



# TOPEX/Poseidon MGRD Quality Assessment Report

**Cycle 384**

**15-02-2003 25-02-2003**

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**SALP-RP-P2-EX-21120-CLS384**

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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](#)

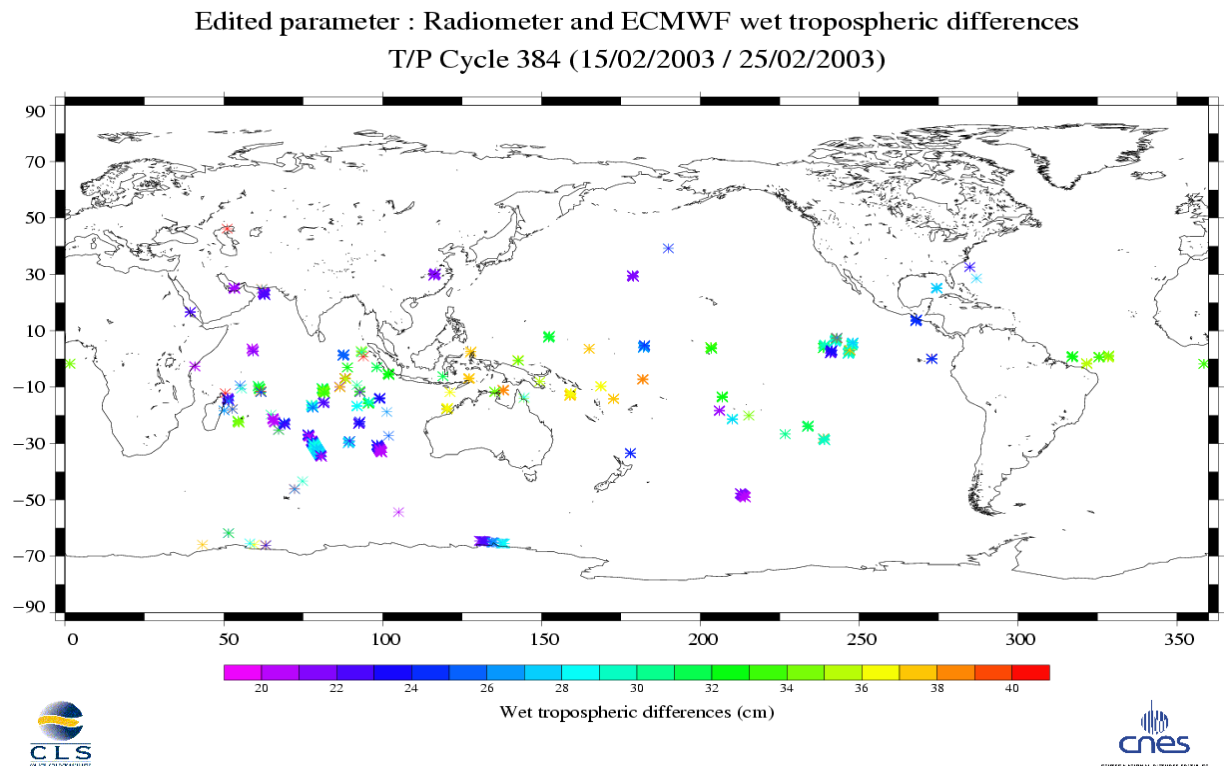
## 2 Cycle overview

### 2.1 Cycle quality and performances

Data quality for this cycle appears to be nominal. For this cycle, the crossover standard deviation is 6.55 cm rms, and the standard deviation of Sea Level Anomalies (SLA) relative to a Mean Sea Surface is 9.48 cm.

### 2.2 Warnings and recommendations

- Tape recorder failures :  
There are a lot of data gaps due to tape recorder anomalies, especially in the Indian Ocean.
- Editing measurements (a) :  
Problems in the interpolation of the TMR parameters occur when there are missing measurements (tape recorder failures). As a result 4.39% of the measurements are removed by the TMR correction criterion.
- Editing measurements (b) :  
A new criterion has been added to the editing procedure since cycle 376 (See [Editing](#)). The measurements removed by this criterion for the current cycle are plotted on the following figure.



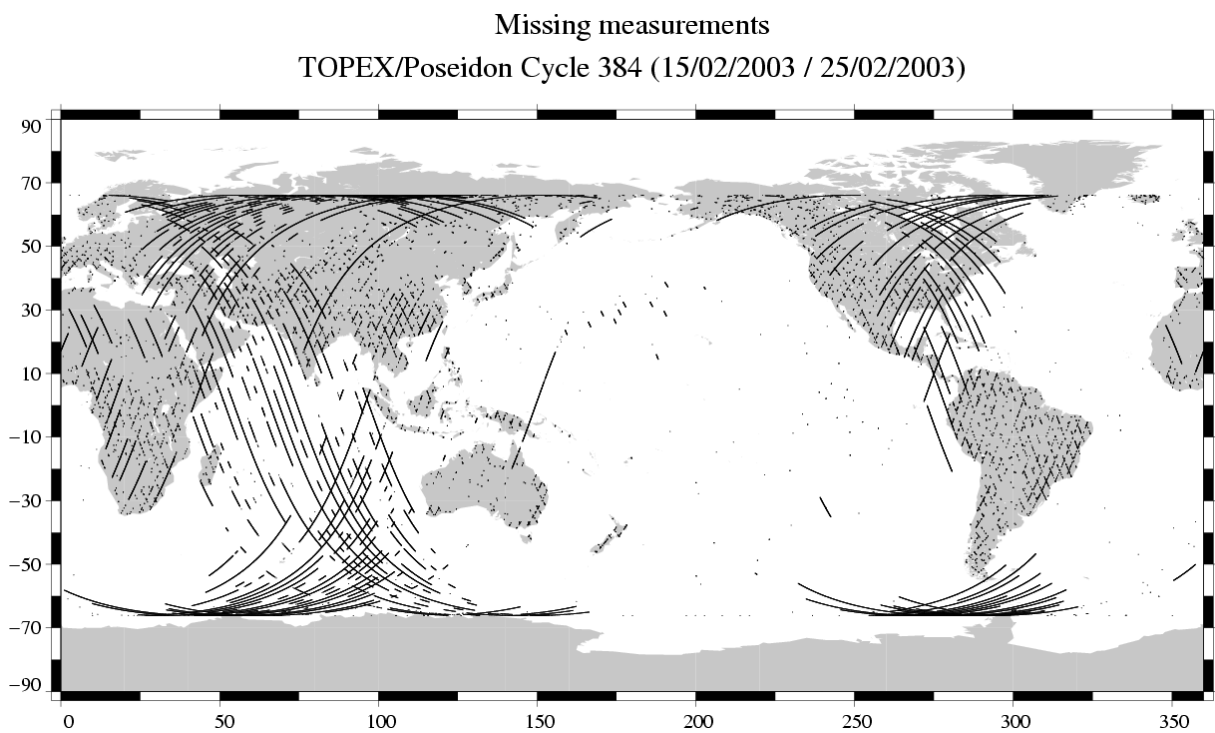
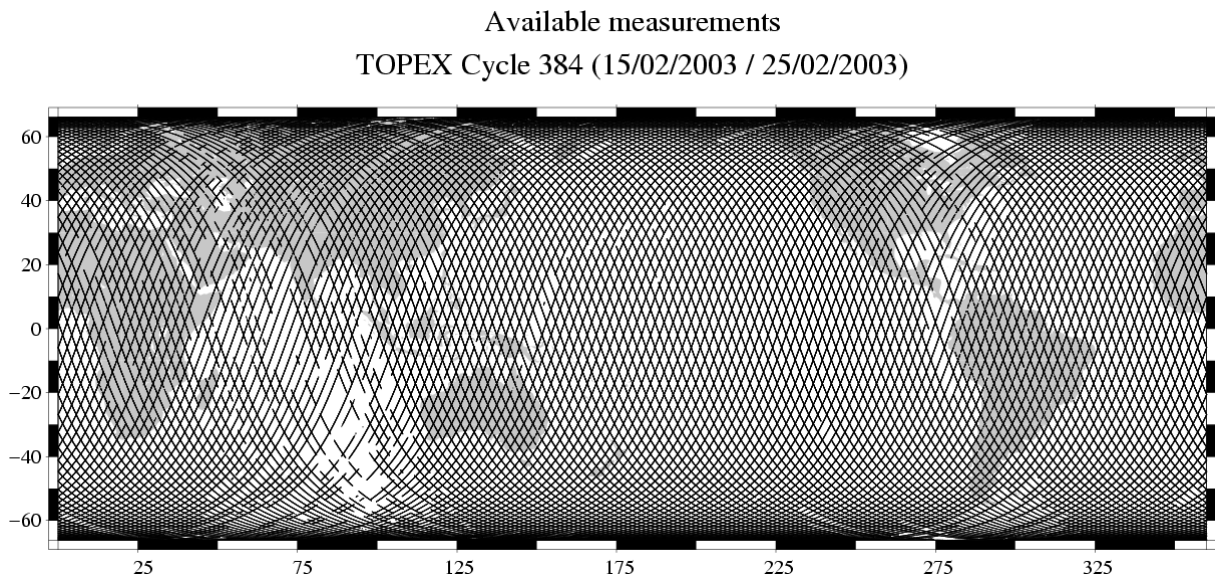
### 3 CALVAL main results

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

707471 altimeter measurements are present, and 87028 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.



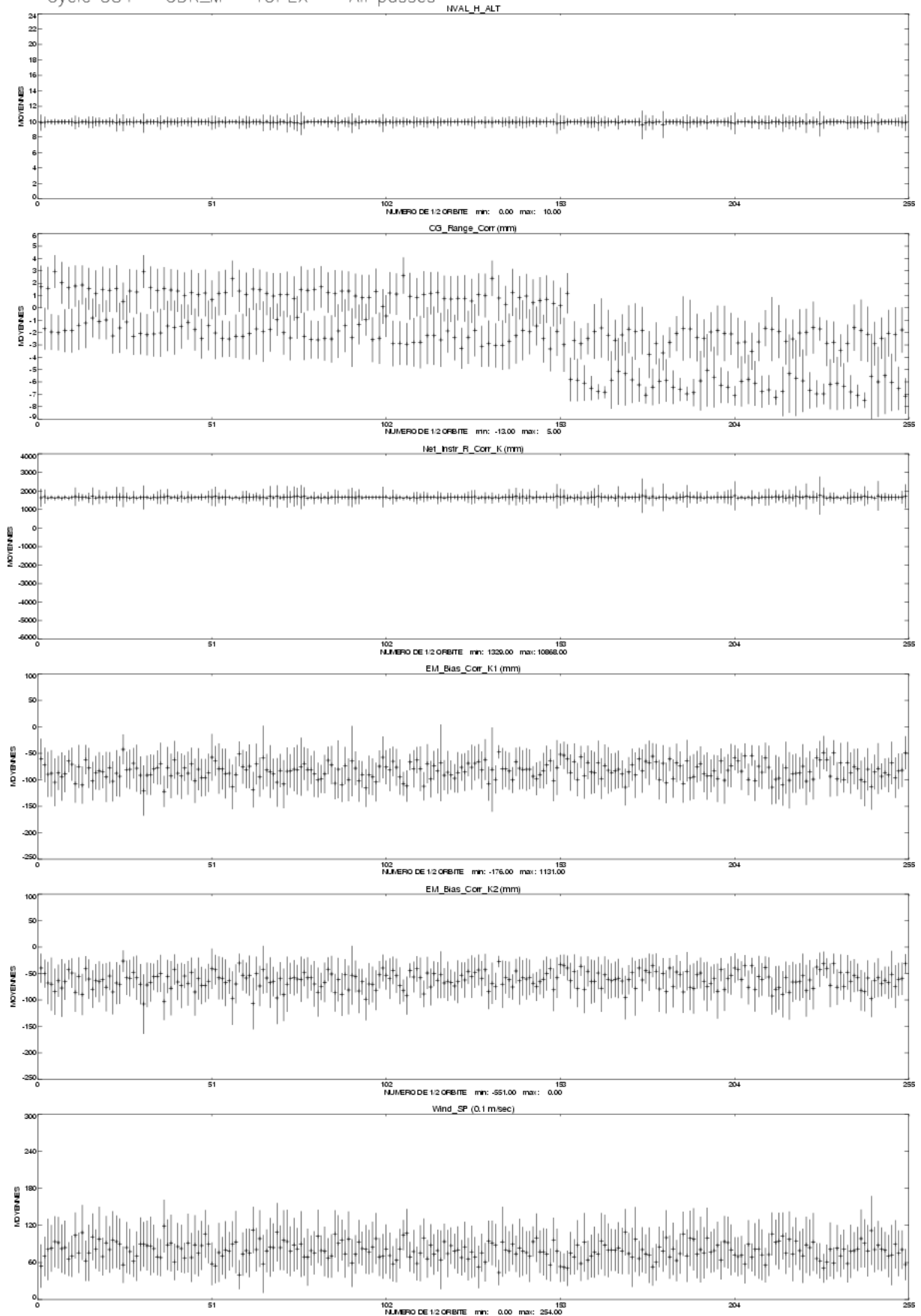
### 3.2 M-GDR quality flags

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

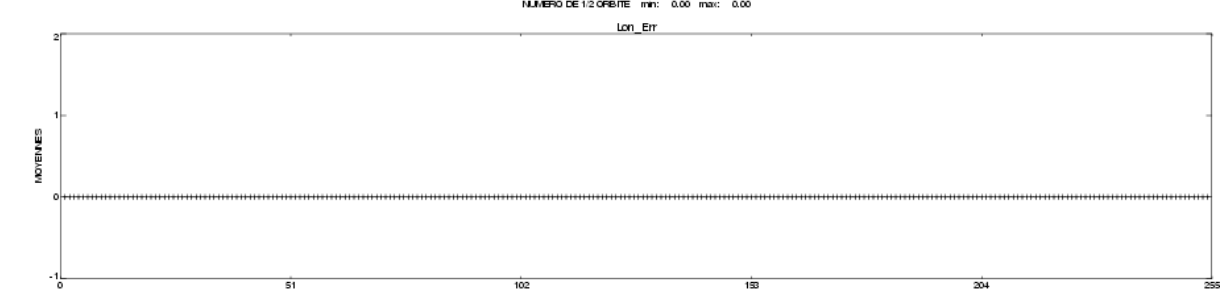
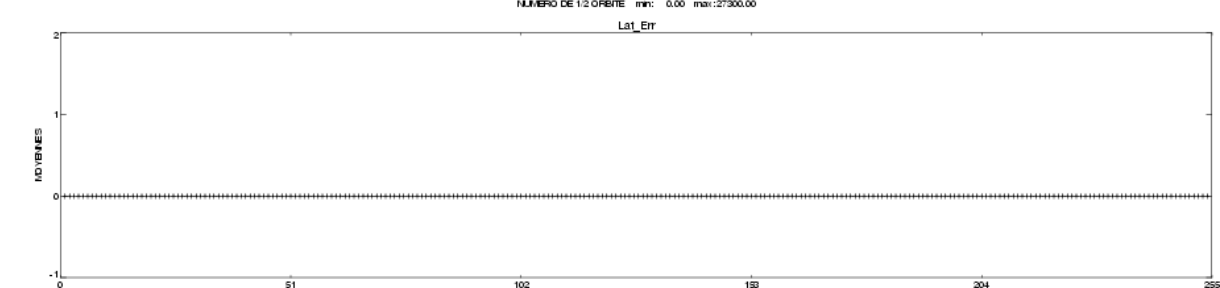
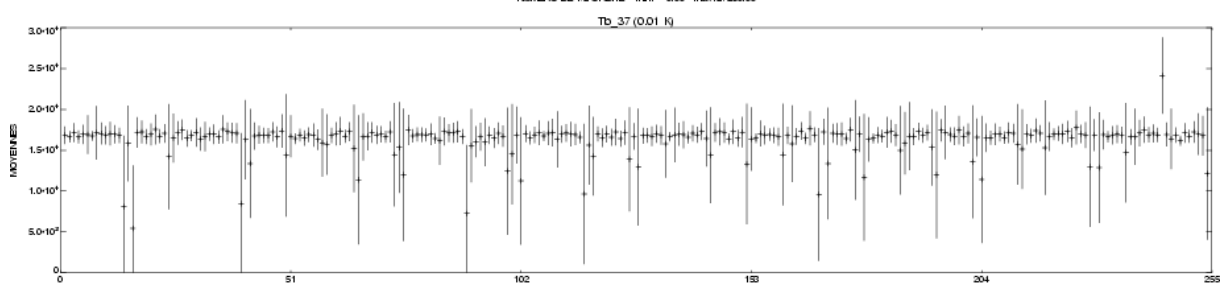
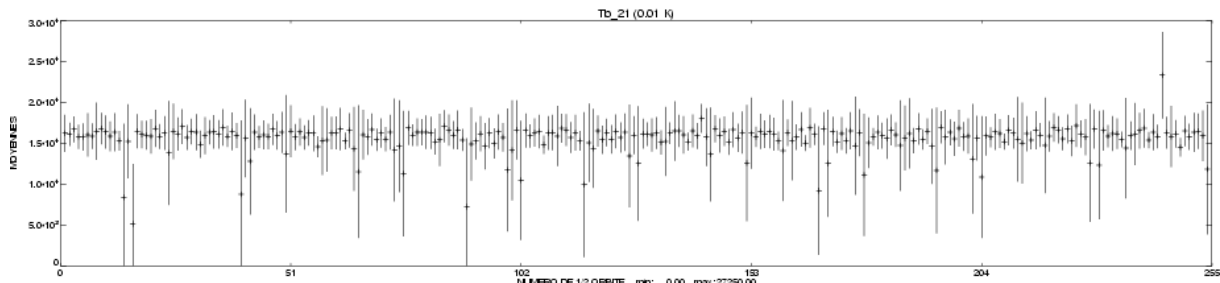
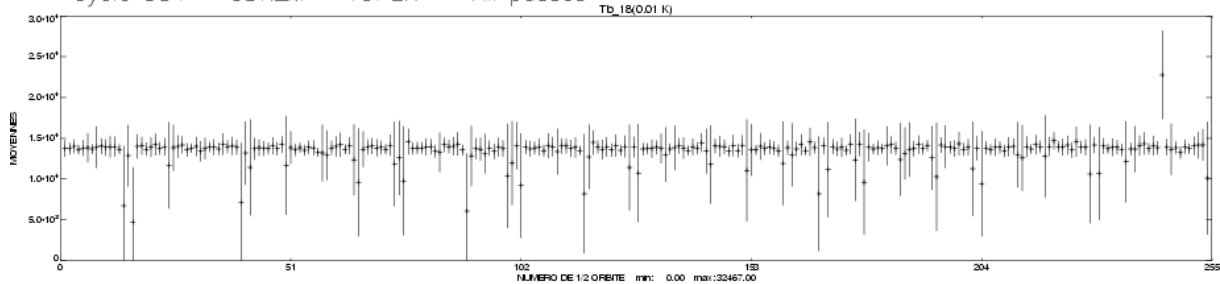
Name	Description	% bad
Geo_Bad_1	altimeter land flag	27.07
Geo_Bad_1	ice flag	3.16
Geo_Bad_1	radiometer land flag	29.05
Alt_Bad_1	conditions 1 altimeter	3.95
Alt_Bad_2	conditions 2 altimeter	3.83
Geo_Bad_2	rain (liquid water in excess)	6.63
Geo_Bad_2	less than 4 points for CSR3.0 tide calculation	0.34
Geo_Bad_2	less than 4 points for FES95.2.1 tide calculation	2.24
TOPEX	TOPEX not valid	0.00
TMR	TMR not valid	0.00
TMR_Bad	Brightness temperatures not valid	5.54
DORIS	DORIS not valid	0.00

### 3.3 M-GDR parameter plots

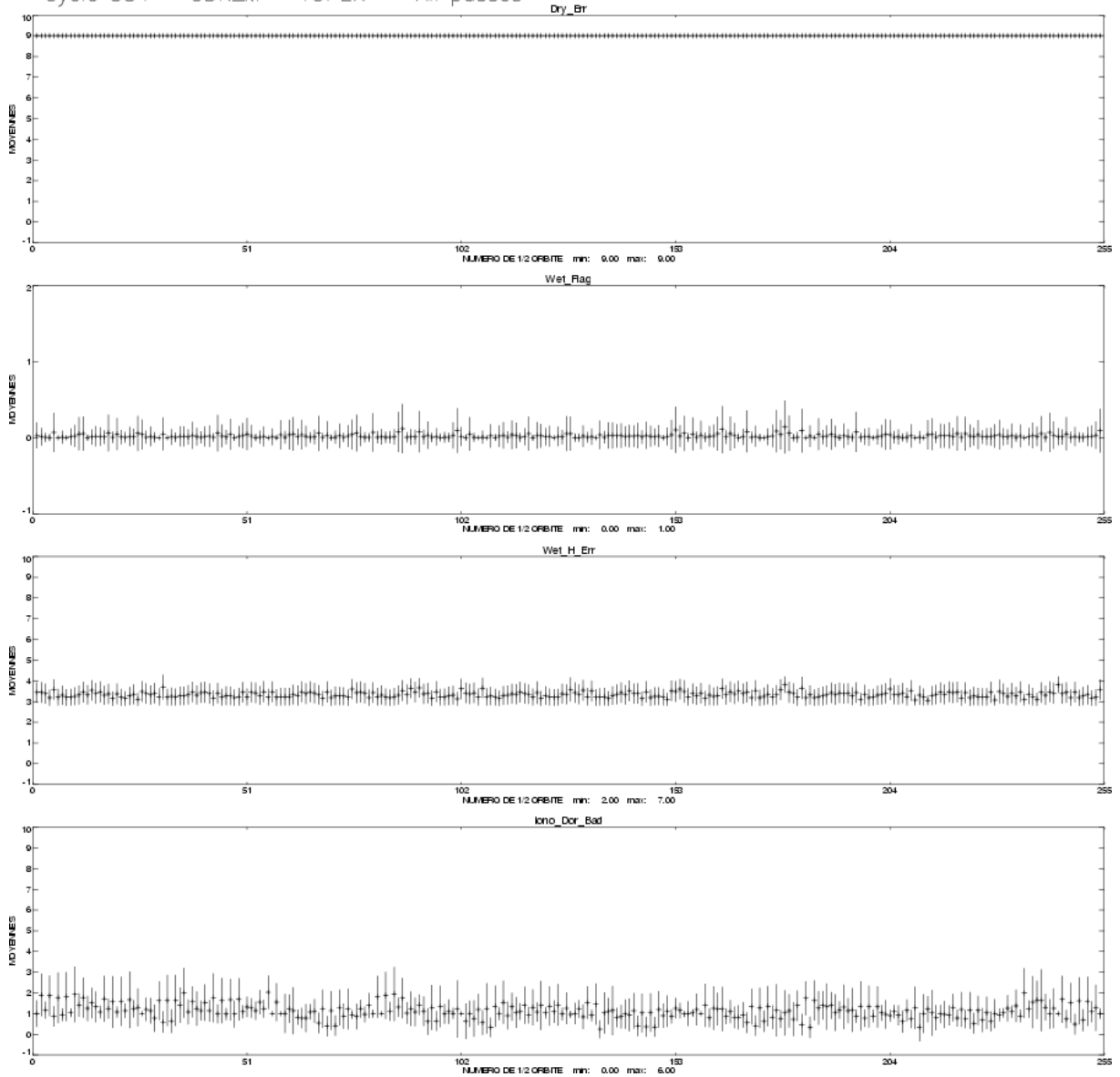
Cycle 384 – GDR\_M – TOPEX – All passes –



Cycle 384 – GDR\_M – TOPEX – All passes –

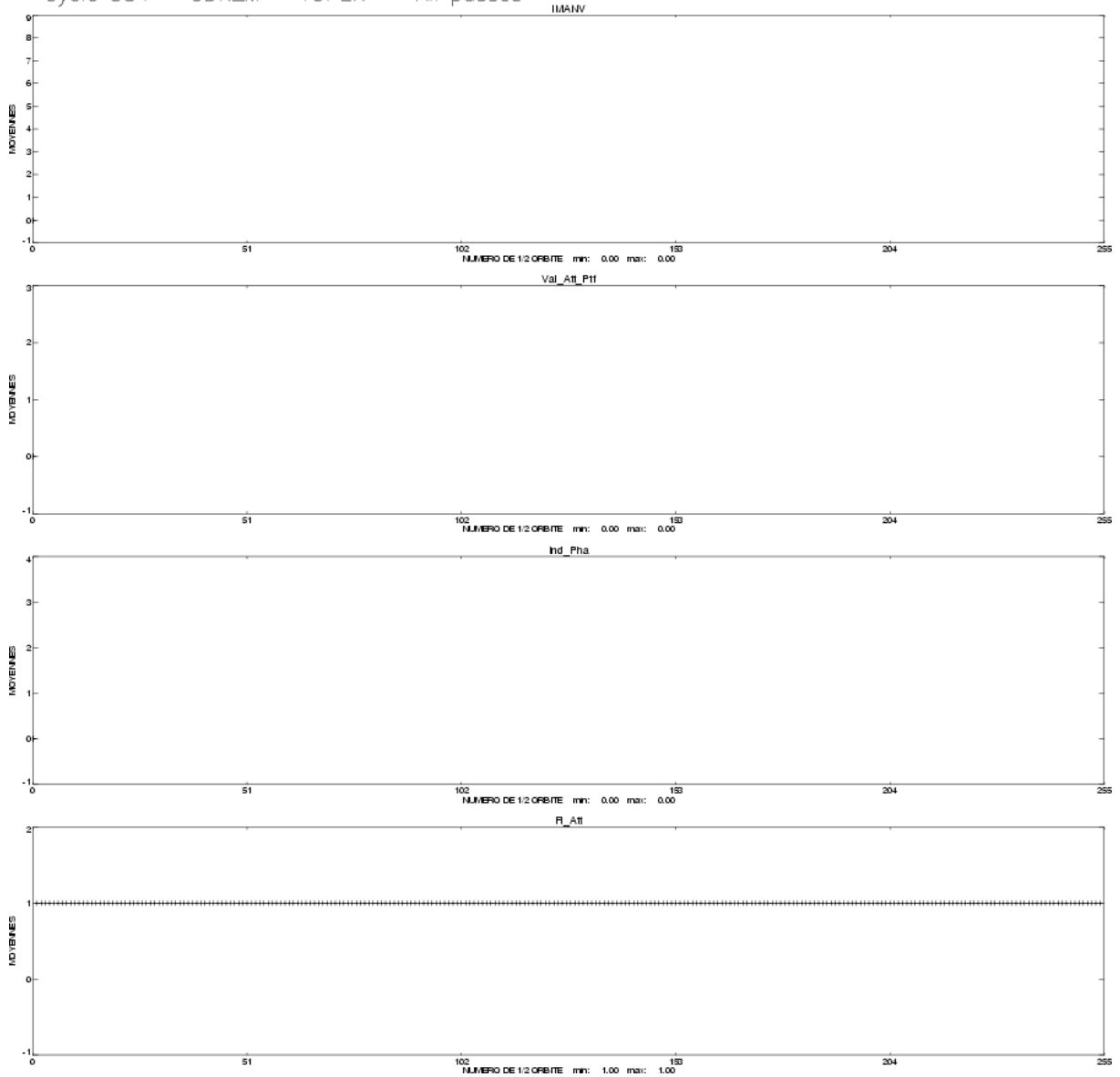


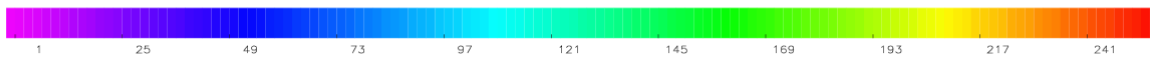
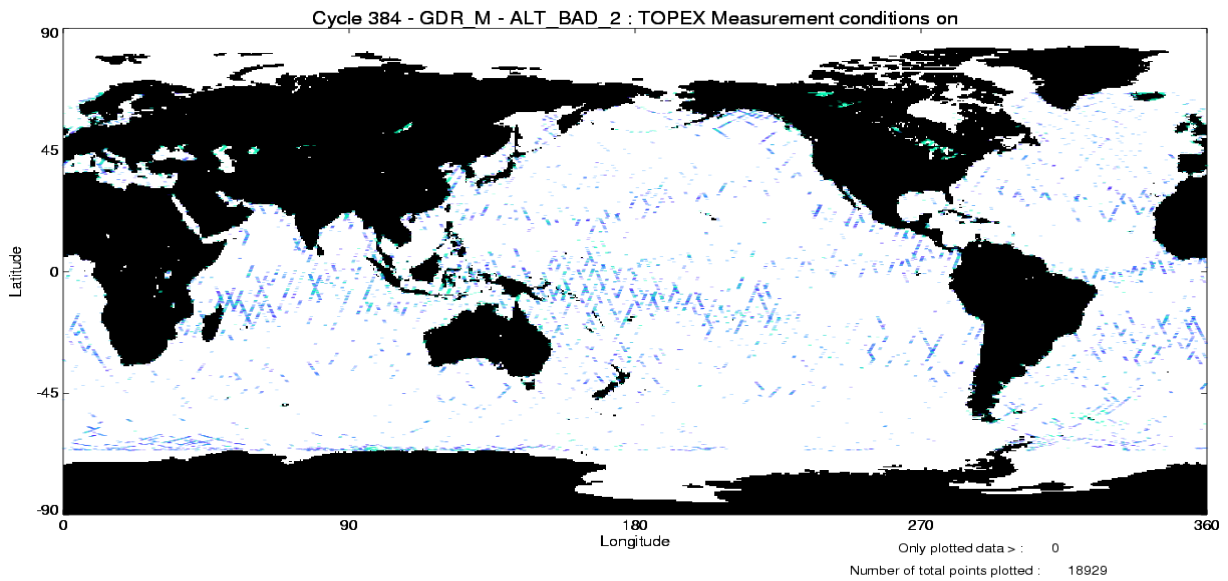
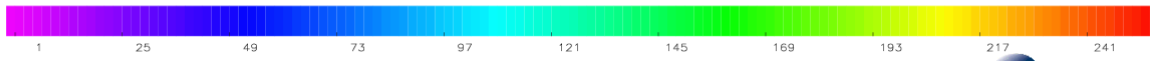
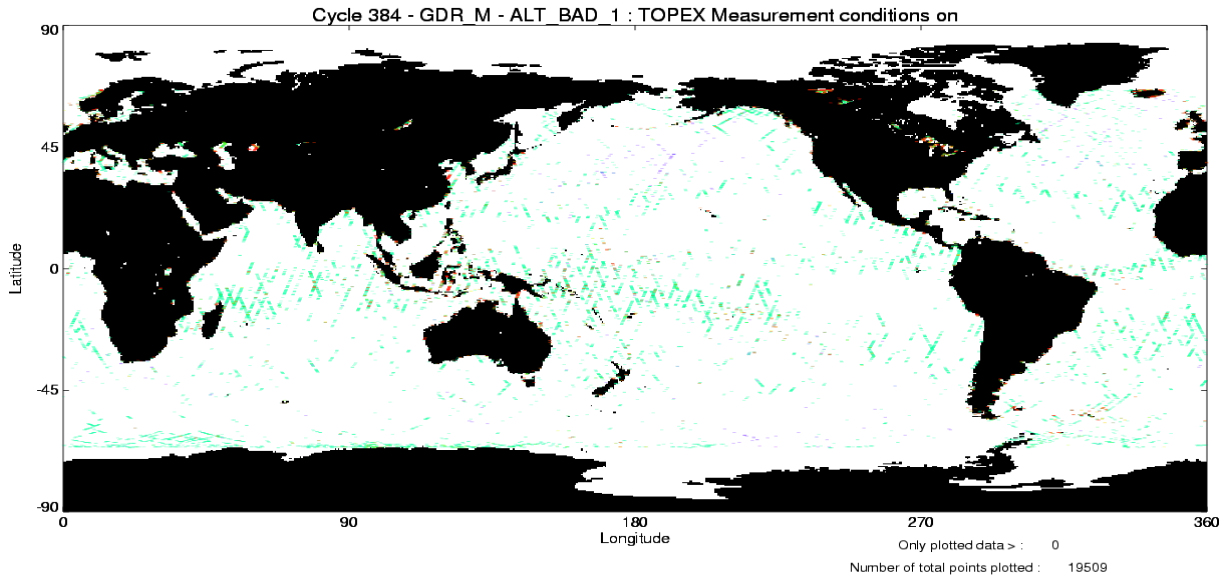
Cycle 384 – GDR\_M – TOPEX – All passes –

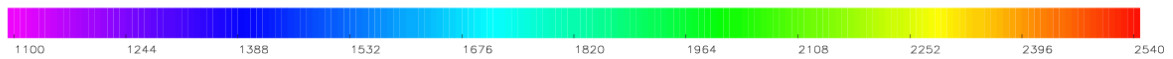
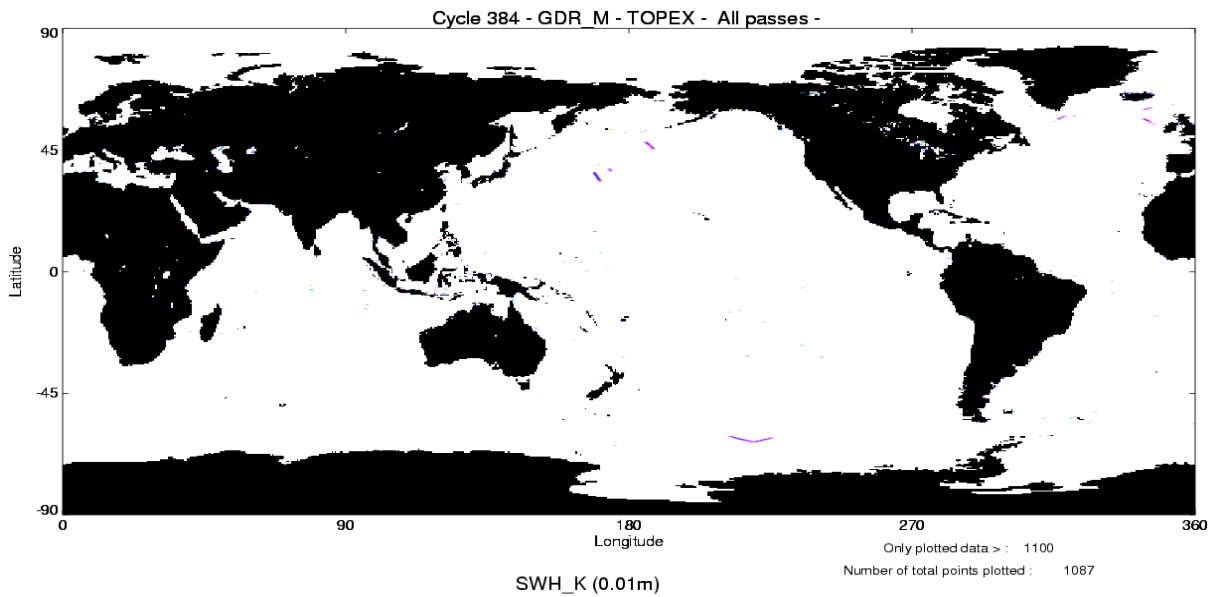
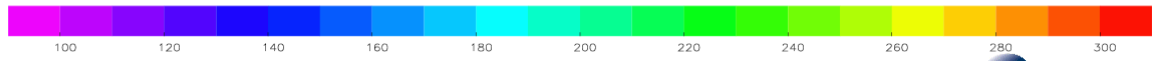
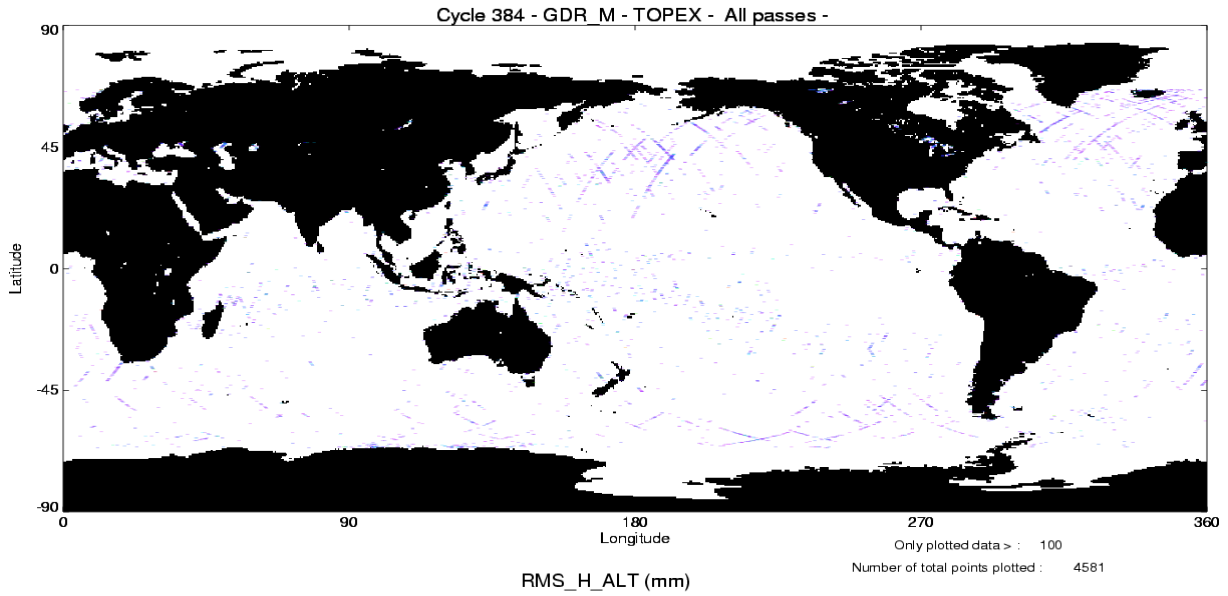


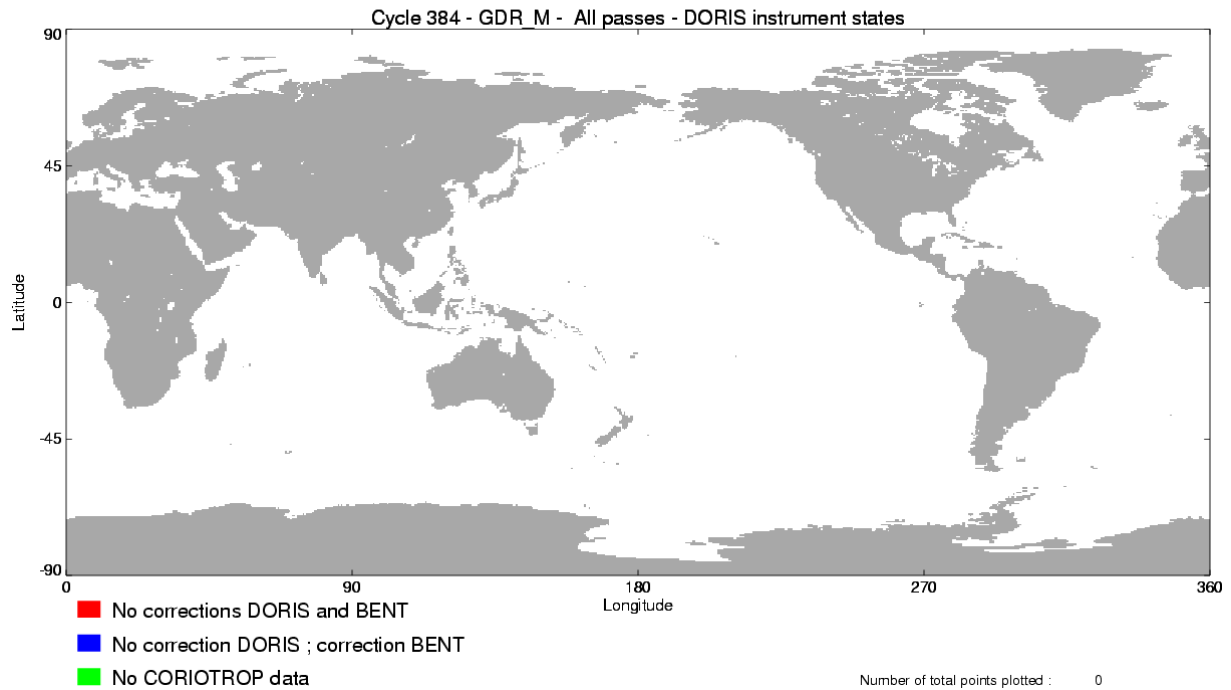


Cycle 384 – GDR\_M – TOPEX – All passes –









### 3.4 Editing

The following table gives for each tested parameter, minimum and maximum thresholds, the number and the percentage of points removed.

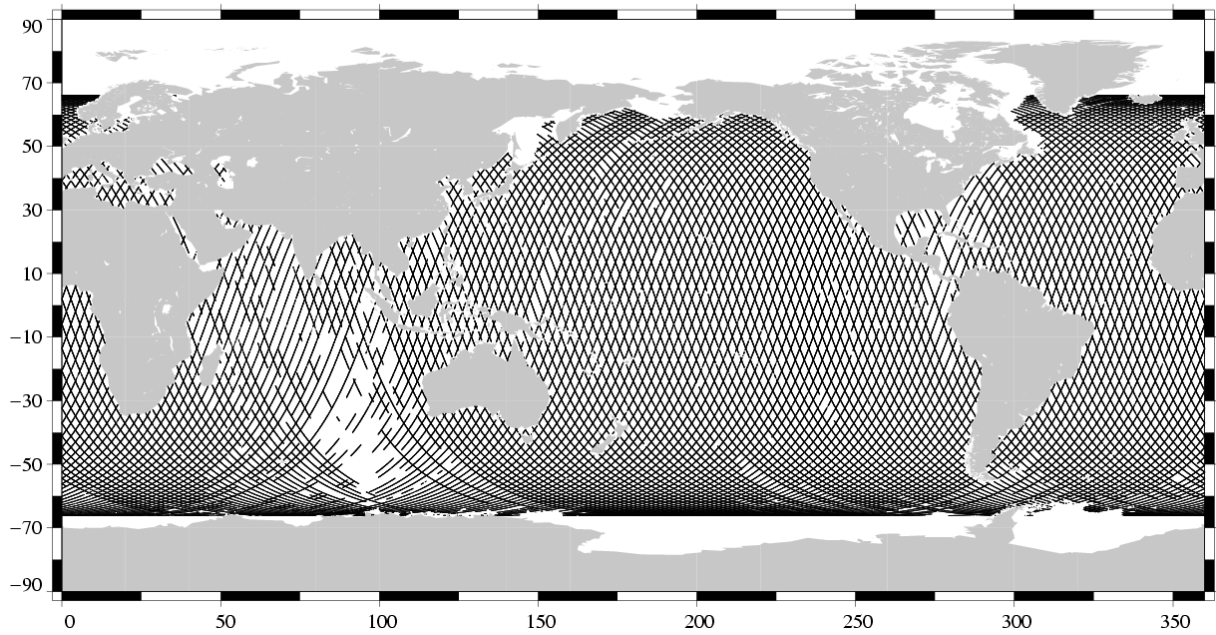
As a comparison, the mean percentage over one year (1997) is also given.

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 in the editing procedure since cycle 376 to remove all measurements for which the difference between the TMR and the ECMWF wet tropospheric corrections is greater than 20 cm. Even after applying this editing procedure, some anomalous TMR correction values remain (See [wet tropo correction section](#)).

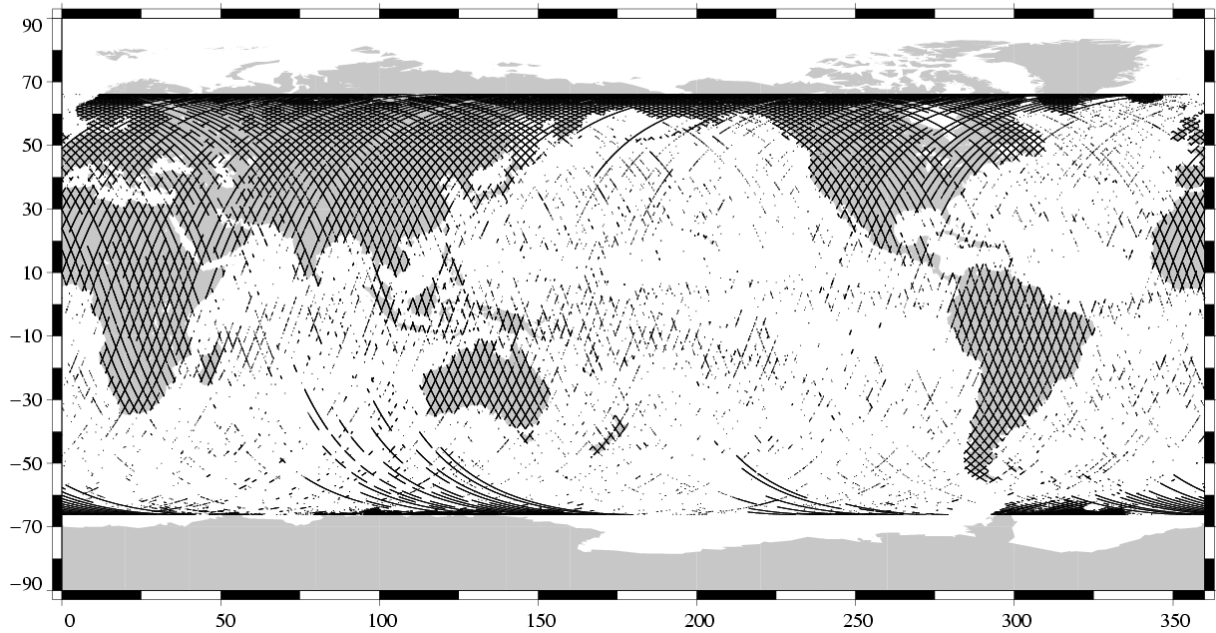
Parameters	Min Thres.	Max Thres.	Unit	Mean % removed in 1997	% removed
Sea surface height	-130.000	100.000	m	1.37	0.51
Number of 20/10Hz valid points Poseidon/TOPEX	5.000	-		1.37	0.77
Std. deviation of range	0.000	0.100	m	1.85	1.59
Off nadir angle from waveform	0.000	0.400	deg	1.36	3.71
Dry tropospheric 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	4.39
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	0.39
Sea state Bias	-0.500	0.000	m	1.39	0.51
Backscatter coefficient	7.000	30.000	dB	1.44	0.48
Ocean tide height	-5.000	5.000	m	0.01	0.72
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	0.72
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.

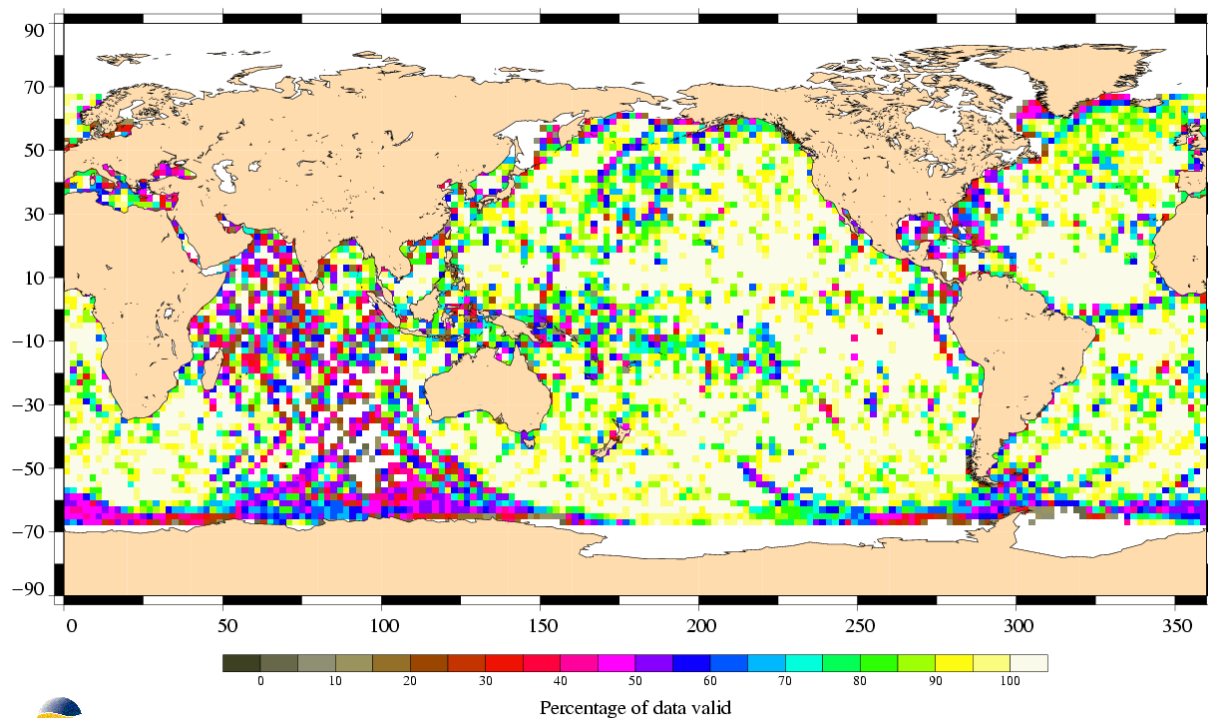
Valid data  
TOPEX/Poseidon Cycle 384 (15/02/2003 / 25/02/2003)



Edited measurements  
TOPEX Cycle 384 (15/02/2003 / 25/02/2003)

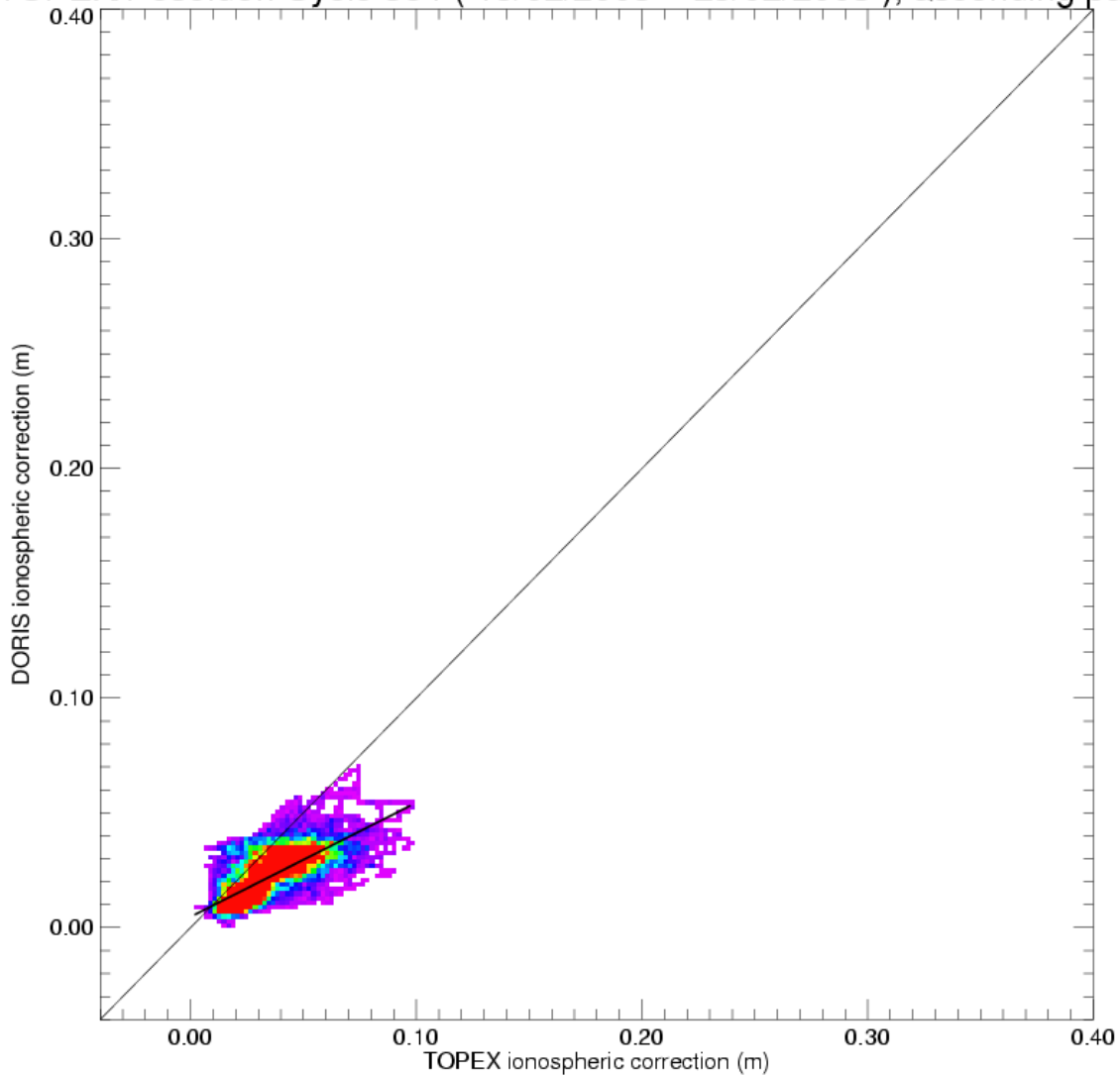


Percentage of valid data relative to the nominal pass  
TOPEX/Poseidon Cycle 384 (15/02/2003 / 25/02/2003)

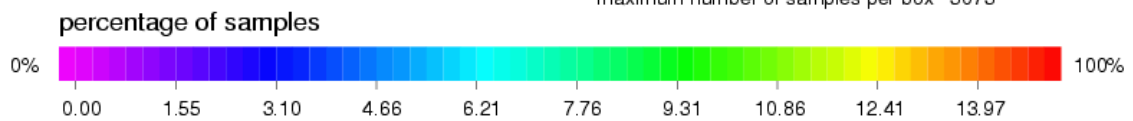


### 3.5 Ionospheric correction

TOPEX/Poseidon Cycle 384 ( 15/02/2003 – 25/02/2003 ), ascending passes



minimum number of samples per box 1  
maximum number of samples per box 3073



#### Statistics Y-X

mean = -0.01219  
rms = 0.01580  
std = 0.01004

#### Order 1 fit polynomial

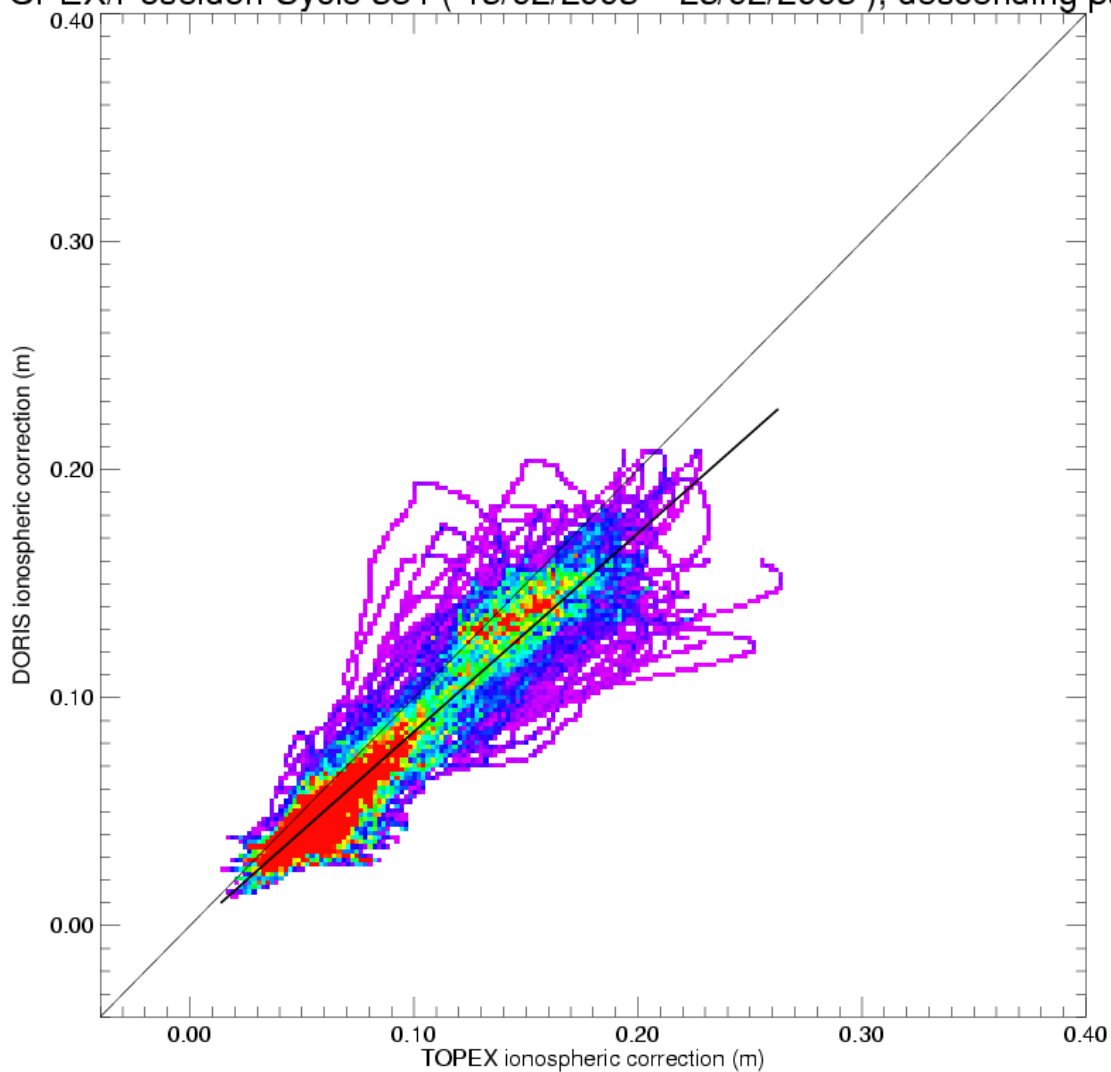
$y = a x + b$   
a = 0.49684018  
b = 0.00471415

#### Legend

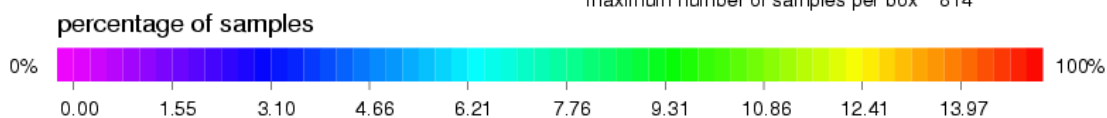
— Order 1 fit polynomial  
— Bisectrix



TOPEX/Poseidon Cycle 384 ( 15/02/2003 – 25/02/2003 ), descending passes



minimum number of samples per box 1  
 maximum number of samples per box 814



**Statistics Y-X**

mean = -0.01385  
 rms = 0.02155  
 std = 0.01651

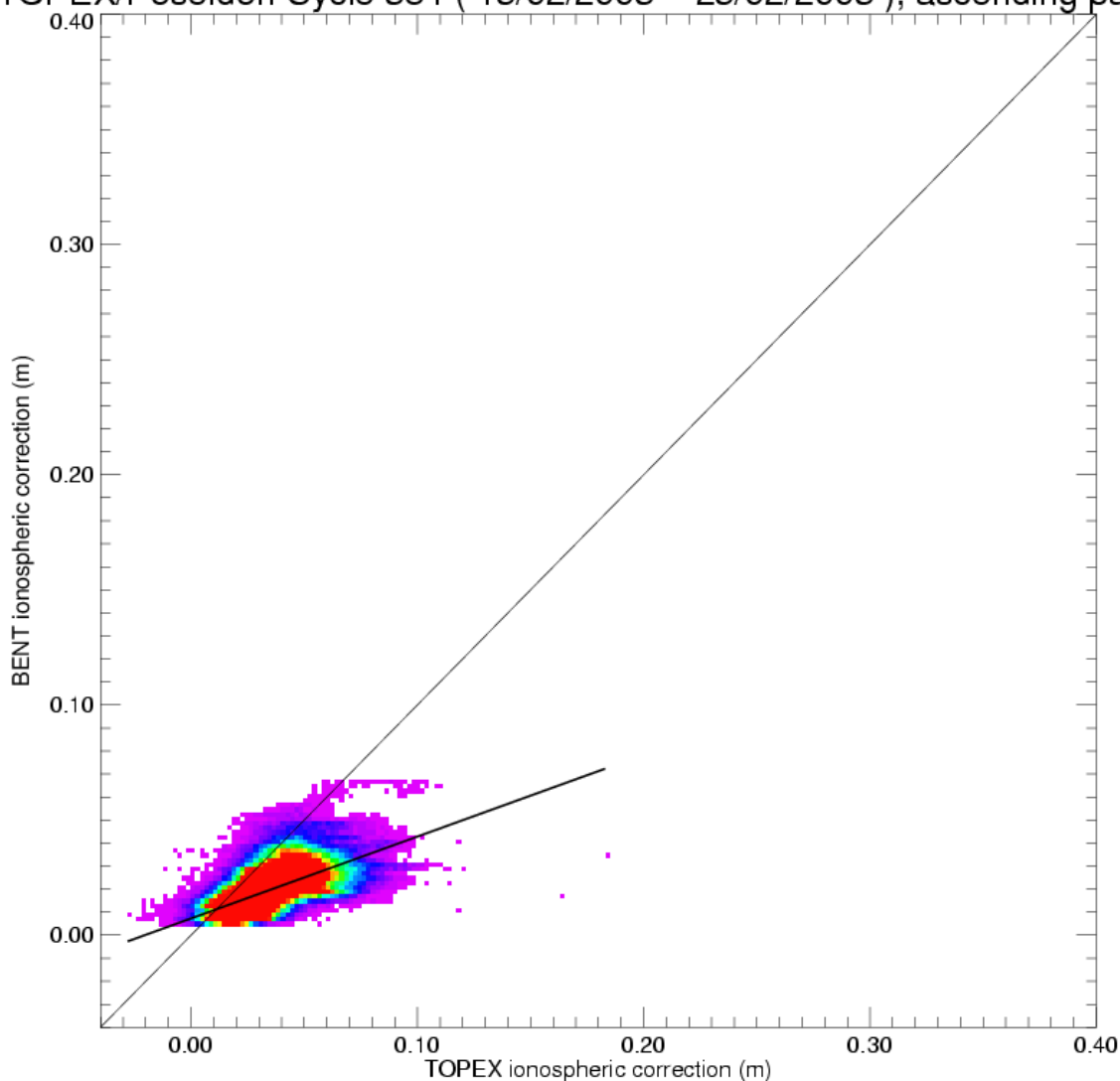
**Order 1 fit polynom**

$y = a x + b$   
 $a = 0.87085813$   
 $b = -0.00202475$

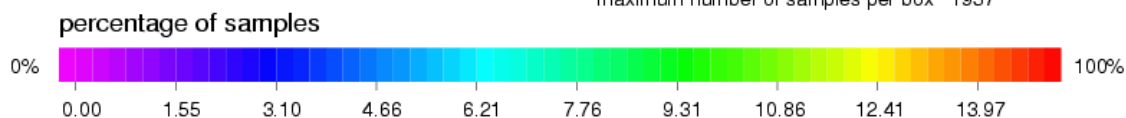
**Legend**

— Order 1 fit polynom  
 - - - Bisectrix

TOPEX/Poseidon Cycle 384 ( 15/02/2003 – 25/02/2003 ), ascending passes



minimum number of samples per box 1  
 maximum number of samples per box 1937



**Statistics Y-X**

mean = -0.01469  
 rms = 0.01931  
 std = 0.01254

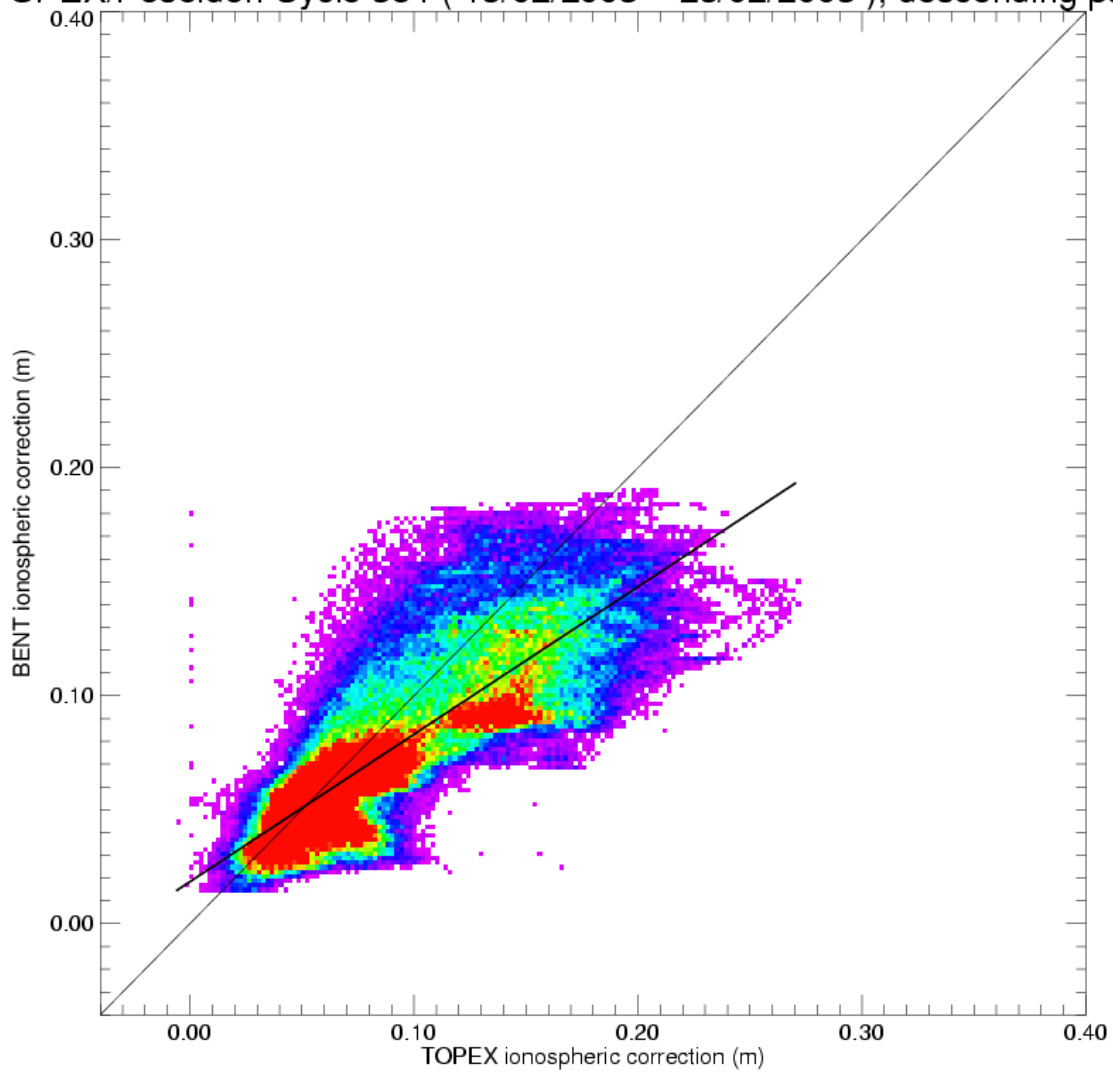
**Order 1 fit polynom**

$y = a x + b$   
 $a = 0.35555559$   
 $b = 0.00727519$

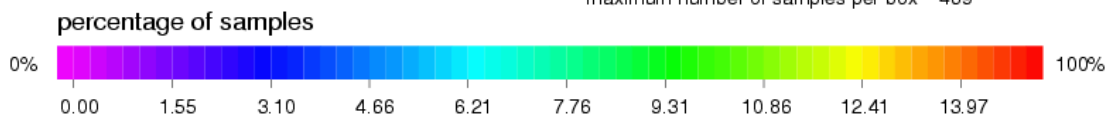
**Legend**

— Order 1 fit polynom  
 — Bisectrix

TOPEX/Poseidon Cycle 384 ( 15/02/2003 – 25/02/2003 ), descending passes



minimum number of samples per box 1  
 maximum number of samples per box 469



**Statistics Y-X**

mean = -0.01410  
 rms = 0.02985  
 std = 0.02630

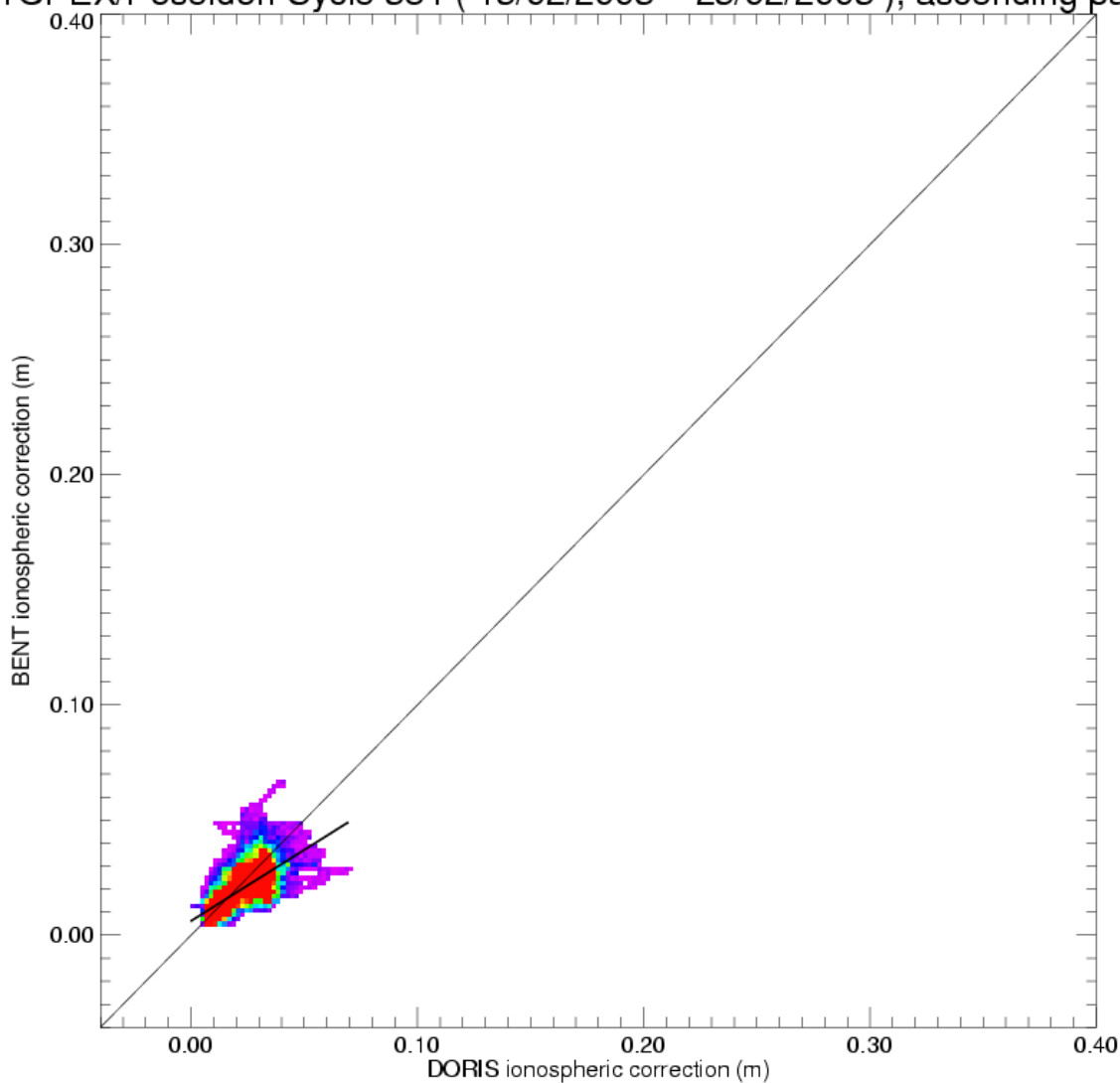
**Order 1 fit polynom**

$y = a x + b$   
 $a = 0.64692014$   
 $b = 0.01838832$

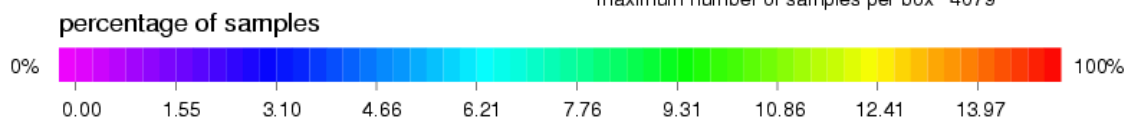
**Legend**

— Order 1 fit polynom  
 — Bisectrix

TOPEX/Poseidon Cycle 384 ( 15/02/2003 – 25/02/2003 ), ascending passes



minimum number of samples per box 1  
 maximum number of samples per box 4079



**Statistics Y-X**

mean = -0.00202  
 rms = 0.00809  
 std = 0.00784

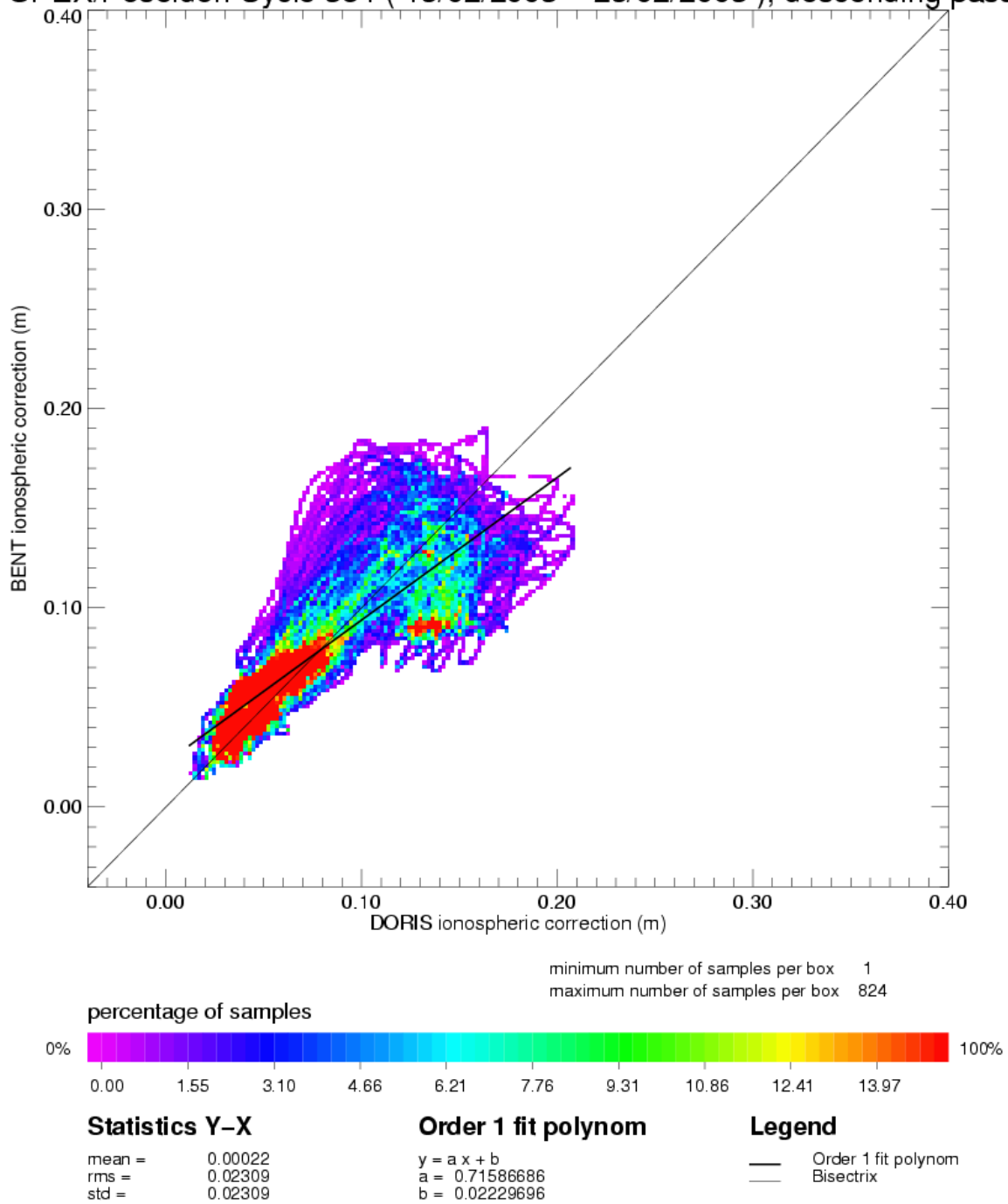
**Order 1 fit polynom**

$y = a x + b$   
 $a = 0.61736870$   
 $b = 0.00617402$

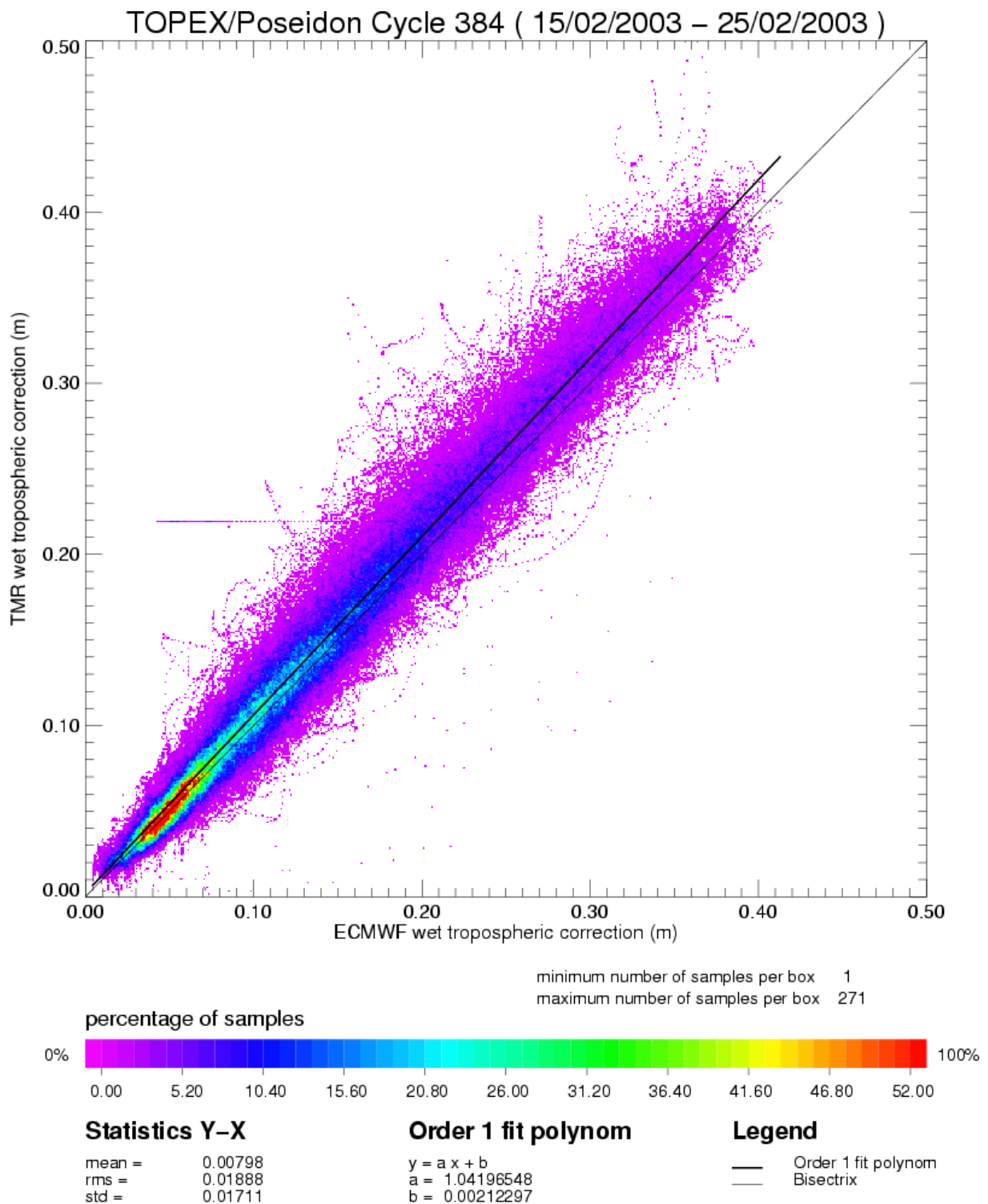
**Legend**

— Order 1 fit polynom  
 — Bisectrix

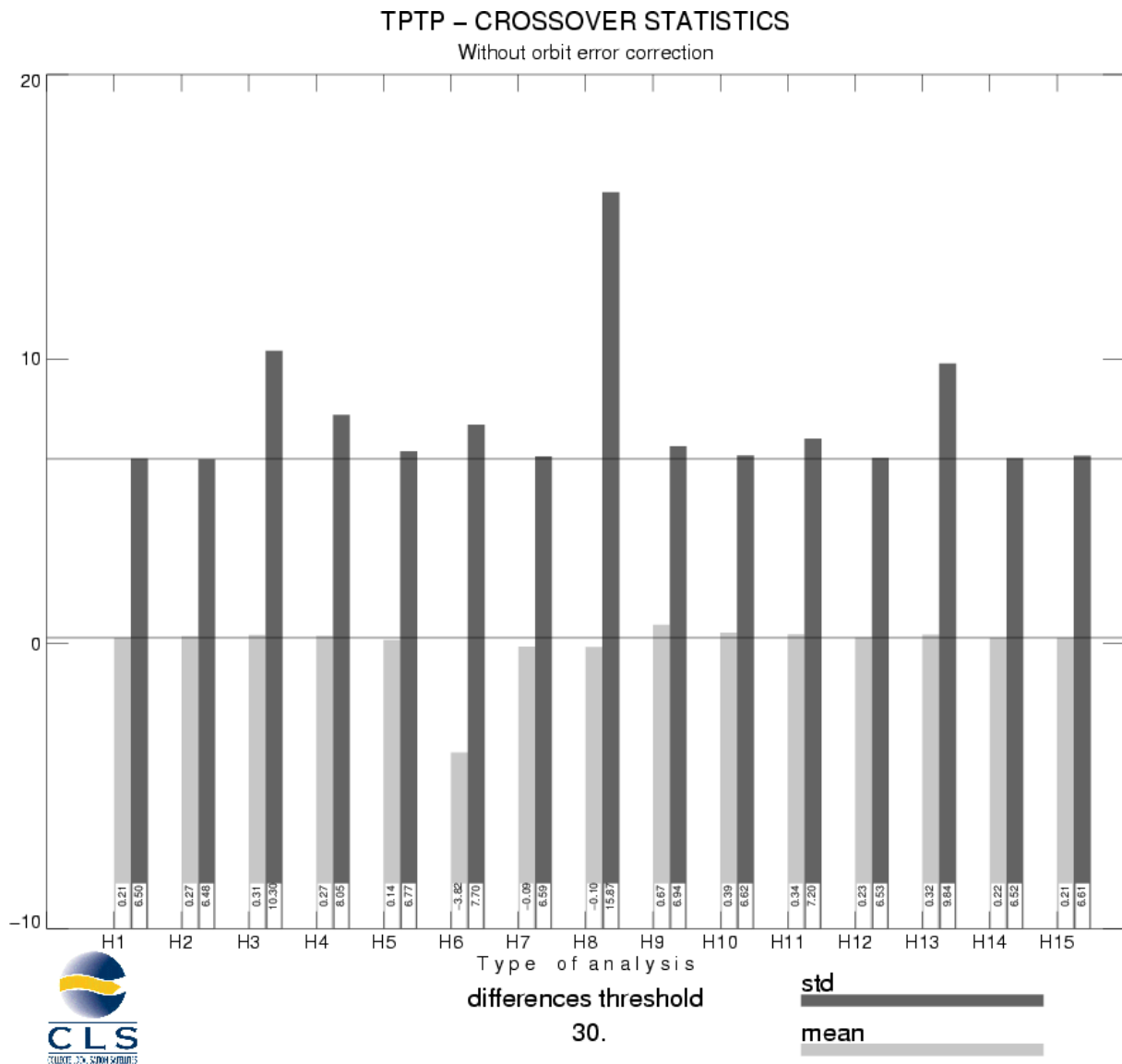
TOPEX/Poseidon Cycle 384 ( 15/02/2003 – 25/02/2003 ), descending passes



### 3.6 Wet tropospheric correction



### 3.7 Crossover statistics



SSH = Corrected sea surface height	SSH with FES95 tide model instead of GOT99
SSH without dry topospheric correction	SSH with CSR3 tide model instead of GOT99
SSH without inverse barometer correction	SSH without BM4 SSB correction
SSH without wet topospheric correction	SSH with BM3 SSB correction instead of BM4 SSB correction
SSH with ECMWF tropo instead of TMR tropo	SSH without solid earth tide correction
SSH without ionospheric correction filtered	SSH without polar tide correction
SSH with DORIS iono correction instead of iono filtered	SSH = Corrected sea surface height with CNES orbit
SSH without GOT99 tide model	

### TPTP – CROSSOVER STATISTICS

Without orbit error correction

SSH = Corrected sea surface height

#### RAPPEL DES SELECTIONS

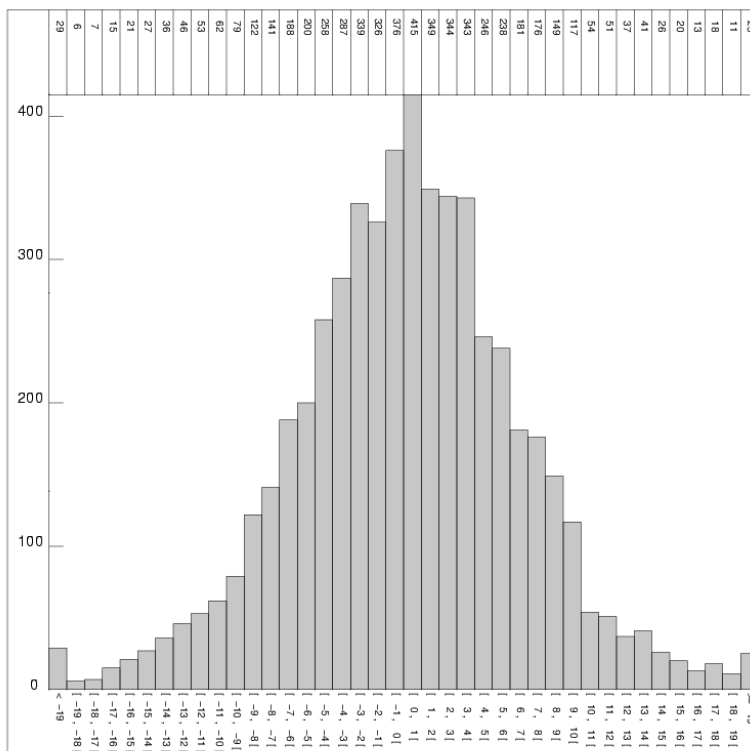
Type de points de croisement: TPTP  
 Zone géographique (deg): -90 / 90 , 0 / 360  
 Seuil sur les écarts d'analyse 0.00 (moy)  
 30.00 (seuil)  
 Selection(s) sur les champs :  
 CL Arc 1 :=INTERP\_SPLN  
 CL Arc 2 :=INTERP\_SPLN  
 Seuil Min +: 0.0000000  
 Seuil Max : 0.0000000

Selection(s) sur les écarts :  
 Aucune

#### RESULTATS STATISTIQUES

Valeur minimale : -28.5800  
 Valeur maximale : 29.7600  
 Différence Max – Min: 58.3400  
 Nombre de points lus: 5571  
 Nombre de points sélectionnés: 5472  
 Moyenne : 0.214123  
 Écart-type : 6.50369  
 Moyenne Quadratique : 6.50721

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### TPTP – CROSSOVER STATISTICS

With orbit error correction

SSH = Corrected sea surface height

#### RAPPEL DES SELECTIONS

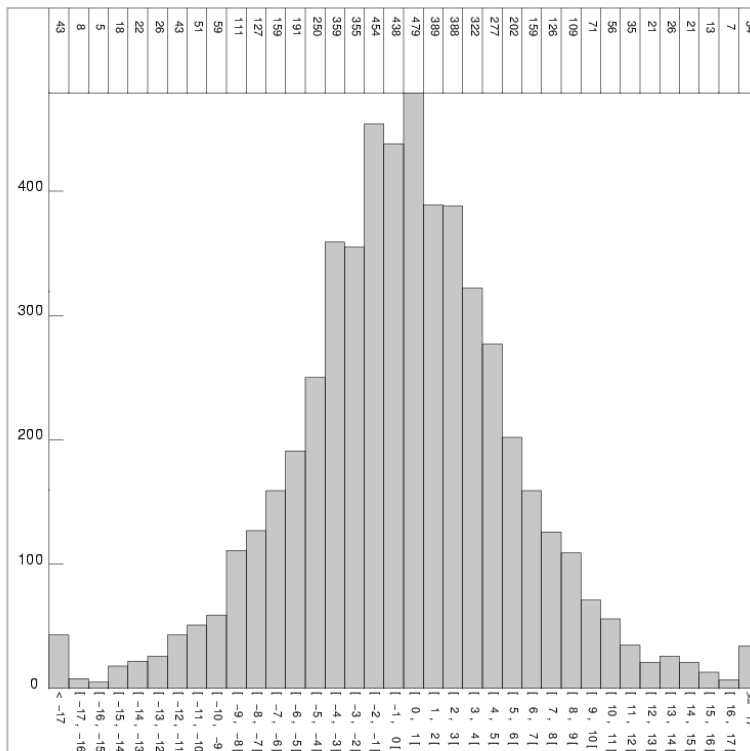
Type de points de croisement: TPTP  
 Zone géographique (deg): -90 / 90 , 0 / 360  
 Seuil sur les écarts d'analyse 0.00 (moy)  
 30.00 (seuil)  
 Selection(s) sur les champs :  
 CL Arc 1 :=INTERP\_SPLN  
 CL Arc 2 :=INTERP\_SPLN  
 Seuil Min +: 0.0000000  
 Seuil Max : 0.0000000

Selection(s) sur les écarts :  
 Aucune

#### RESULTATS STATISTIQUES

Valeur minimale : -28.4300  
 Valeur maximale : 29.5900  
 Différence Max – Min: 58.0200  
 Nombre de points lus: 5571  
 Nombre de points sélectionnés: 5454  
 Moyenne : 0.0127140  
 Écart-type : 5.79803  
 Moyenne Quadratique : 5.79804

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**TPTP – CROSSOVER STATISTICS**  
**SSH, BATHY < -1000 m, VAR\_OCE < 20 cm, LAT [-50°, +50]**  
**SSH = Corrected sea surface height before orbit error**

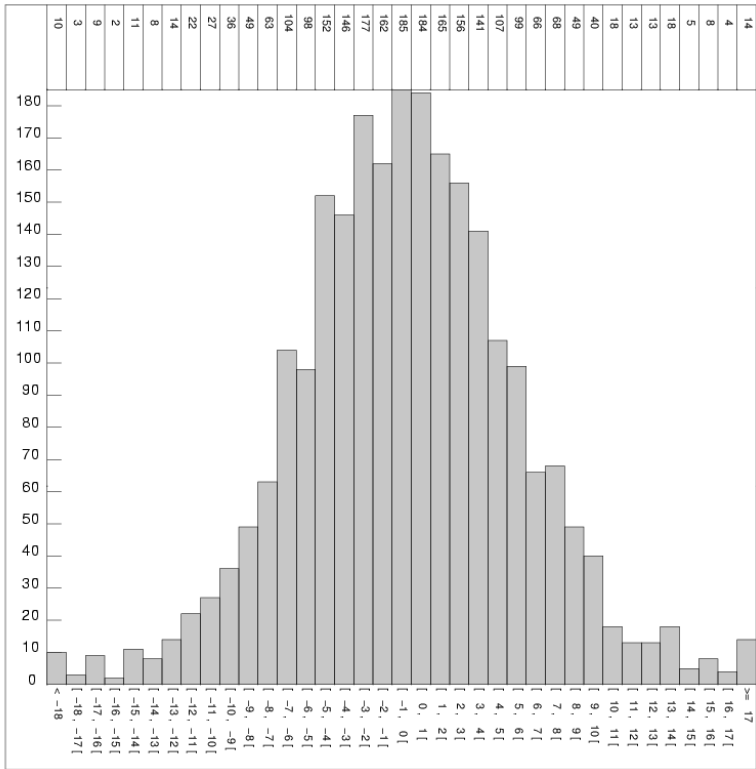
**RAPPEL DES SELECTIONS**

Type de points de croisement: TPTP  
 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 : -36.5600  
 Valeur maximale : 32.0800  
 Différence Max – Min: 68.6400  
 Nombre de points lus: 2686  
 Nombre de points sélectionnés: 2446  
 Moyenne : -0.245503  
 Écart-type : 5.95008  
 Moyenne Quadratique : 5.95514

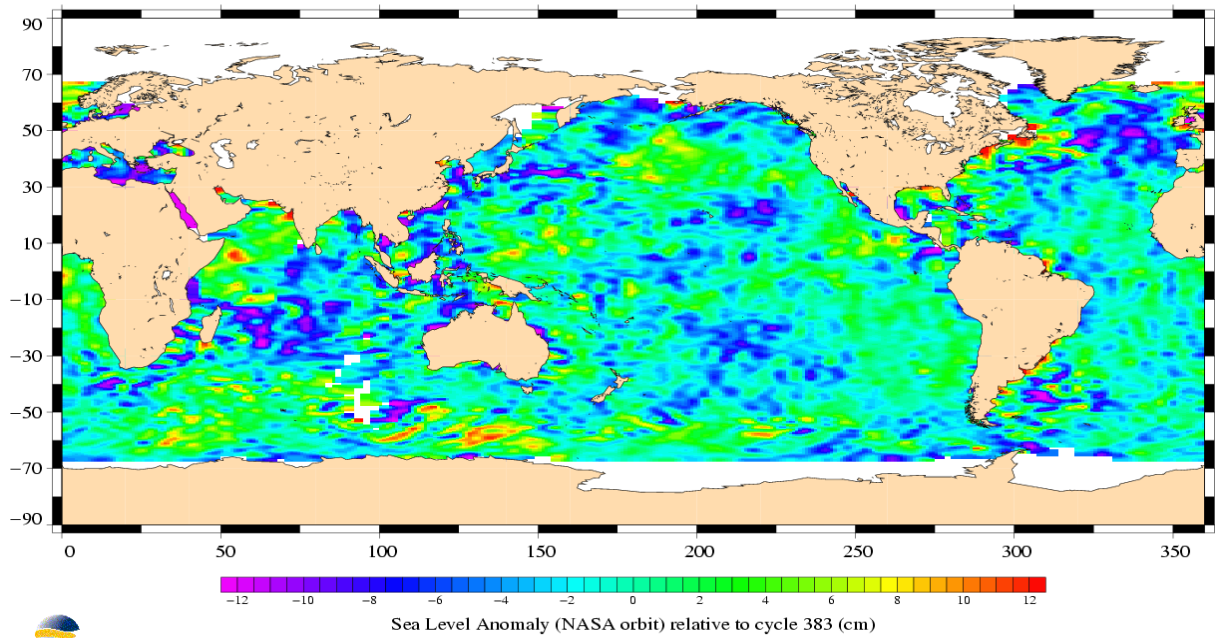
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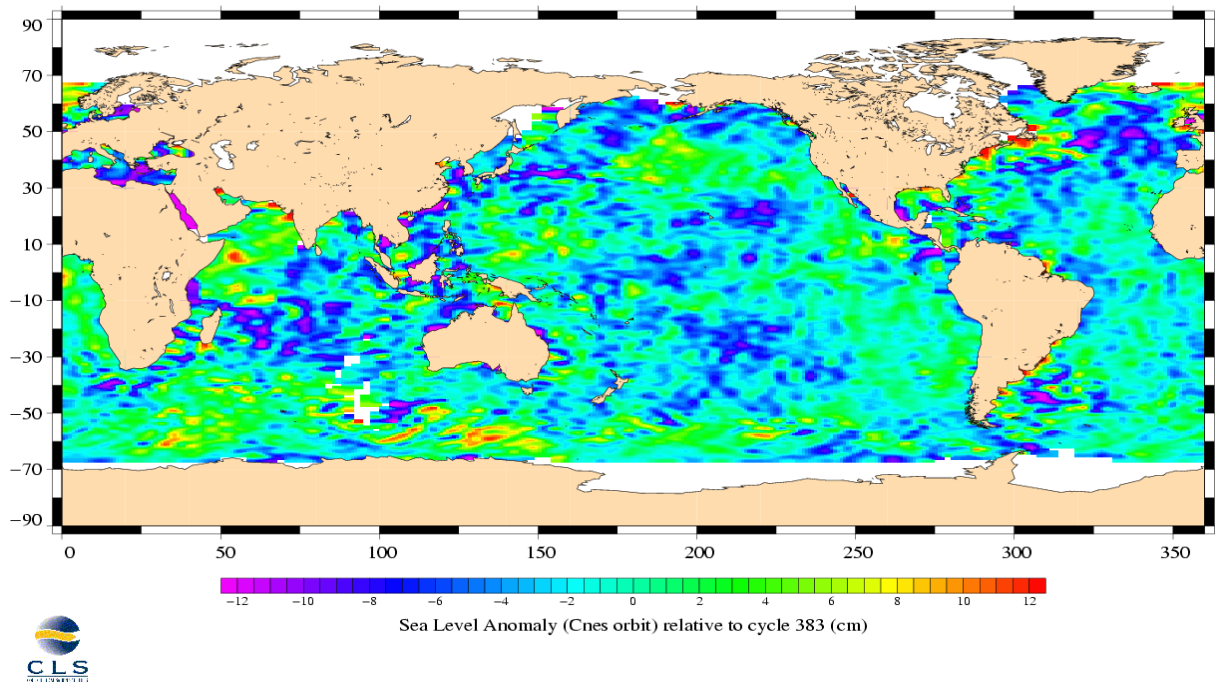
### 3.8 SSH variability

#### 3.8.1 Sea Level Anomaly

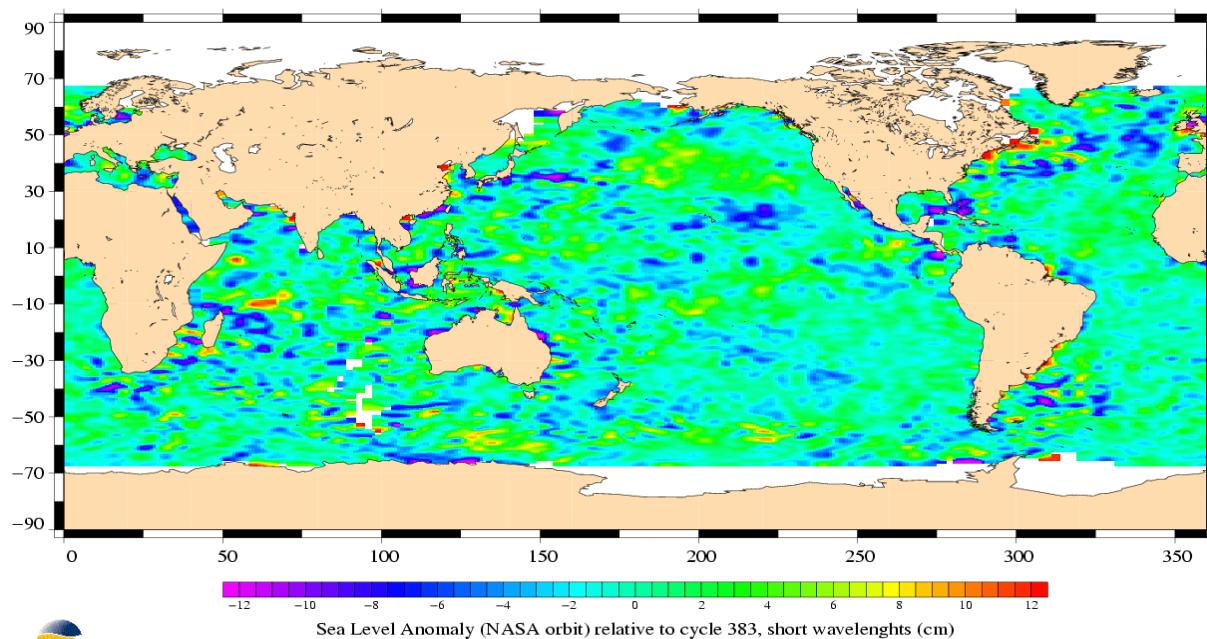
TOPEX/Poseidon, cycle 384  
Period : 15/02/2003 – 25/02/2003



TOPEX/Poseidon, cycle 384  
Period : 15/02/2003 – 25/02/2003



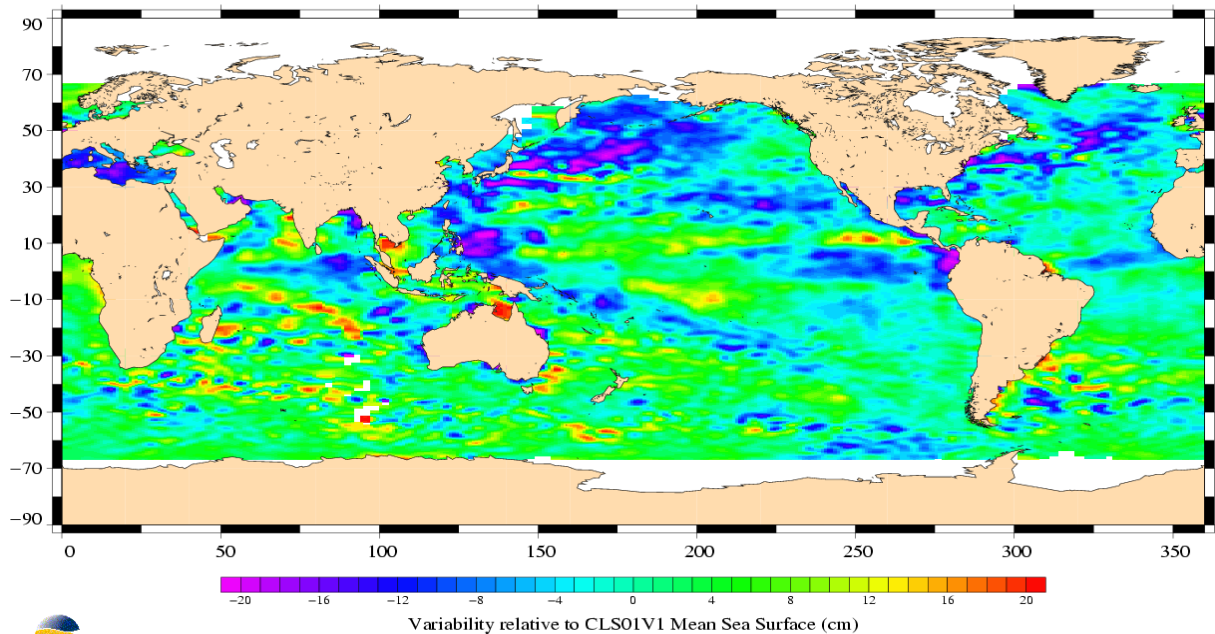
TOPEX/Poseidon, cycle 384  
Period : 15/02/2003 – 25/02/2003



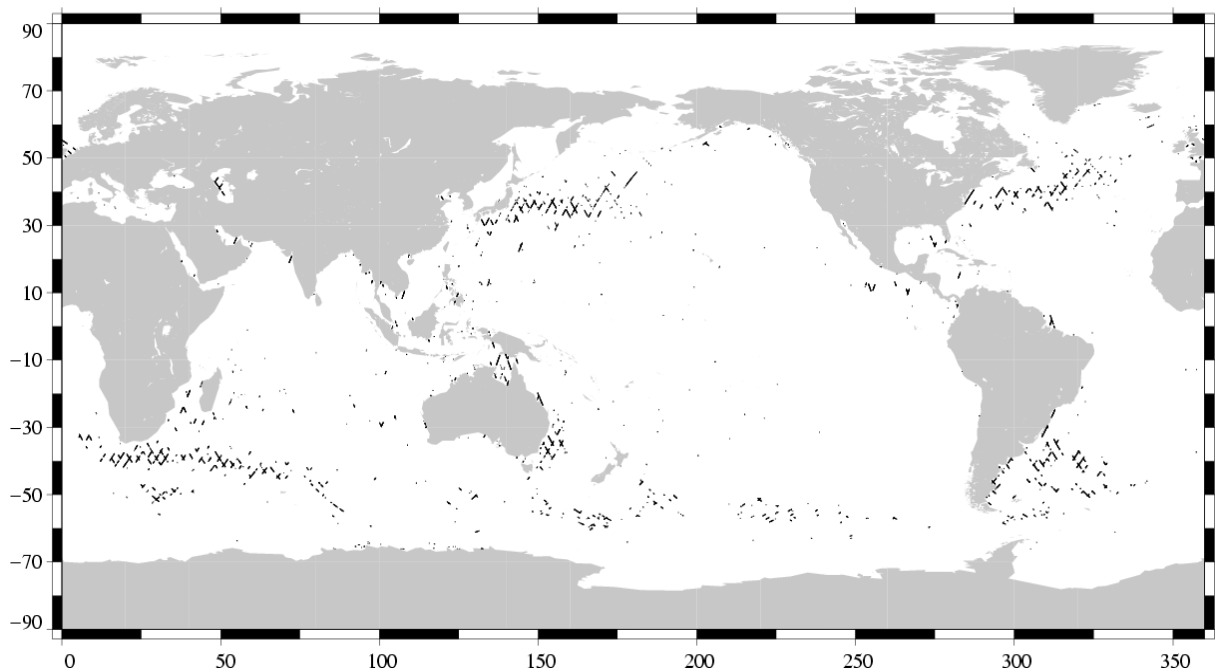
### 3.8.2 Comparison to a precise Mean Sea Surface

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 384  
Period : 15/02/2003 – 25/02/2003

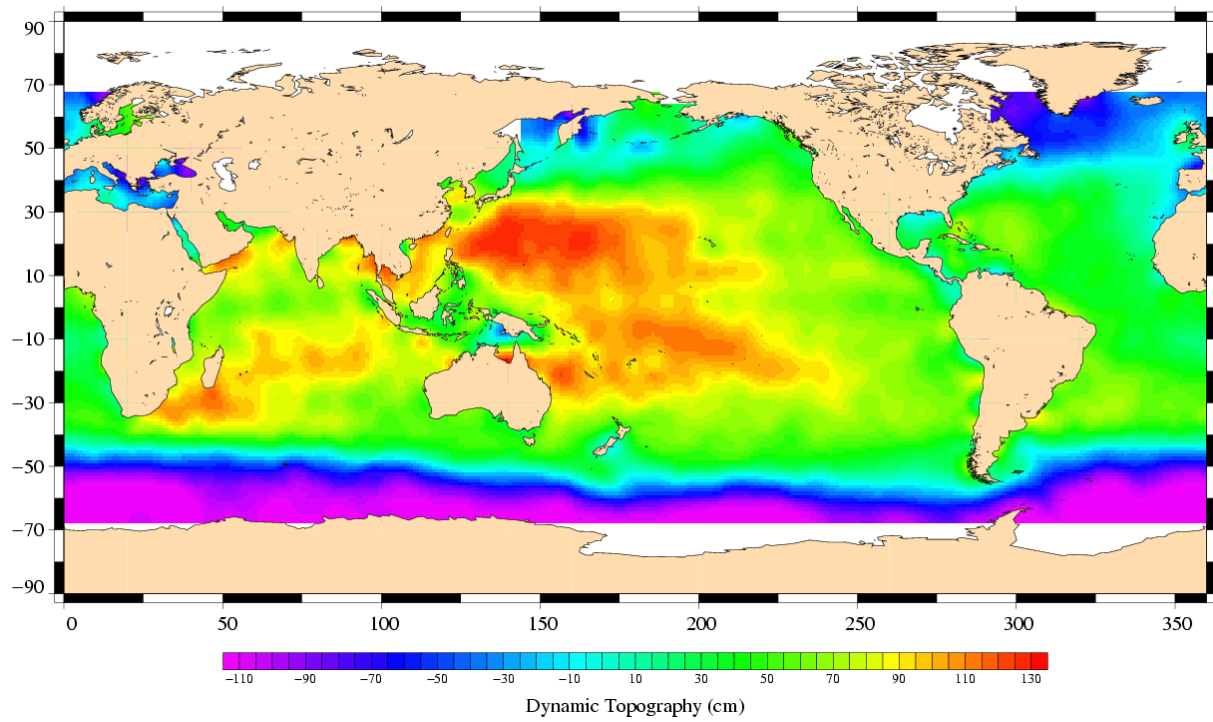


(SSH – MSS) differences greater than 0.3 m  
TOPEX/Poseidon Cycle 384 (15/02/2003 / 25/02/2003)



### 3.9 Dynamic topography

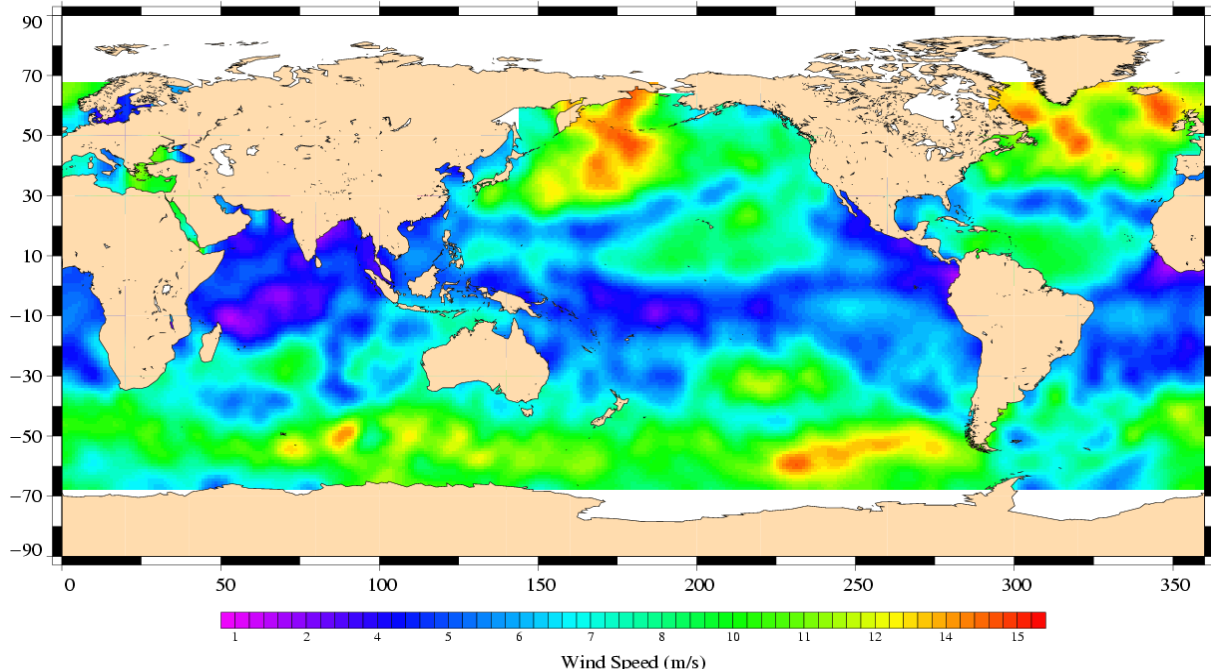
TOPEX/Poseidon, cycle 384  
Period : 15/02/2003 – 25/02/2003



### 3.10 Wind and wave maps

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

TOPEX/Poseidon, cycle 384  
Period : 15/02/2003 – 25/02/2003



Wind Speed (m/s)  
TOPEX/Poseidon, cycle 384  
Period : 15/02/2003 – 25/02/2003

