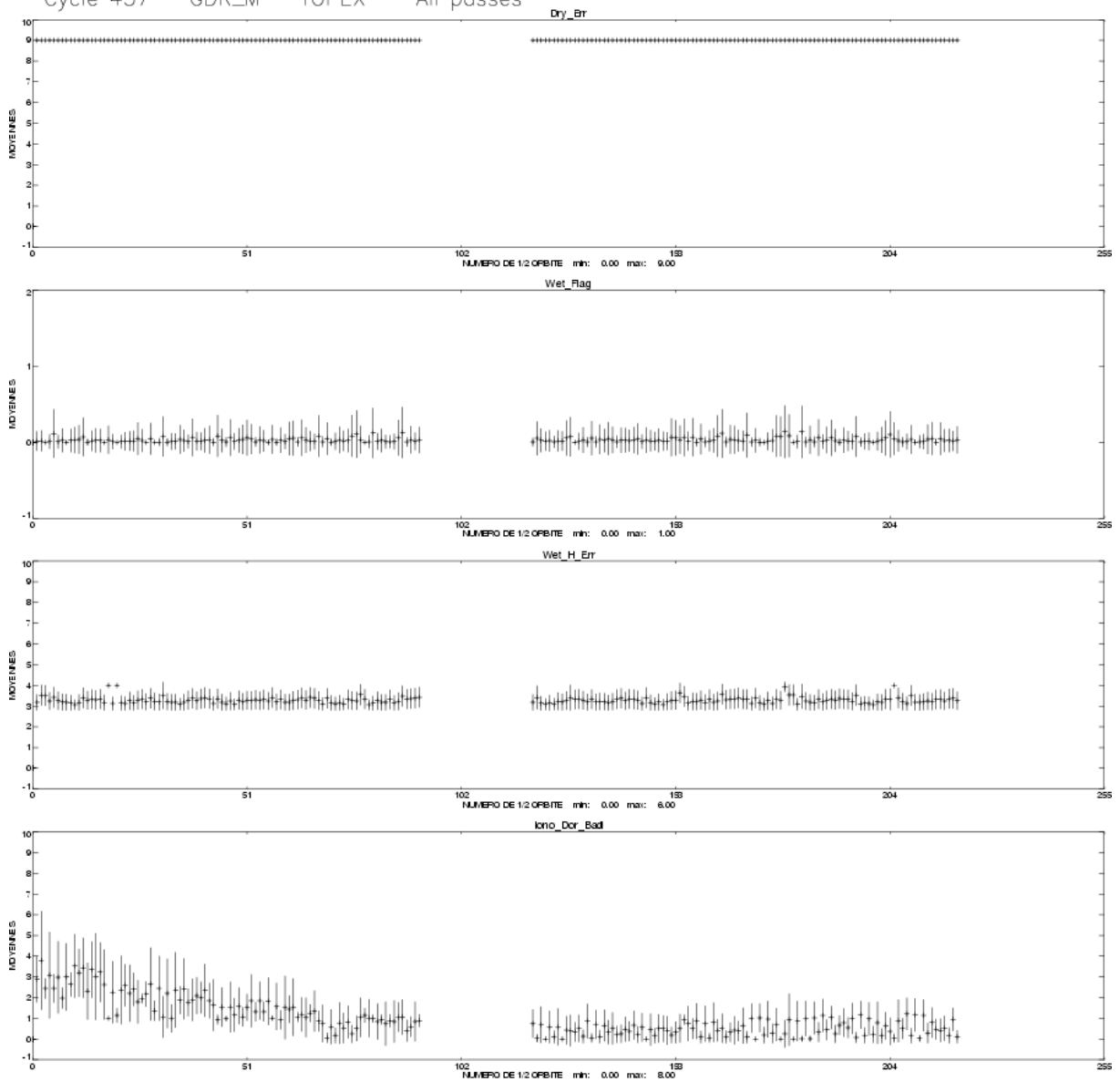
Cycle 437 – GDR_M – TOPEX – All passes –



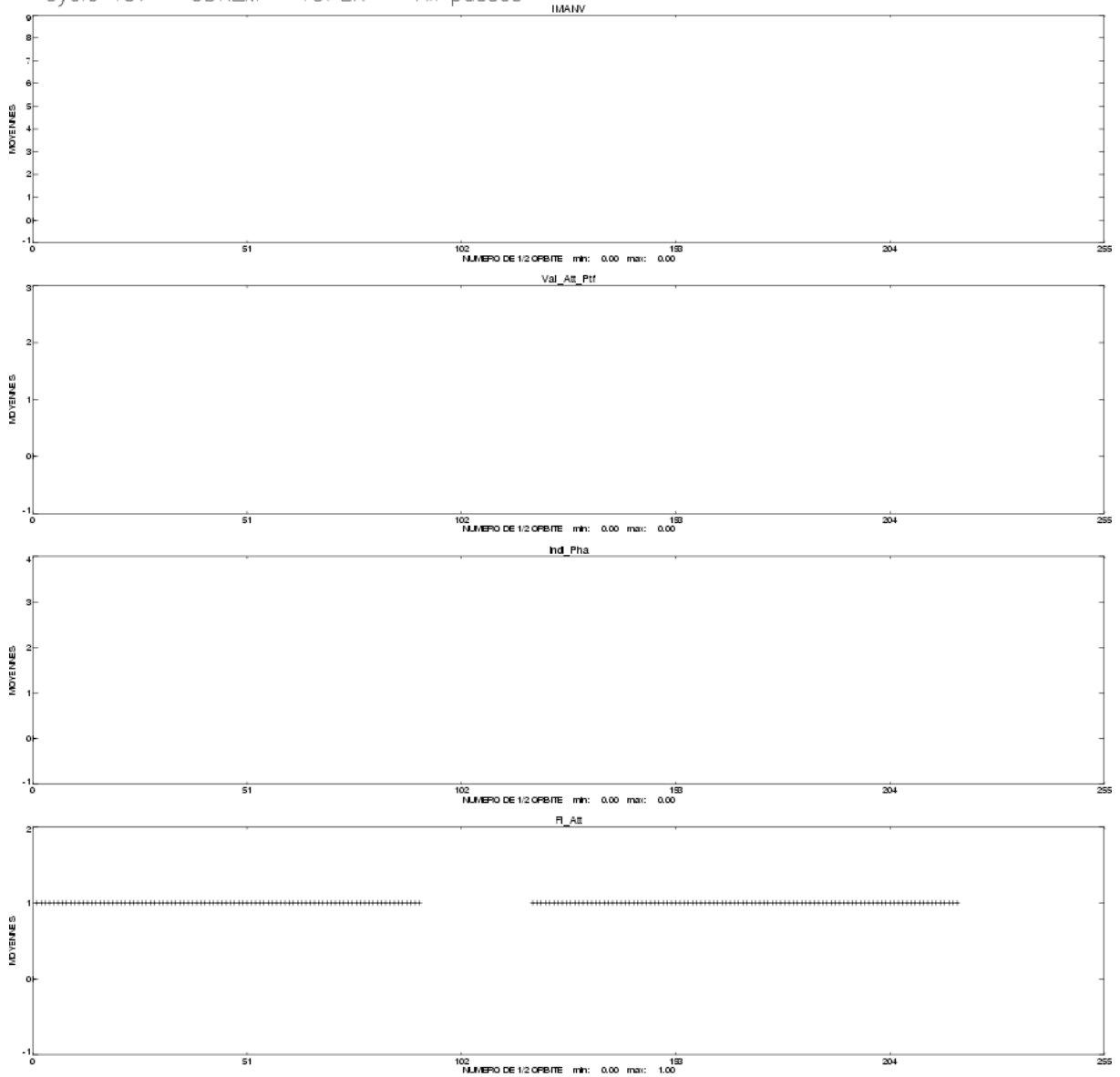
Cycle 437 – GDR_M – TOPEX – All passes –

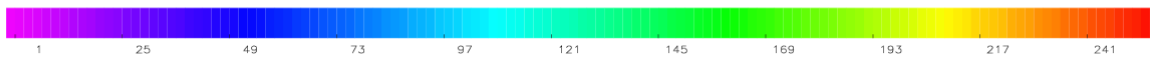
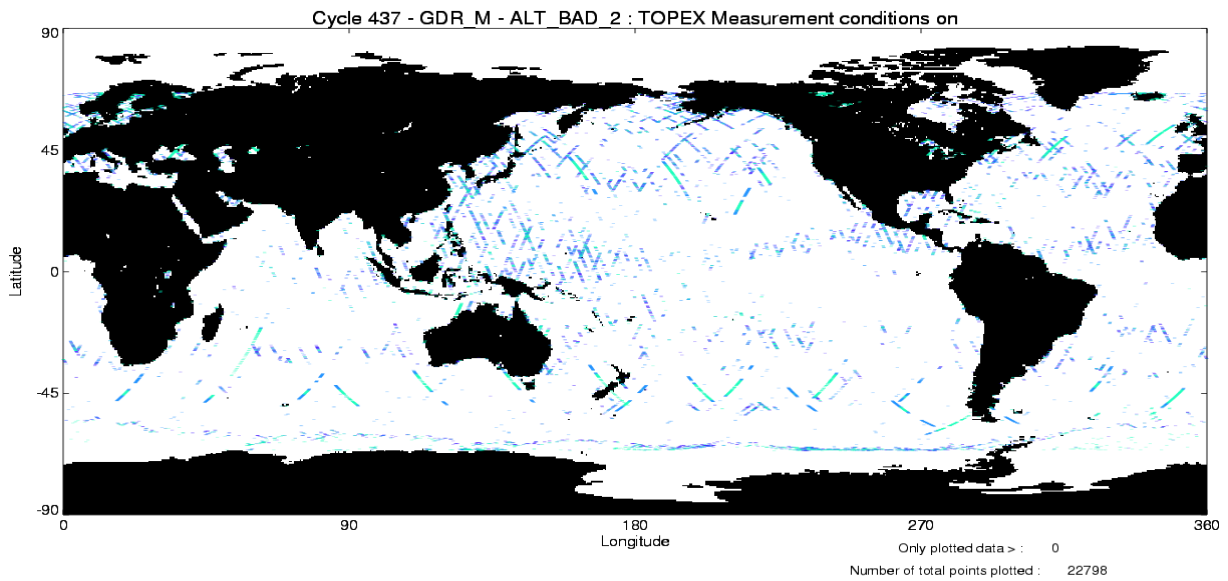
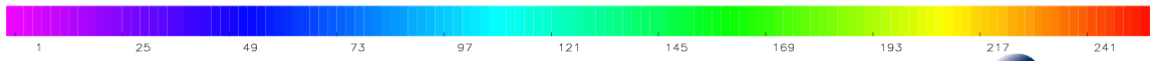
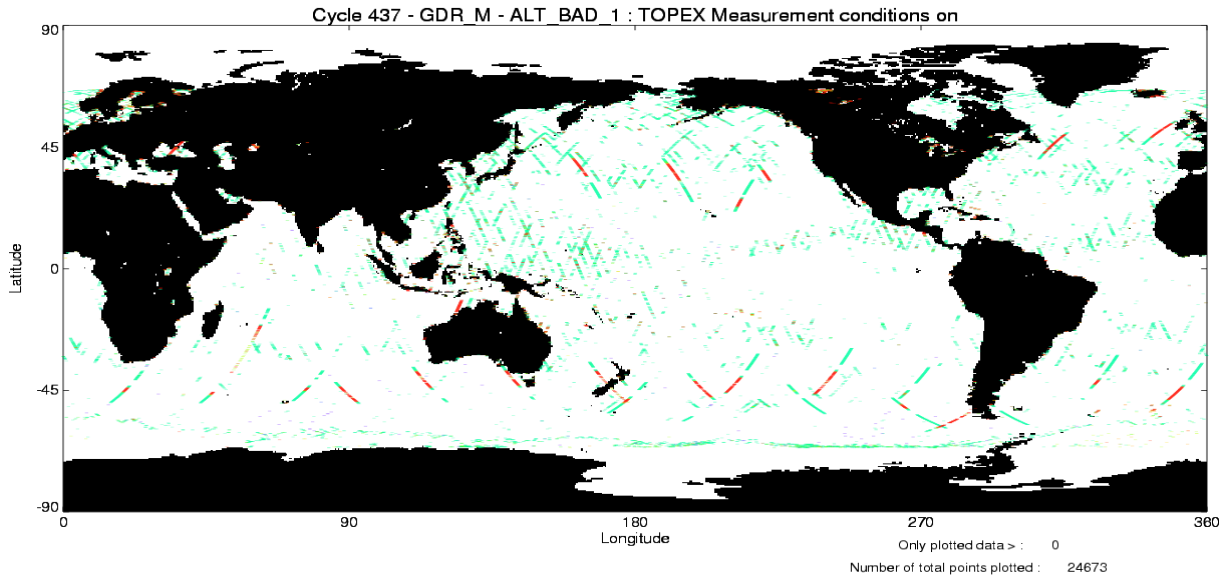


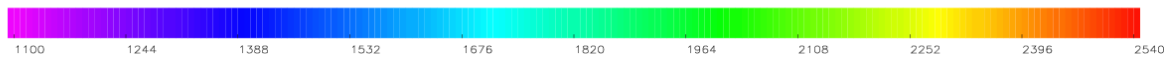
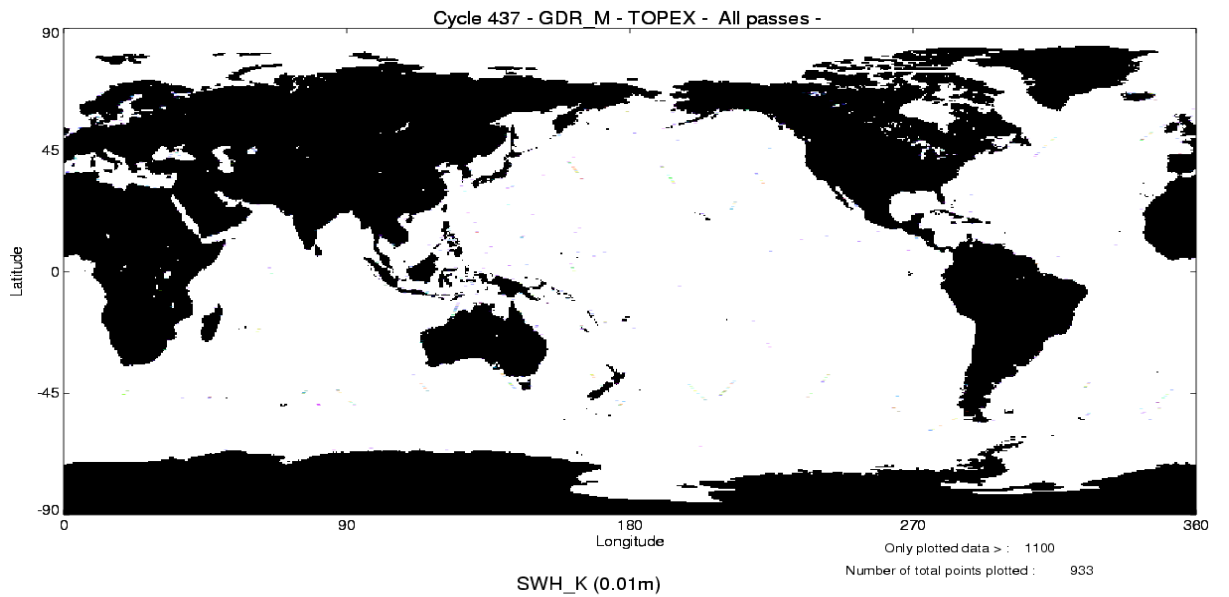
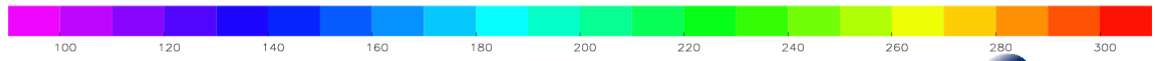
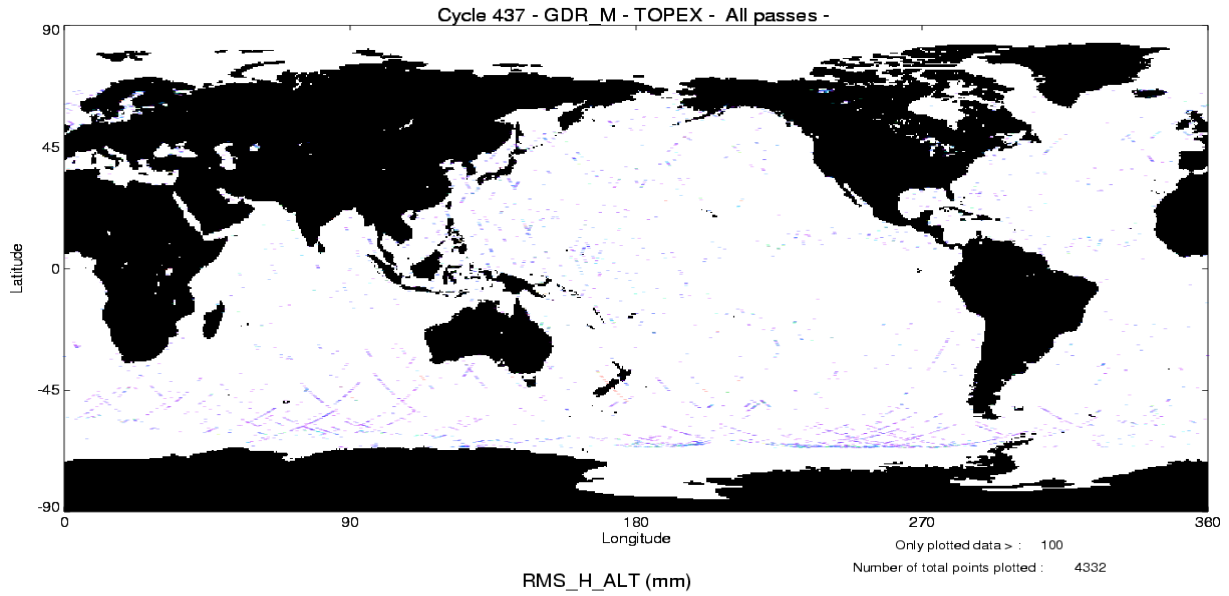
Cycle 437 – GDR_M – TOPEX – All passes –

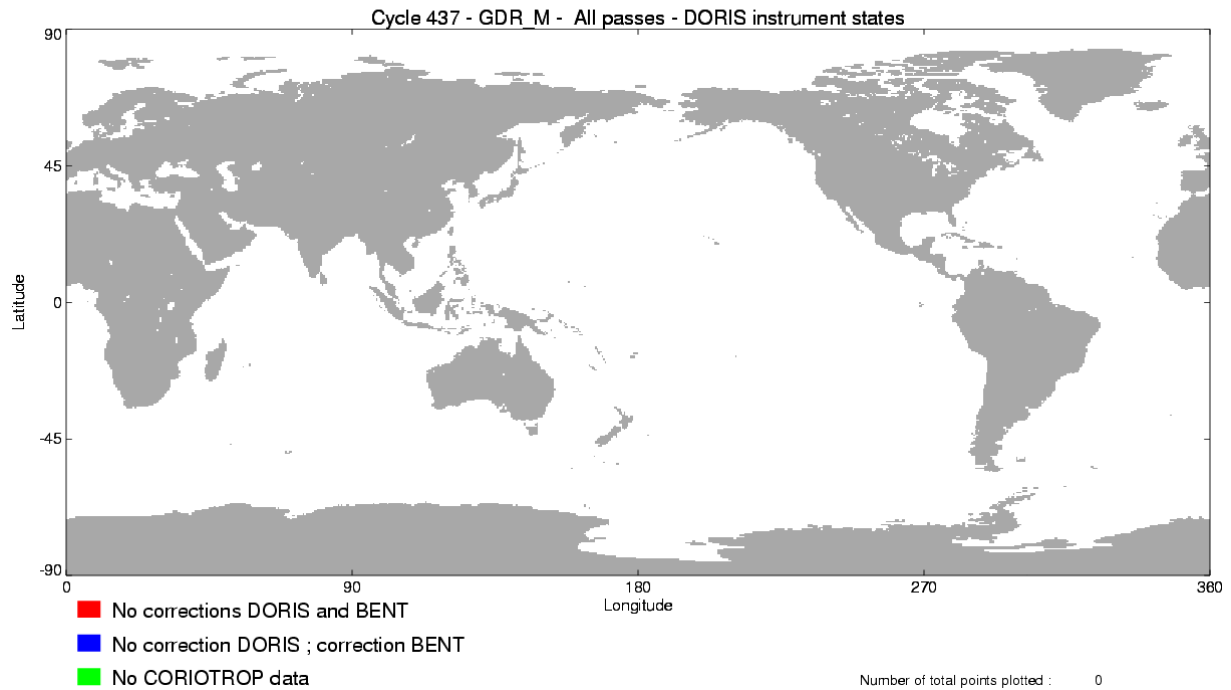


Cycle 437 – GDR_M – TOPEX – All passes –









3.3 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.

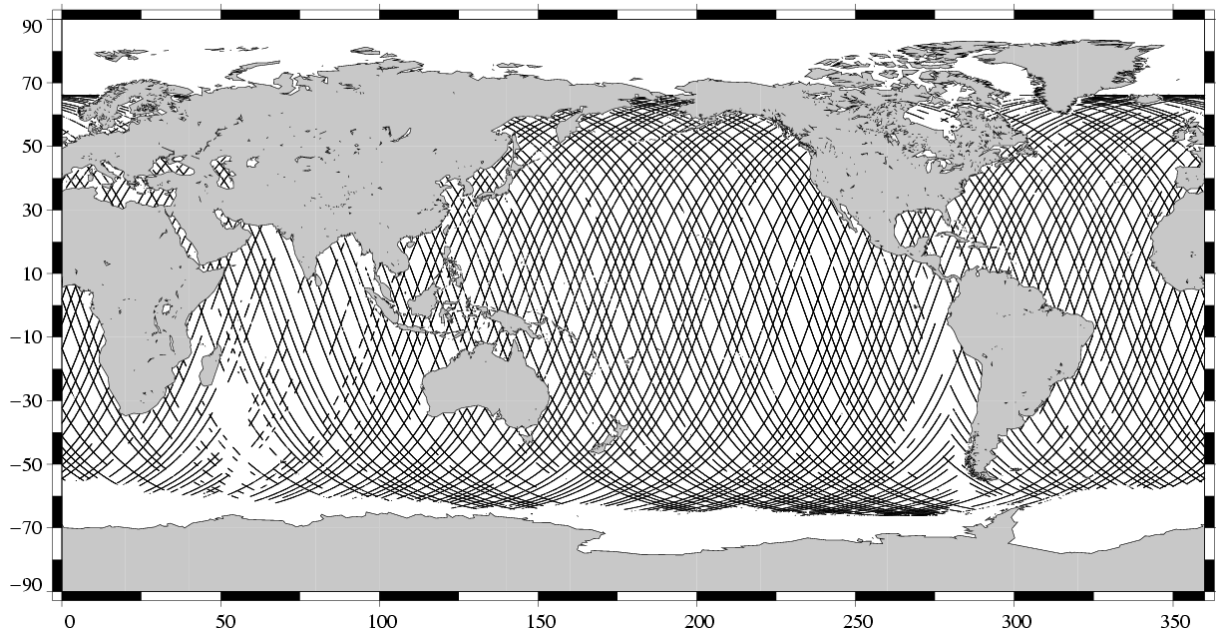
Probably due to the interpolation problem with the TMR, some measurements have radiometer land flag unset over land. This has no impact on the valid data because these measurements have been edited by the altimetric parameter criteria. Nevertheless, this anomaly leads to wrong statistics of the edited 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 (35.15 % of points removed) and ice flag (7.45 % of points removed).

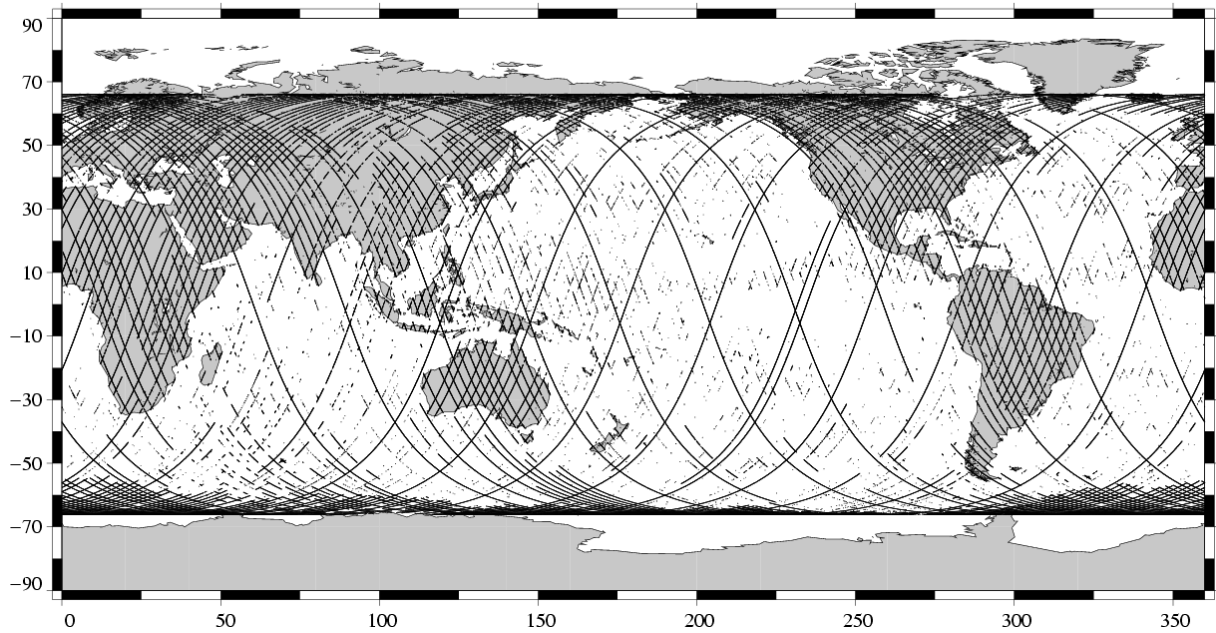
Parameters	Min Thres.	Max Thres.	Unit	Mean % removed in 1997	% removed
Sea surface height	-130.000	100.000	m	1.37	0.43
Number of 20/10Hz valid points Poseidon/TOPEX	5.000	-		1.37	0.78
Std. deviation of range	0.000	0.100	m	1.85	1.77
Off nadir angle from waveform	0.000	0.400	deg	1.36	5.27
Dry tropospheric 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	3.49
Ionospheric correction (Poseidon:Doris, TOPEX: Dual)	-0.400	0.040	m	0.00	0.78
Significant wave height	0.000	11.000	m	1.46	0.19
Sea state Bias	-0.500	0.000	m	1.39	1.05
Backscatter coefficient	7.000	30.000	dB	1.44	1.18
Ocean tide height	-5.000	5.000	m	0.01	0.18
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.

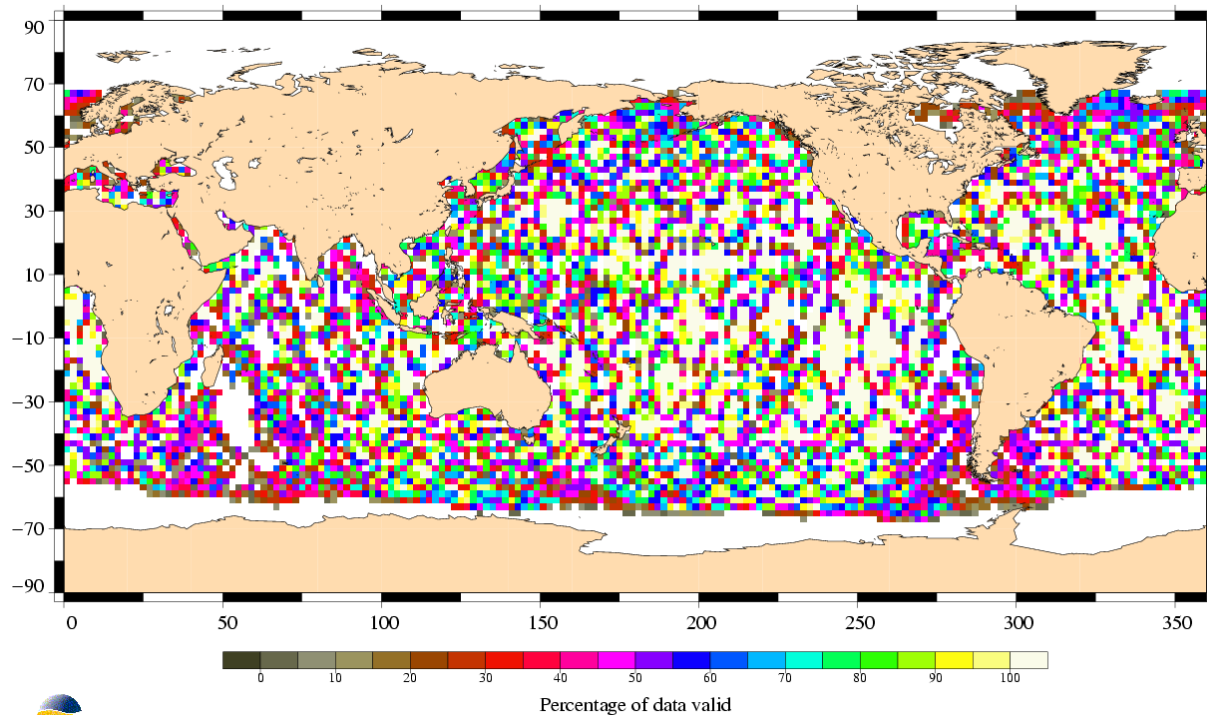
Valid data
TOPEX/Poseidon Cycle 437 (25/07/2004 / 02/08/2004)



Edited measurements
TOPEX Cycle 437 (25/07/2004 / 02/08/2004)

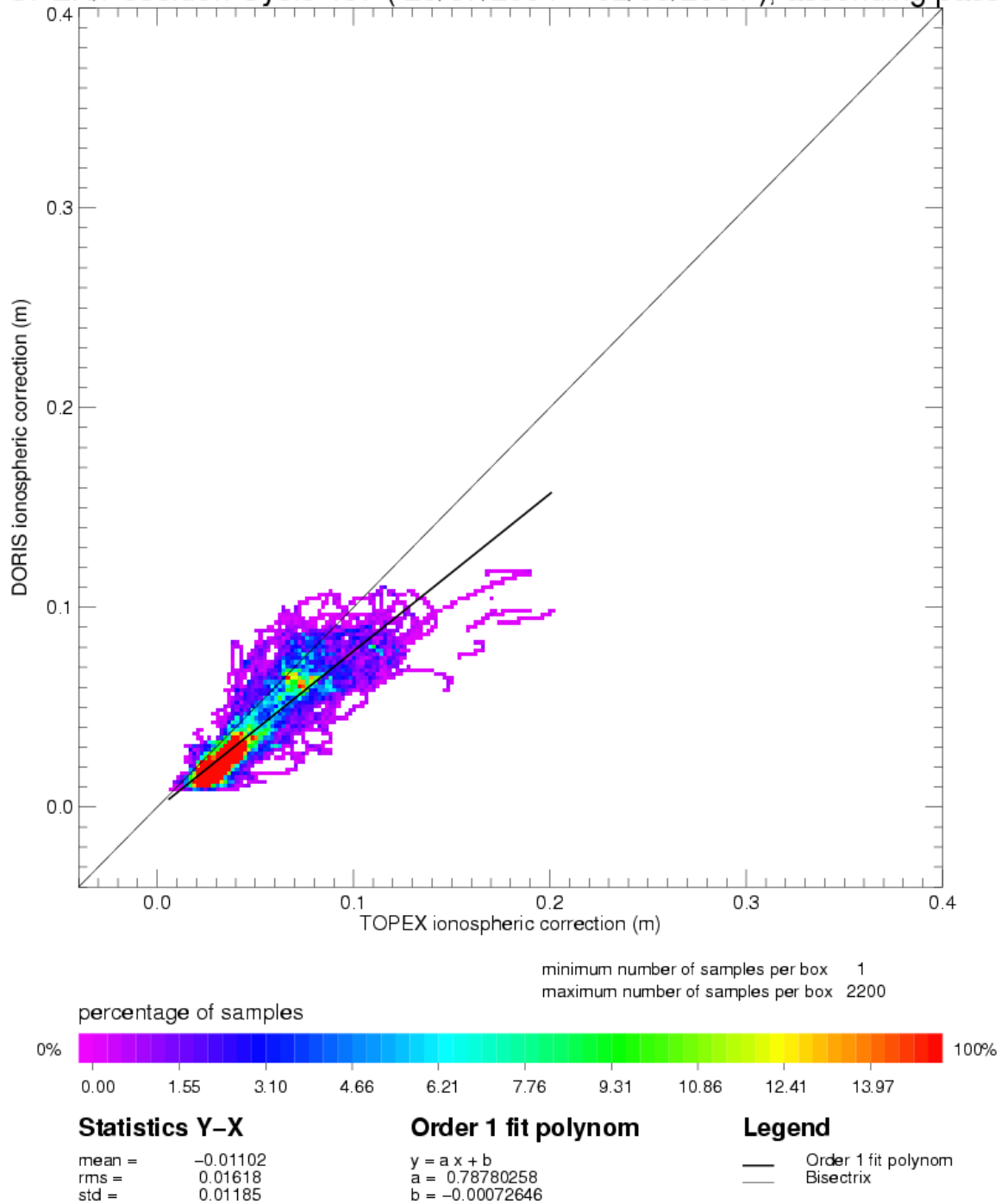


Percentage of valid data relative to the nominal pass
TOPEX/Poseidon Cycle 437 (25/07/2004 / 02/08/2004)

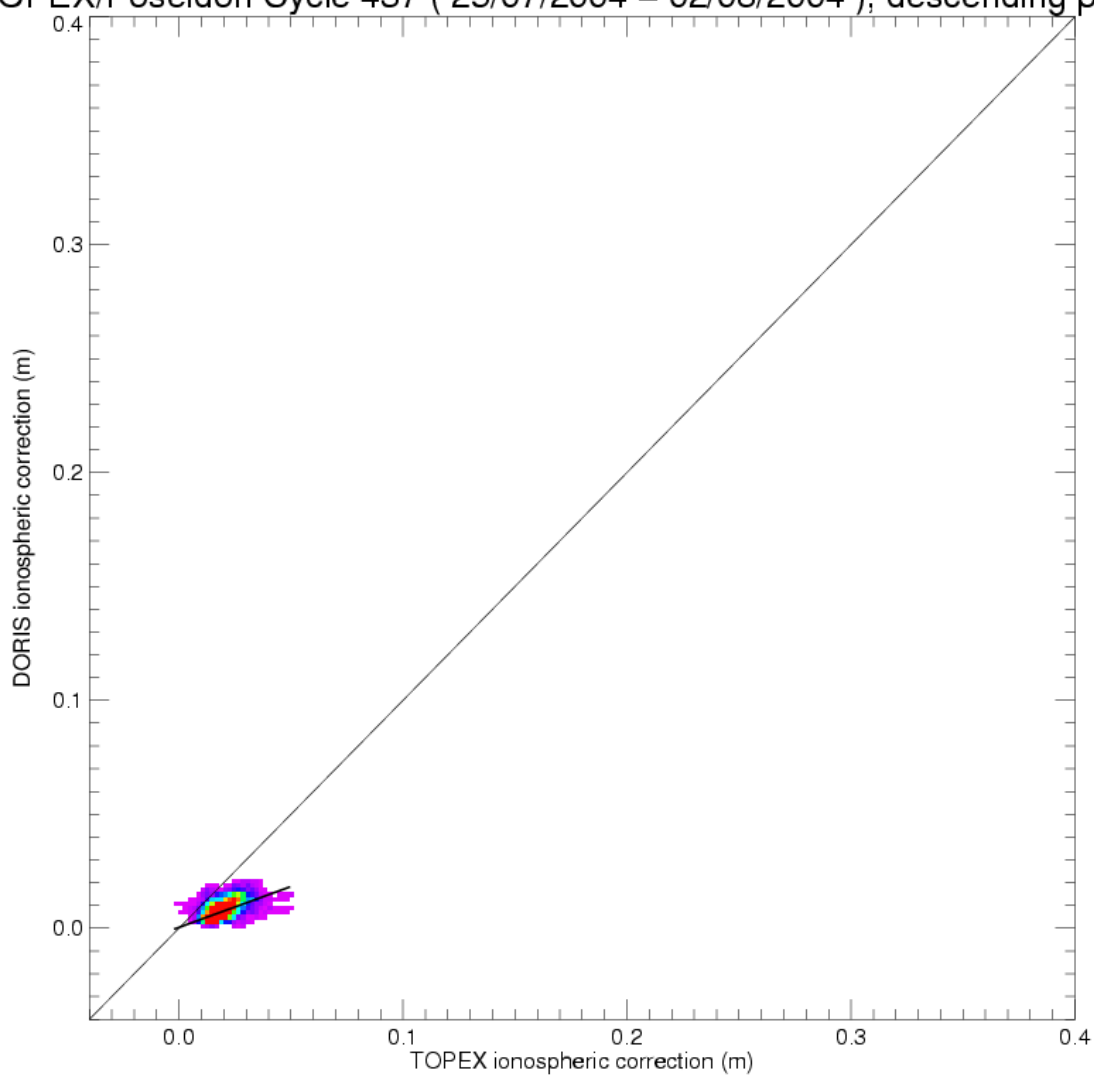


3.4 Ionospheric correction

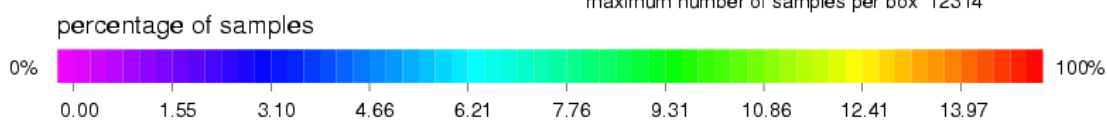
TOPEX/Poseidon Cycle 437 (25/07/2004 – 02/08/2004), ascending passes



TOPEX/Poseidon Cycle 437 (25/07/2004 – 02/08/2004), descending passes



minimum number of samples per box 1
 maximum number of samples per box 12314



Statistics Y-X

mean = -0.01134
 rms = 0.01222
 std = 0.00454

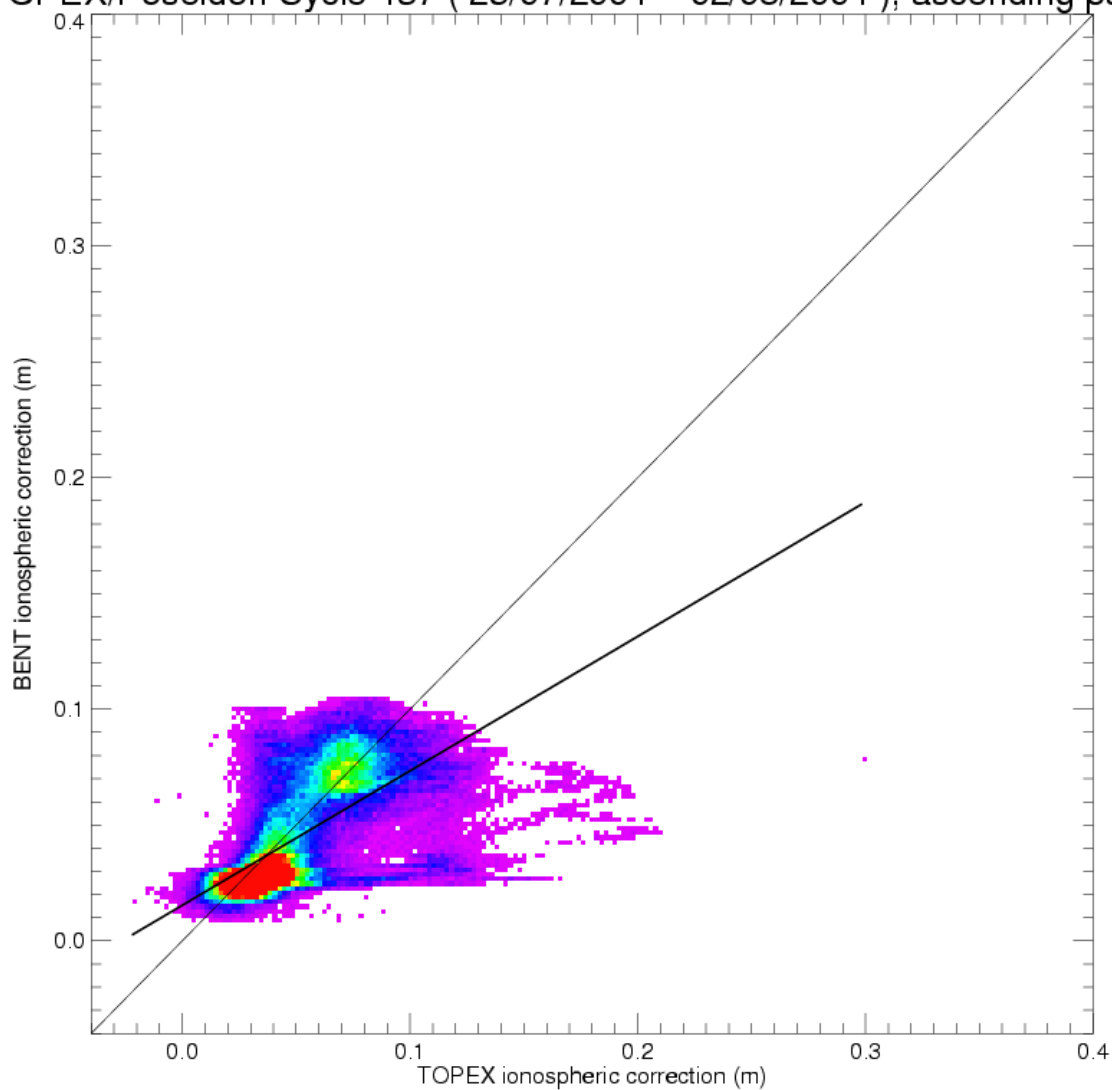
Order 1 fit polynom

$y = a x + b$
 $a = 0.35867399$
 $b = 0.00036862$

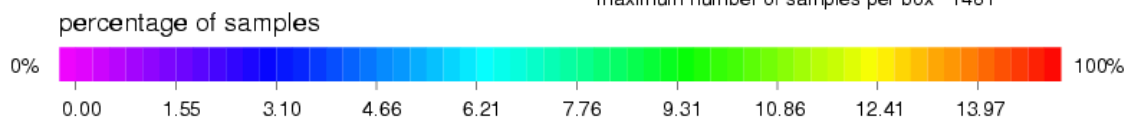
Legend

— Order 1 fit polynom
 — Bisectrix

TOPEX/Poseidon Cycle 437 (25/07/2004 – 02/08/2004), ascending passes



minimum number of samples per box 1
 maximum number of samples per box 1481



Statistics Y-X

mean = -0.00520
 rms = 0.02116
 std = 0.02051

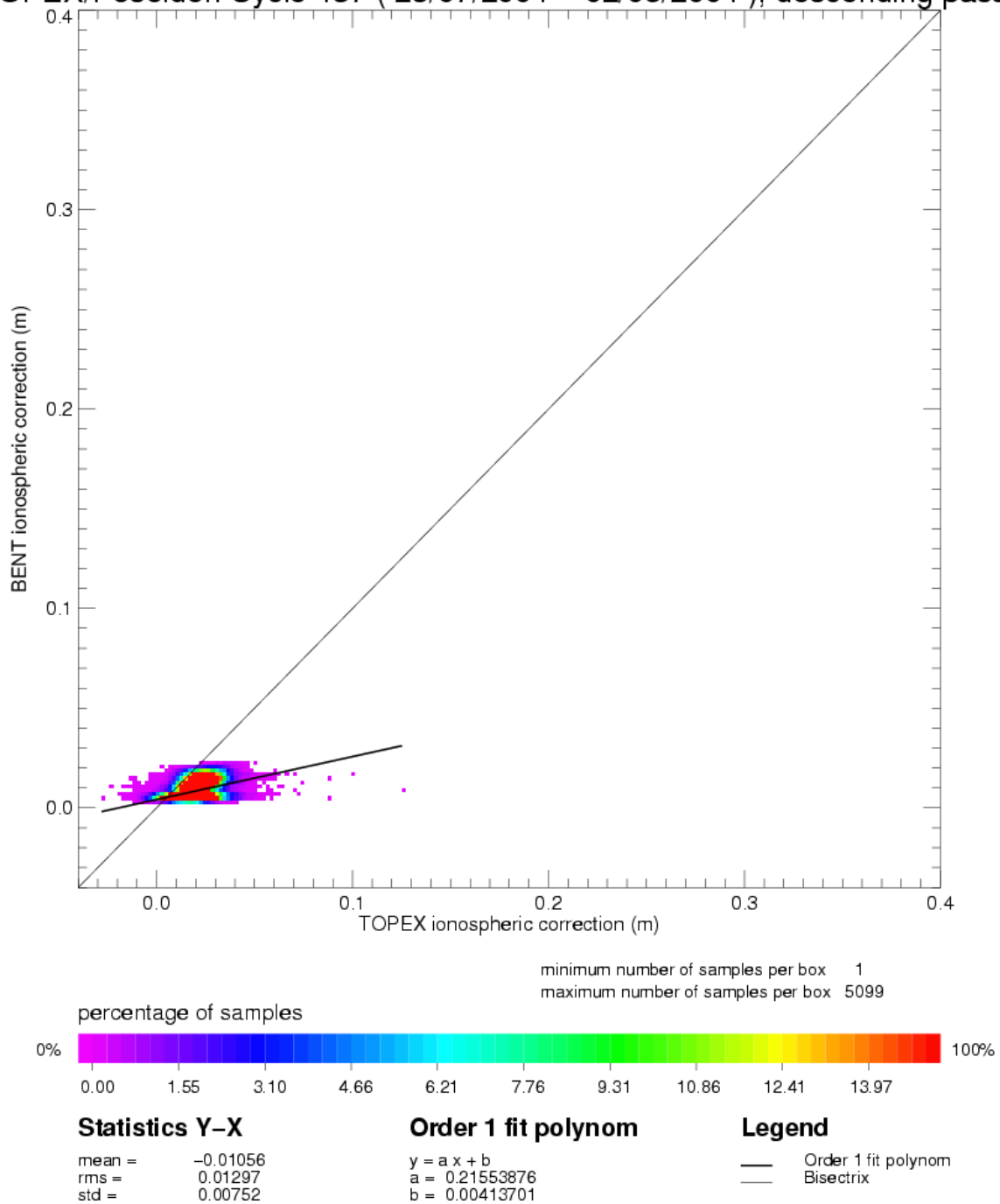
Order 1 fit polynom

$y = a x + b$
 $a = 0.58048224$
 $b = 0.01534069$

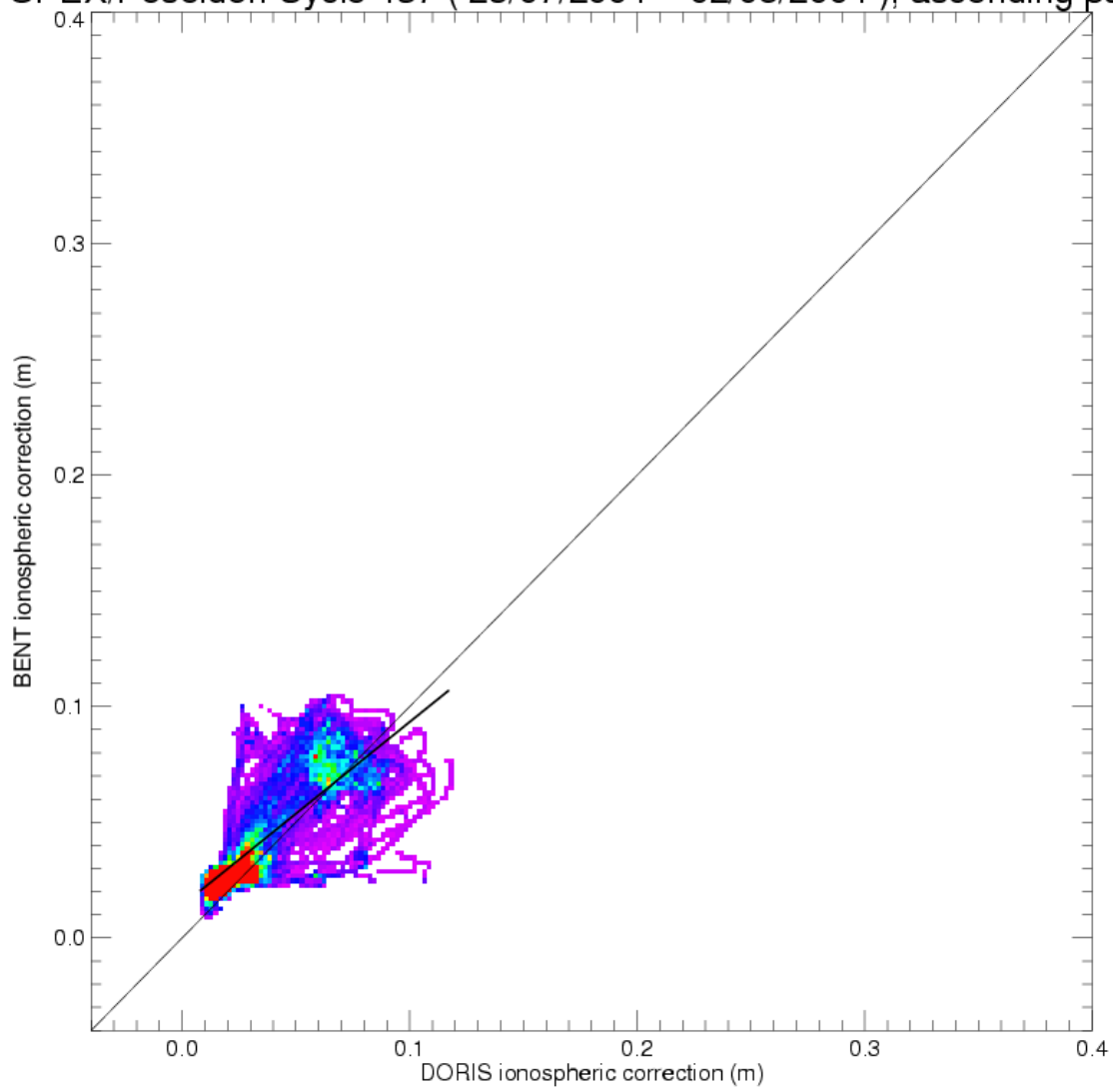
Legend

— Order 1 fit polynom
 - - - Bisectrix

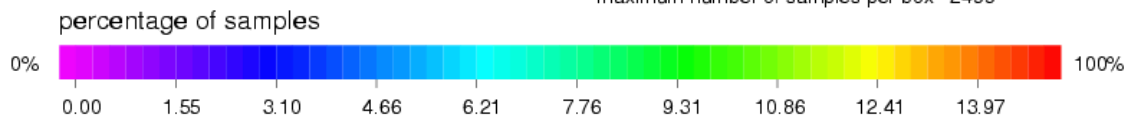
TOPEX/Poseidon Cycle 437 (25/07/2004 – 02/08/2004), descending passes



TOPEX/Poseidon Cycle 437 (25/07/2004 – 02/08/2004), ascending passes



minimum number of samples per box 1
 maximum number of samples per box 2499



Statistics Y-X

mean = 0.00629
 rms = 0.01647
 std = 0.01522

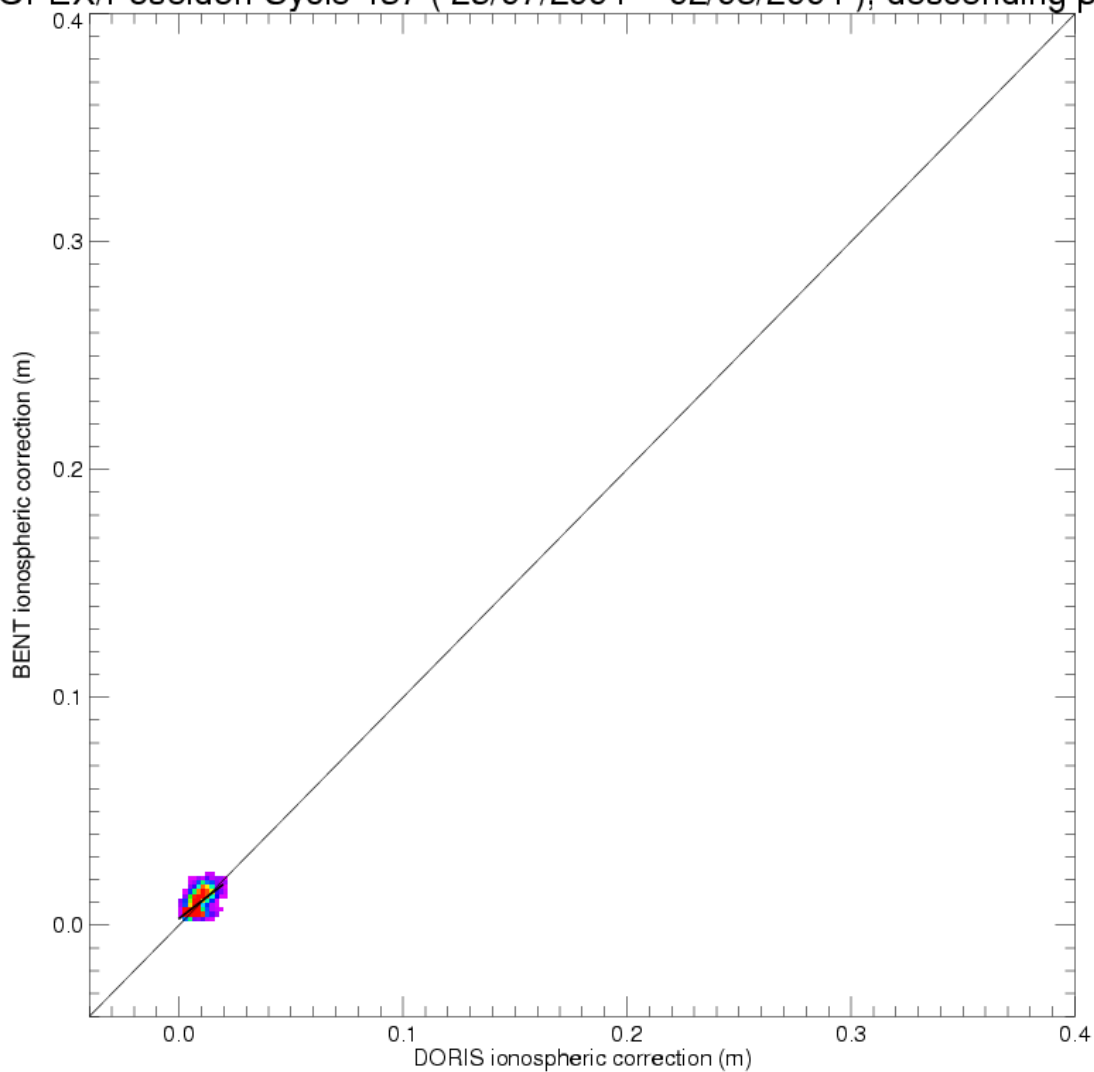
Order 1 fit polynom

$y = a x + b$
 $a = 0.79296666$
 $b = 0.01405050$

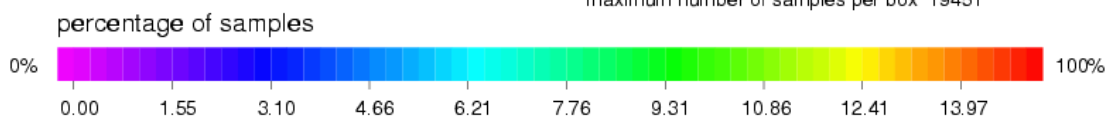
Legend

— Order 1 fit polynom
 — Bisectrix

TOPEX/Poseidon Cycle 437 (25/07/2004 – 02/08/2004), descending passes



minimum number of samples per box 4
 maximum number of samples per box 19451



Statistics Y-X

mean = 0.00126
 rms = 0.00390
 std = 0.00369

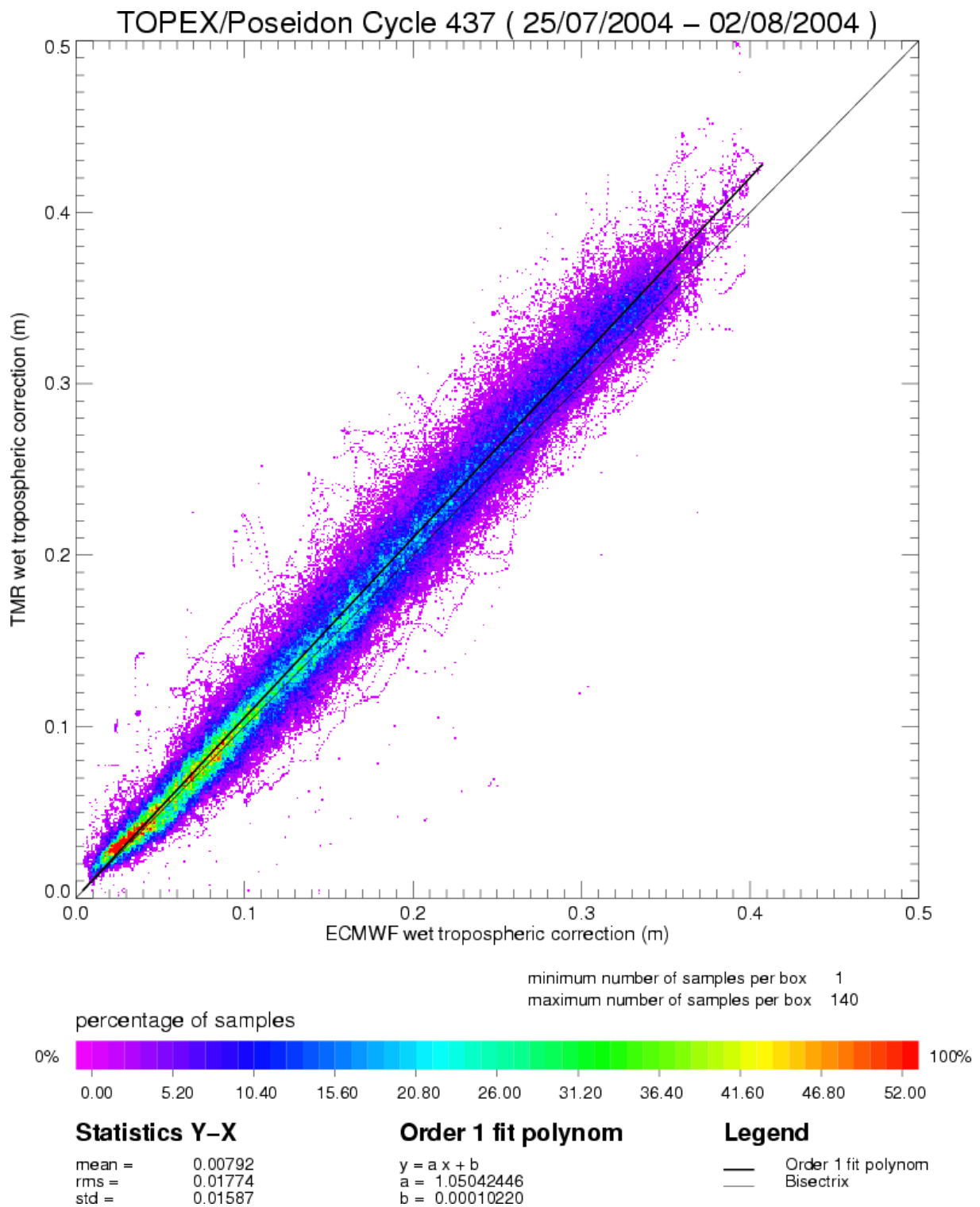
Order 1 fit polynom

$y = a x + b$
 $a = 0.76105404$
 $b = 0.00291034$

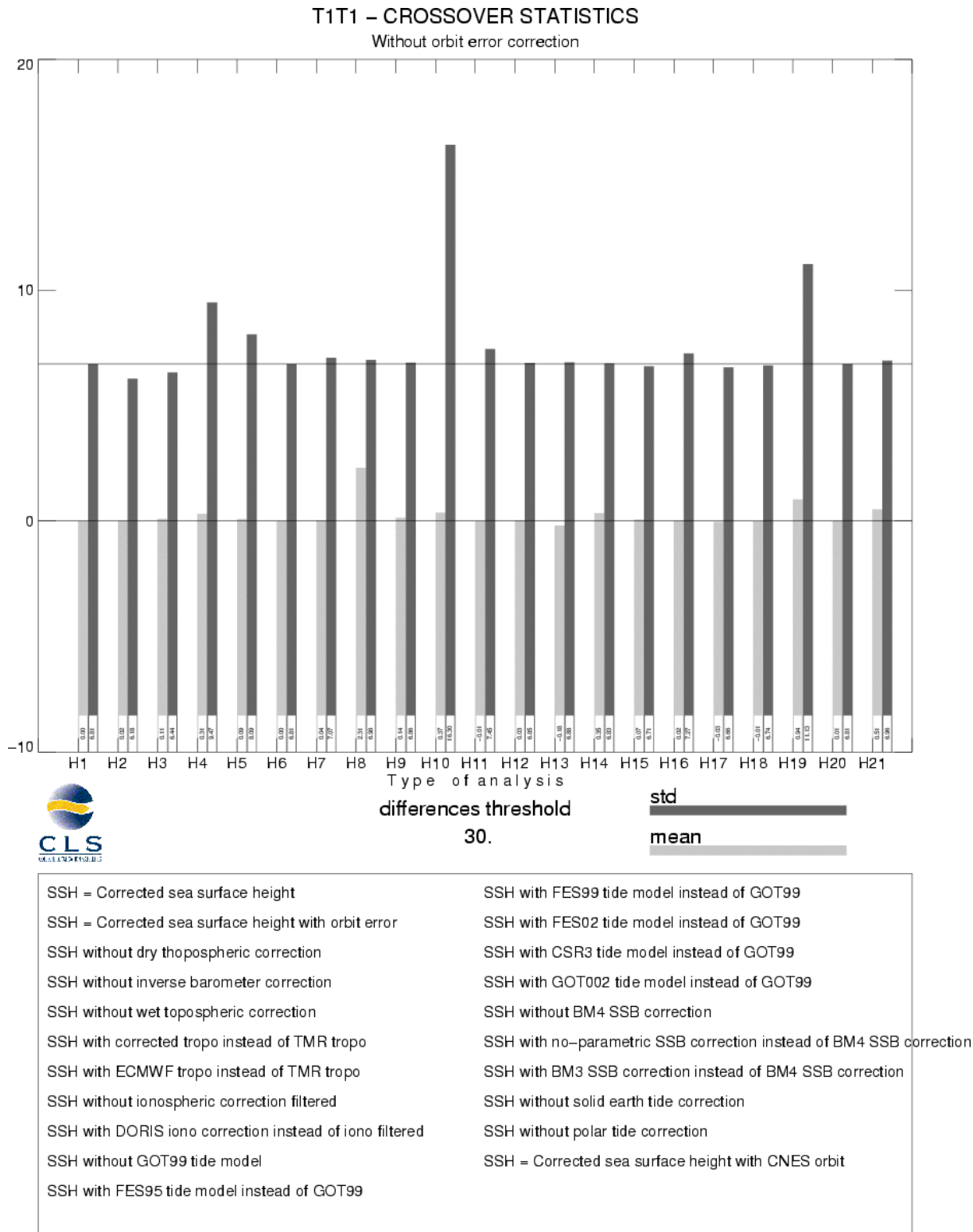
Legend

— Order 1 fit polynom
 — Bisectrix

3.5 Wet tropospheric correction



3.6 Crossover statistics



T1T1 – CROSSOVER STATISTICS

Without orbit error correction

SSH = Corrected sea surface height

RAPPEL DES SELECTIONS

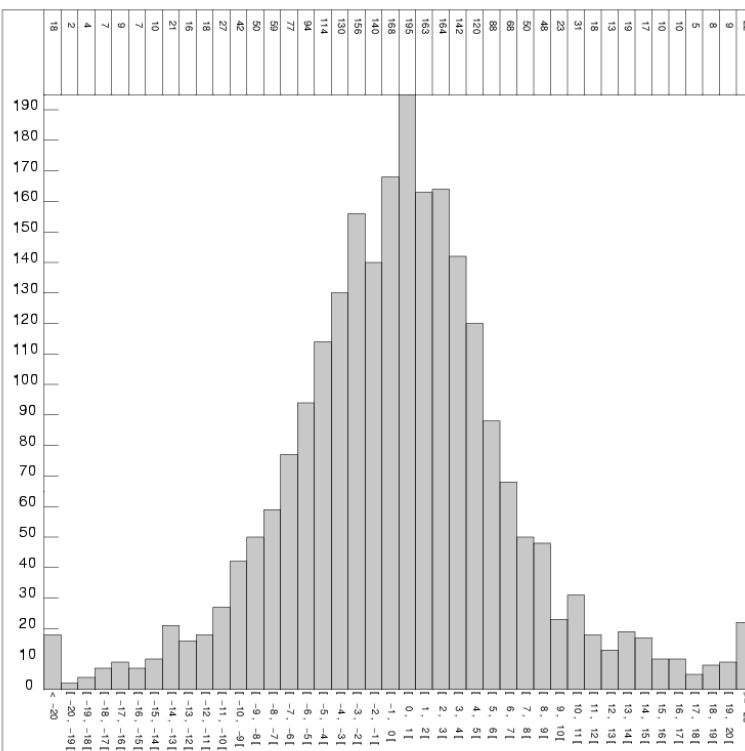
Type de points de croisement: T1T1
 Zone géographique (deg): -90 / 90 , 0 / 360
 Seuil sur les écarts d'analyse DV (moy) 30.00 (seuil)
 Selection(s) sur les champs :
 CL Arc 1 :=INTERP_SPLN
 CL Arc 2 :=INTERP_SPLN
 Seuil Min +: 0.0000000
 Seuil Max : 0.0000000

Selection(s) sur les écarts :
 Aucune

RESULTATS STATISTIQUES

Valeur minimale : -29.1600
 Valeur maximale : 28.6800
 Différence Max – Min: 57.8400
 Nombre de points lus: 2444
 Nombre de points sélectionnés: 2385
 Moyenne : 0.00454088
 Écart-type : 6.80859
 Moyenne Quadratique : 6.80859

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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 DV (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 : -27.2500
 Valeur maximale : 29.9000
 Différence Max – Min: 57.1500
 Nombre de points lus: 2444
 Nombre de points sélectionnés: 2374
 Moyenne : 0.0238458
 Écart-type : 6.17703
 Moyenne Quadratique : 0.0238458

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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

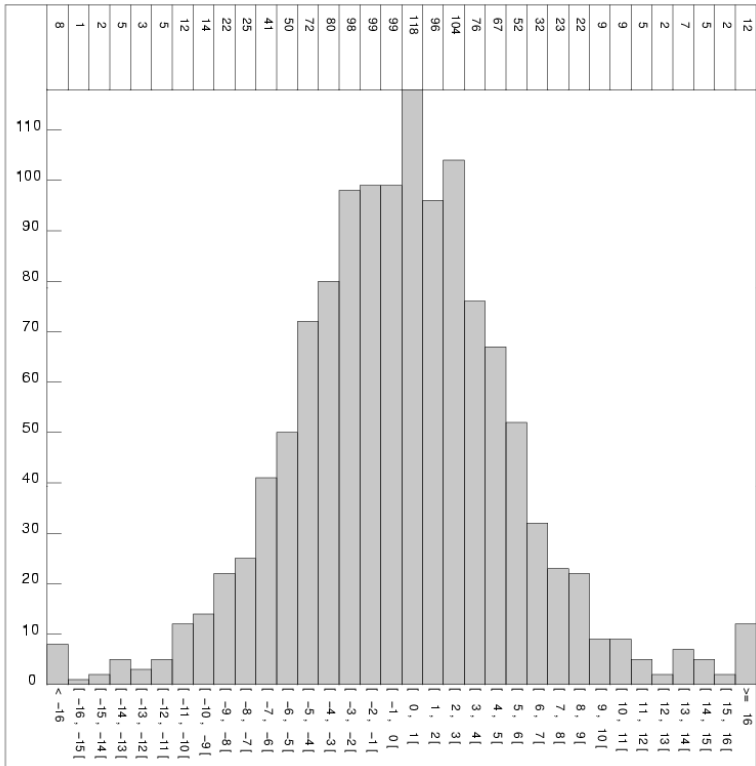
RAPPEL DES SELECTIONS

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 : -25.3700
 Valeur maximale : 28.4800
 Différence Max – Min: 53.8500
 Nombre de points lus: 1385
 Nombre de points sélectionnés: 1277
 Moyenne : -0.00416601
 Écart-type : 5.40013
 Moyenne Quadratique : 5.40013

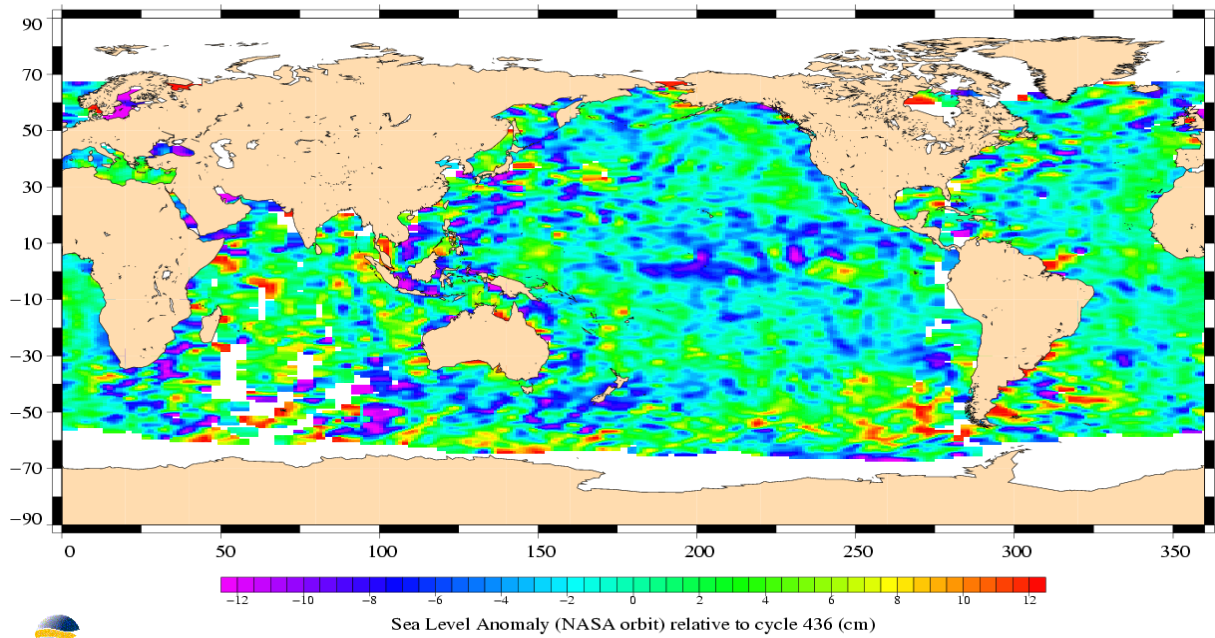
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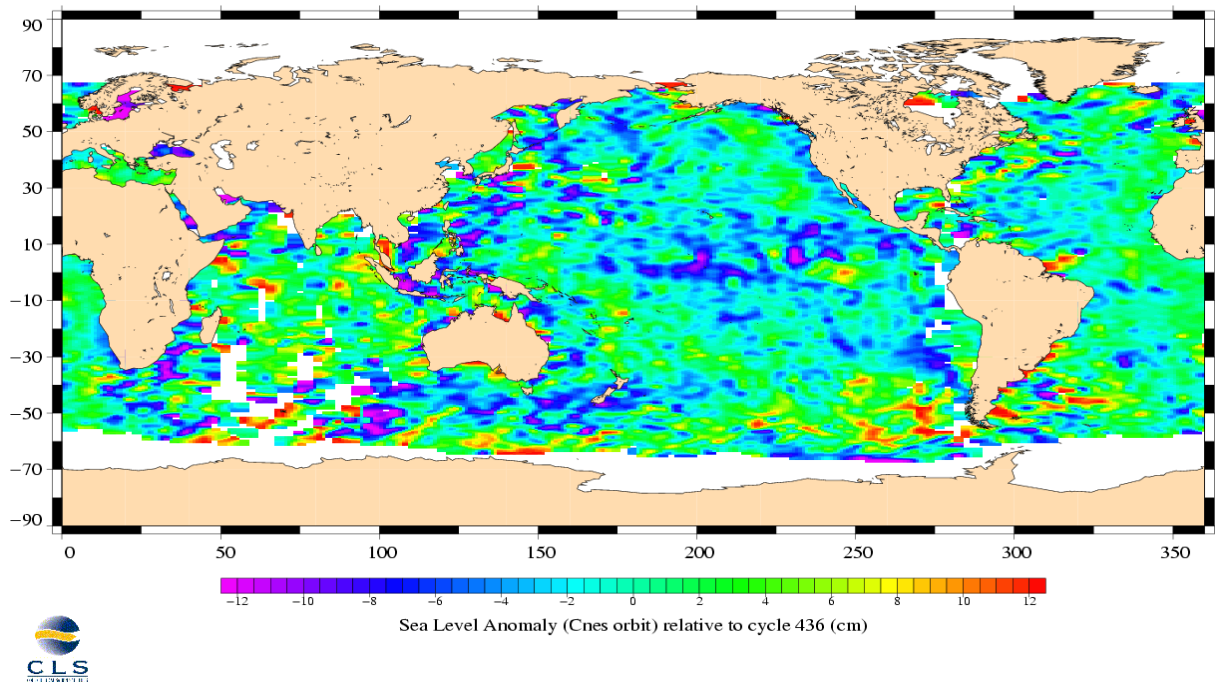
3.7 SSH variability

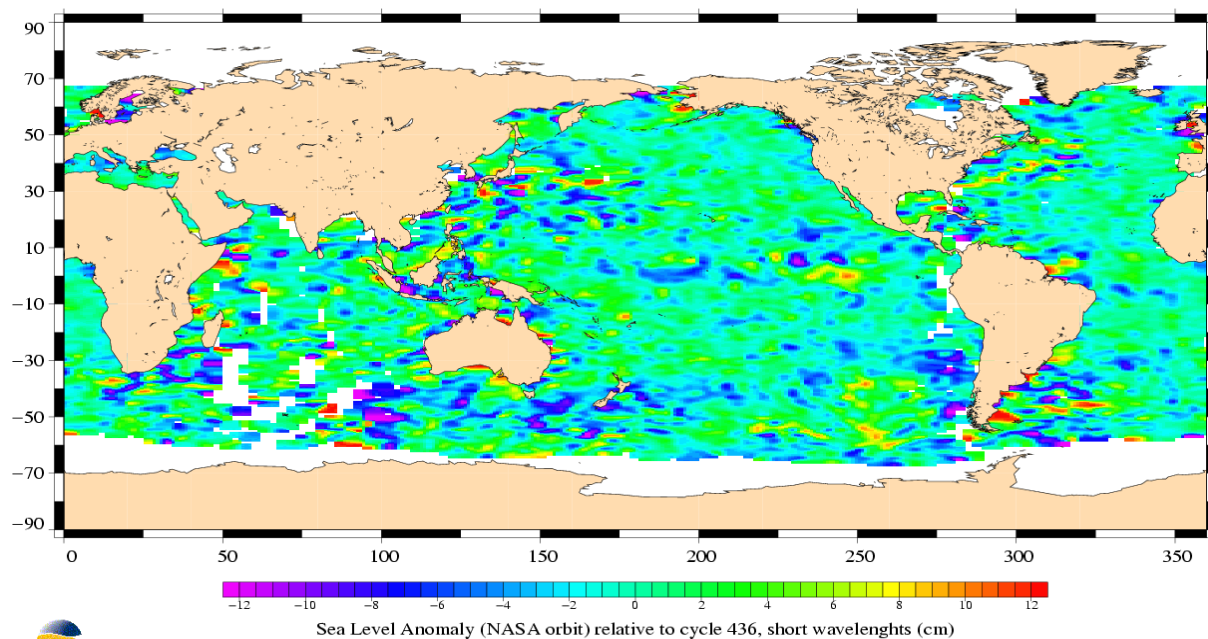
3.7.1 Sea Level Anomaly

TOPEX/Poseidon, cycle 437
Period : 25/07/2004 – 02/08/2004



TOPEX/Poseidon, cycle 437
Period : 25/07/2004 – 02/08/2004

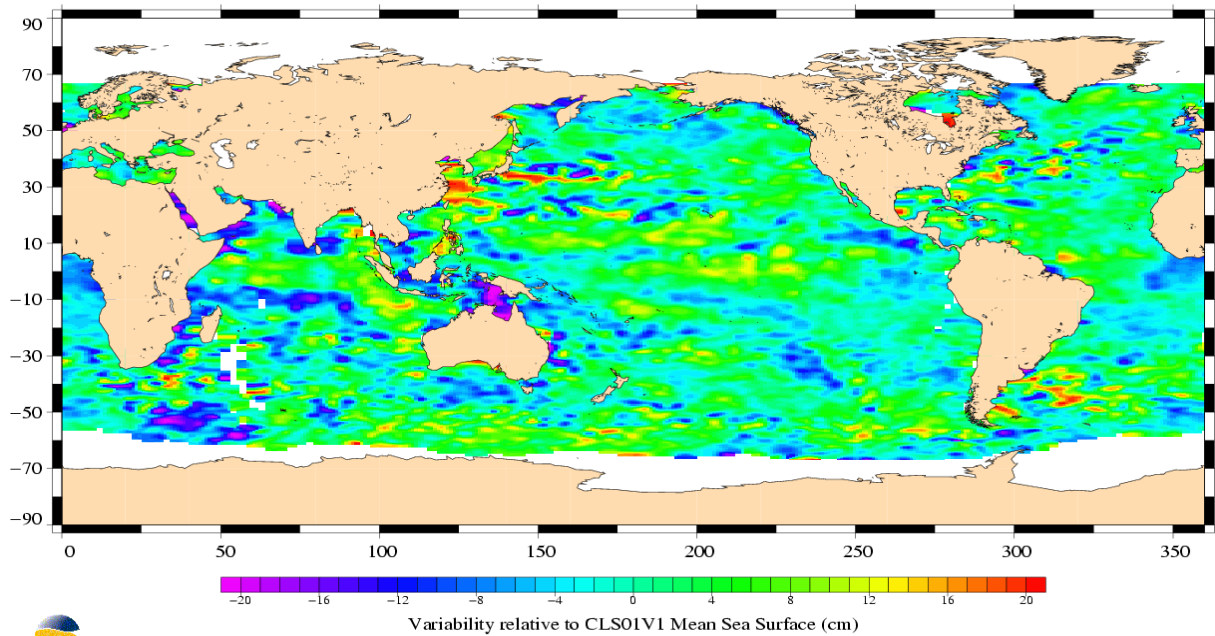




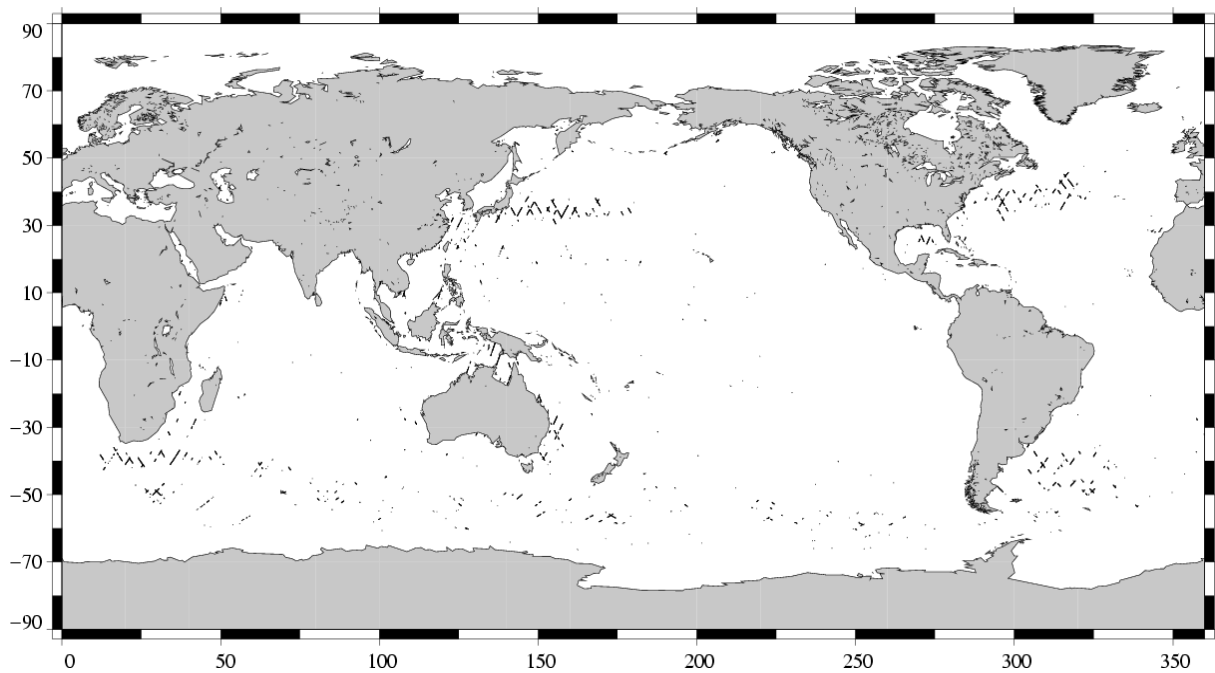
3.7.2 Comparison to a precise Mean Sea Surface

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 437
Period : 25/07/2004 – 02/08/2004

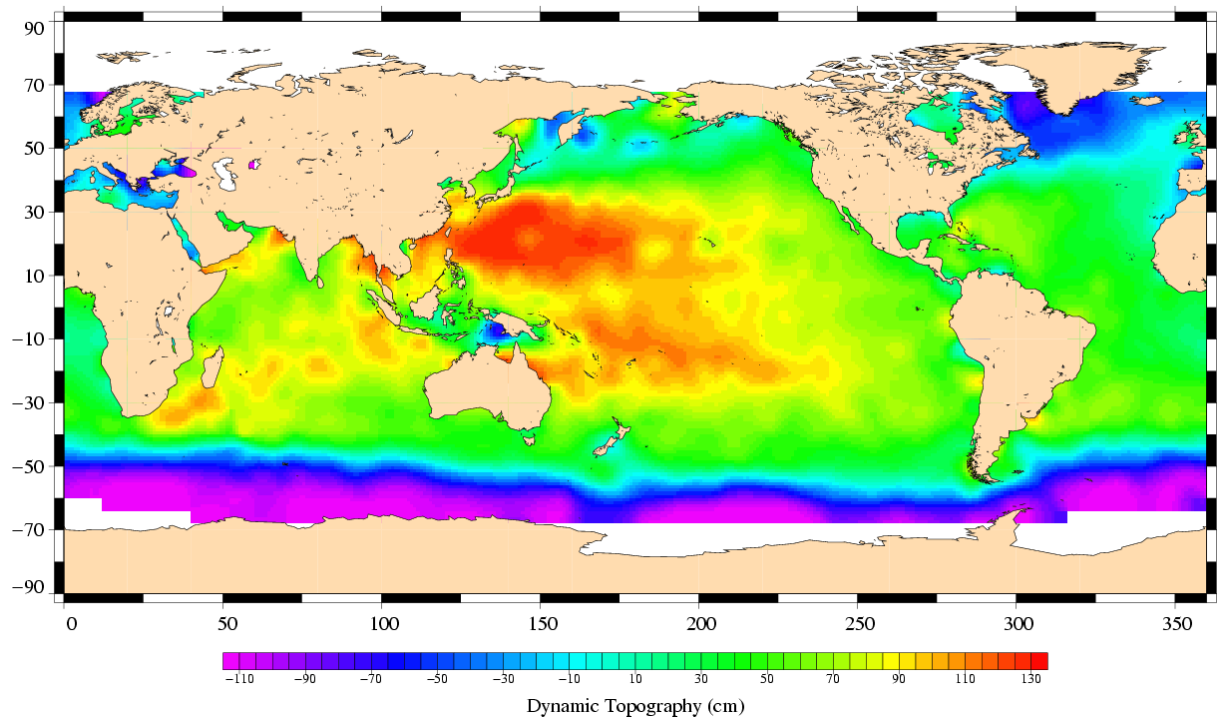


(SSH - MSS) differences greater than 0.3 m
TOPEX/Poseidon Cycle 437 (25/07/2004 / 02/08/2004)



3.8 Dynamic topography

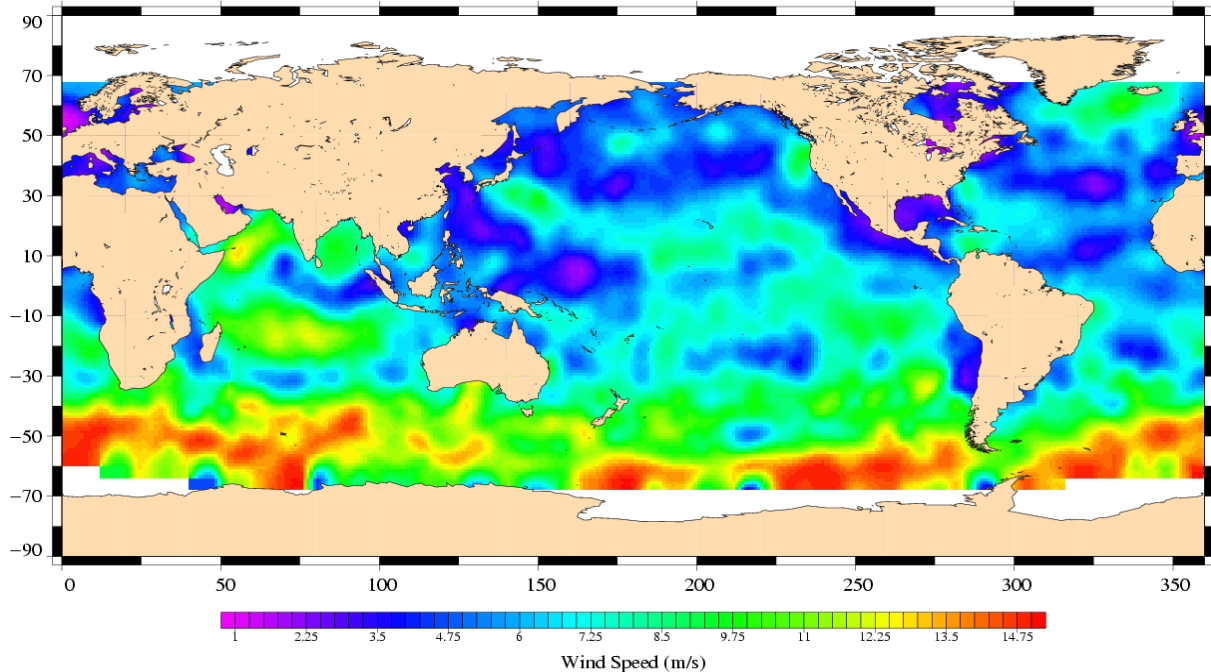
TOPEX/Poseidon, cycle 437
Period : 25/07/2004 – 02/08/2004



3.9 Wind and wave maps

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

TOPEX/Poseidon, cycle 437
Period : 25/07/2004 – 02/08/2004



TOPEX/Poseidon, cycle 437
Period : 25/07/2004 – 02/08/2004

