



# TOPEX/Poseidon MGRD Quality Assessment Report

**Cycle 369**

**20-09-2002 30-09-2002**

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**SALP-RP-P2-EX-21120-CLS369**

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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

For this cycle, the crossover standard deviation is 5.98 cm rms, and the standard deviation of Sea Level Anomalies (SLA) relative to a Mean Sea Surface is 9.87 cm.

Compared to the whole TOPEX/Poseidon data set, these values are low. This may be explained by a lower number of crossovers due to tape recorder problems.

### 2.2 Warnings and recommendations

- This cycle is the first one on the new tandem Mission orbit. Thus it is possible to use a nominal pass to compute the percentage of available measurements relative to the theory, the missing measurements and the sea level anomaly.
- Missing measurements :  
due to a tape recorder problems there is an large number of data gaps during this cycle.
- Editing measurements :  
Problems in the interpolation of the TMR parameters occur when there are missing measurements (tape recorder failures). As a result some measurements are removed near this missing data due the TMR correction criterion.

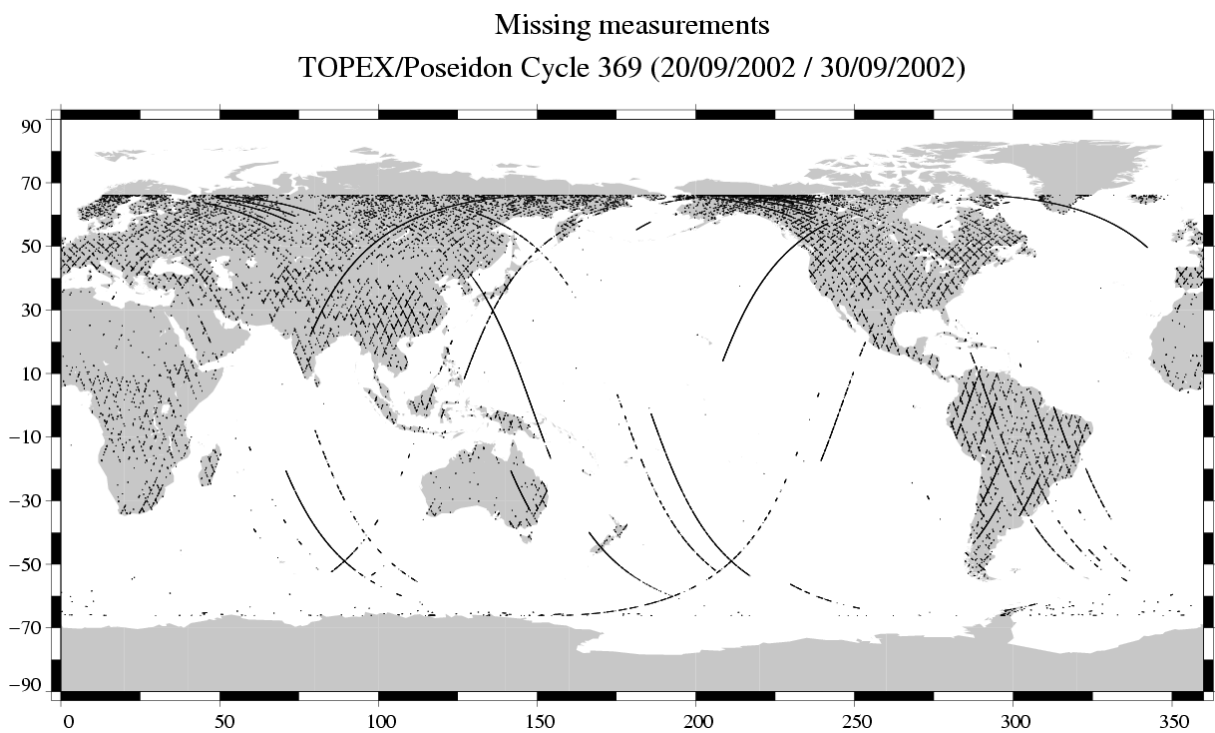
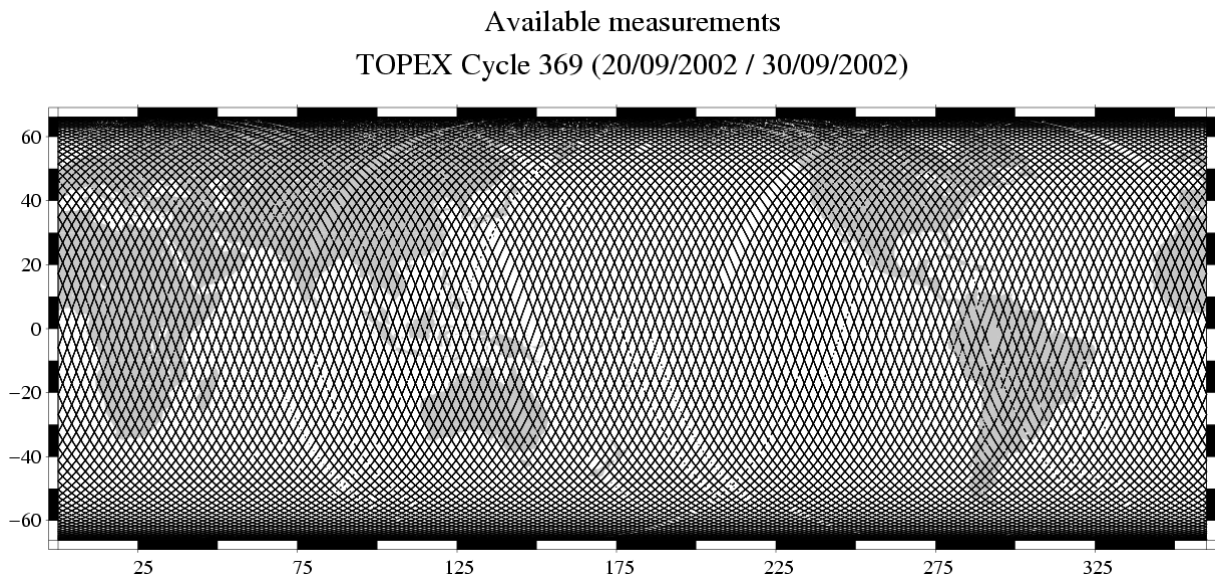
### 3 CALVAL main results

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

746952 altimeter measurements are present, and 47503 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.



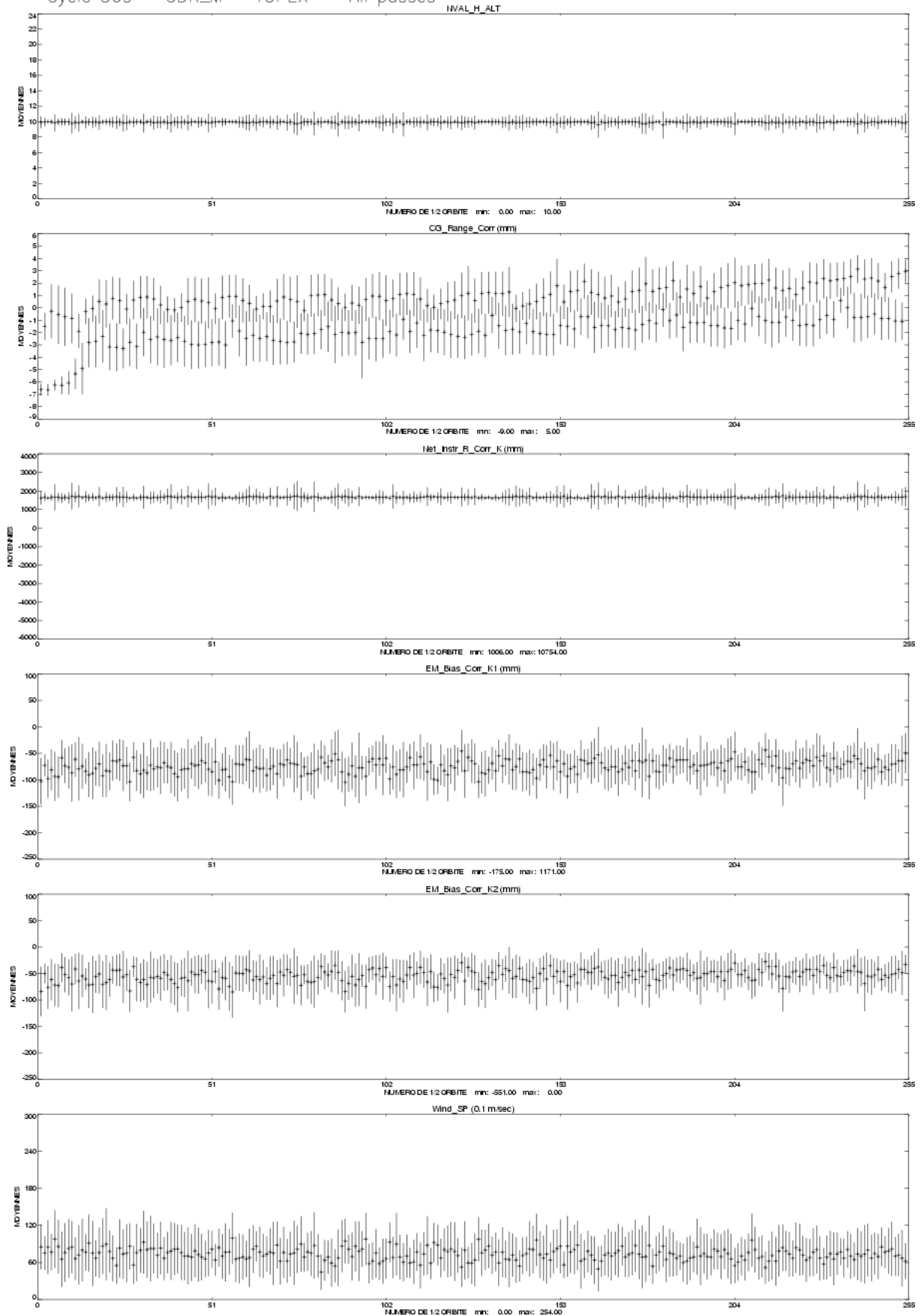
### 3.2 M-GDR quality flags

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

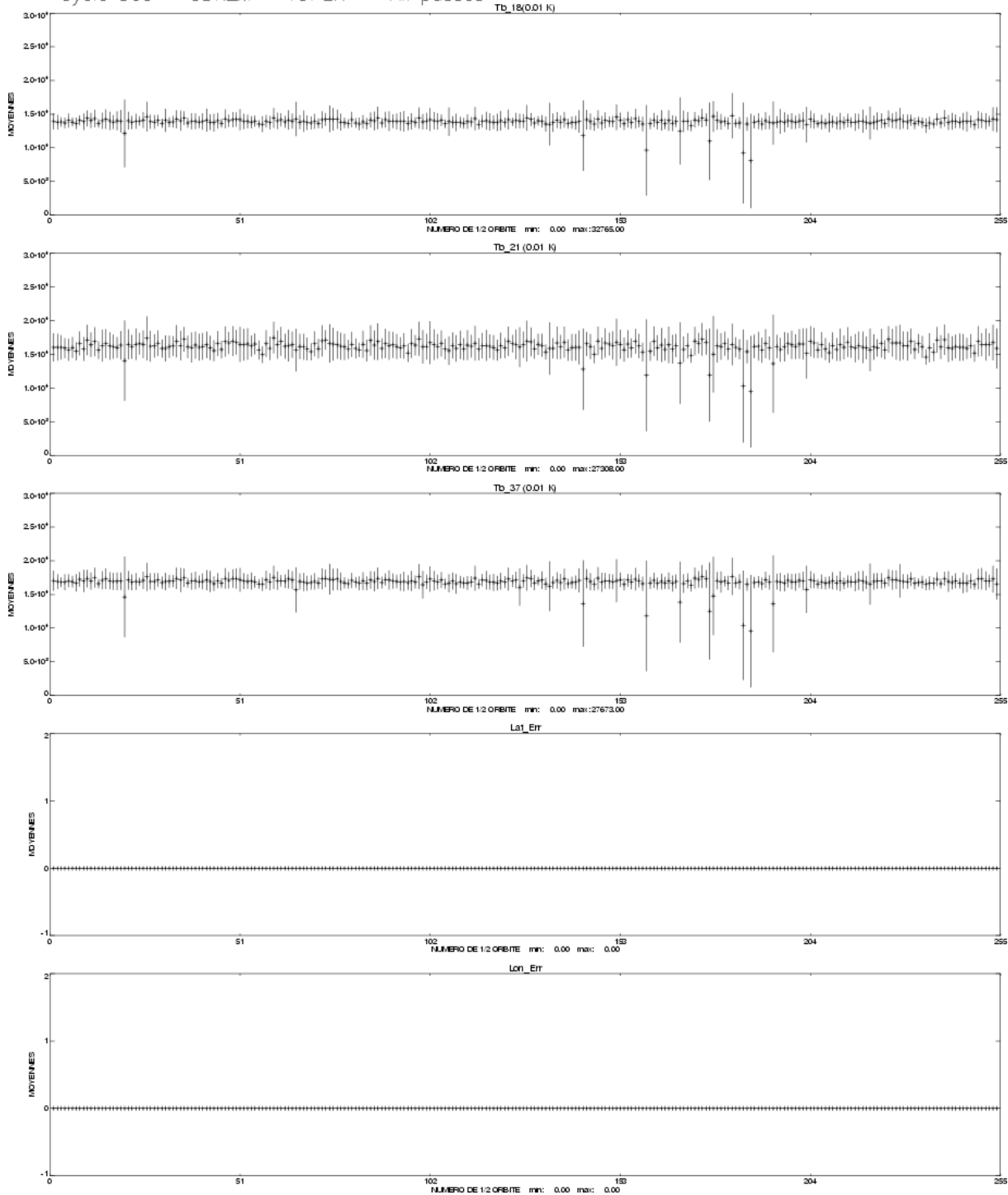
Name	Description	% bad
Geo_Bad_1	altimeter land flag	26.40
Geo_Bad_1	ice flag	8.98
Geo_Bad_1	radiometer land flag	28.53
Alt_Bad_1	conditions 1 altimeter	5.44
Alt_Bad_2	conditions 2 altimeter	5.31
Geo_Bad_2	rain (liquid water in excess)	3.80
Geo_Bad_2	less than 4 points for CSR3.0 tide calculation	0.46
Geo_Bad_2	less than 4 points for FES95.2.1 tide calculation	3.20
TOPEX	TOPEX not valid	0.00
TMR	TMR not valid	0.00
TMR_Bad	Brightness temperatures not valid	1.25
DORIS	DORIS not valid	0.00

### 3.3 M-GDR parameter plots

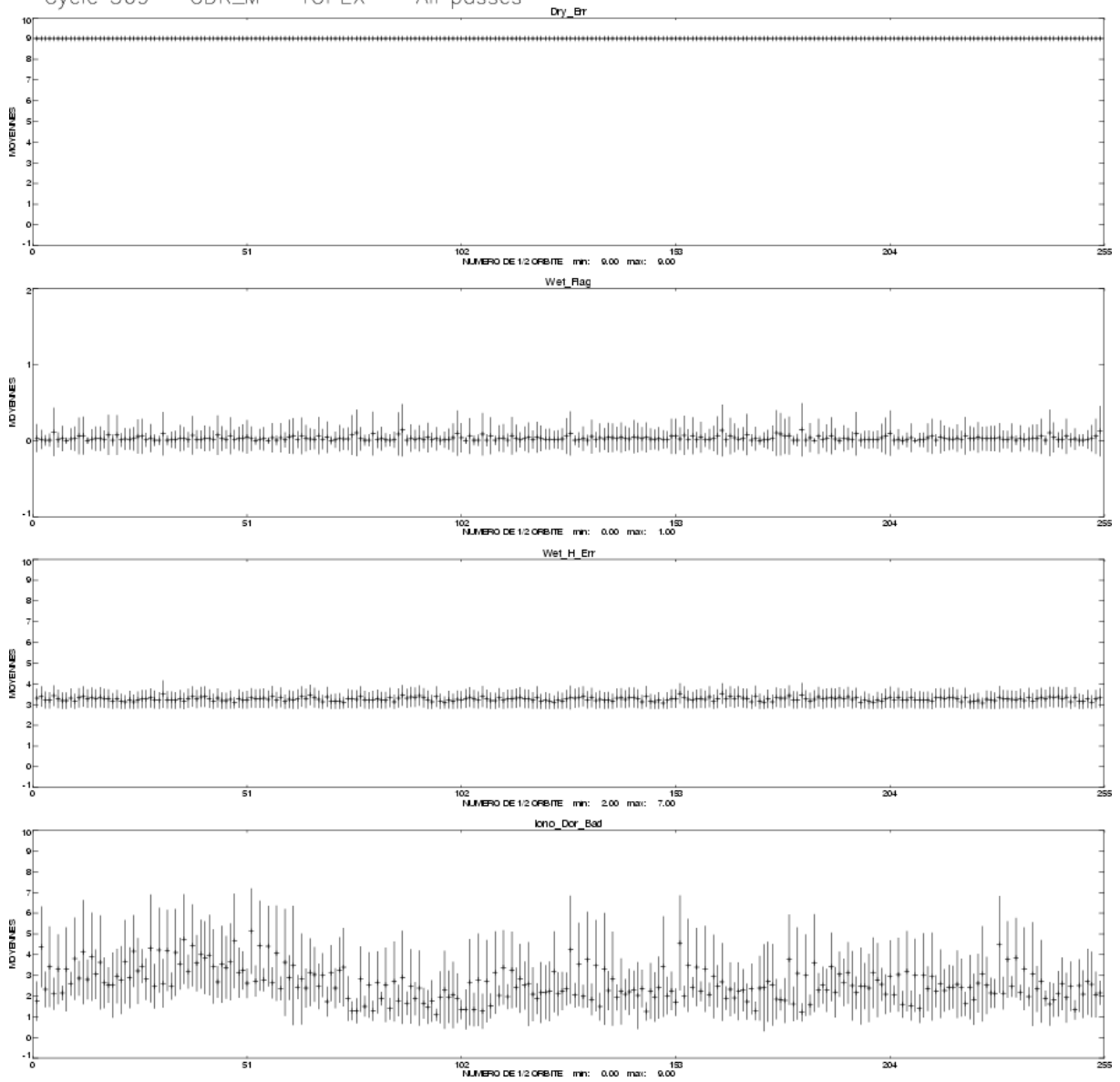
Cycle 369 – GDR\_M – TOPEX – All passes –



Cycle 369 – GDR\_M – TOPEX – All passes –

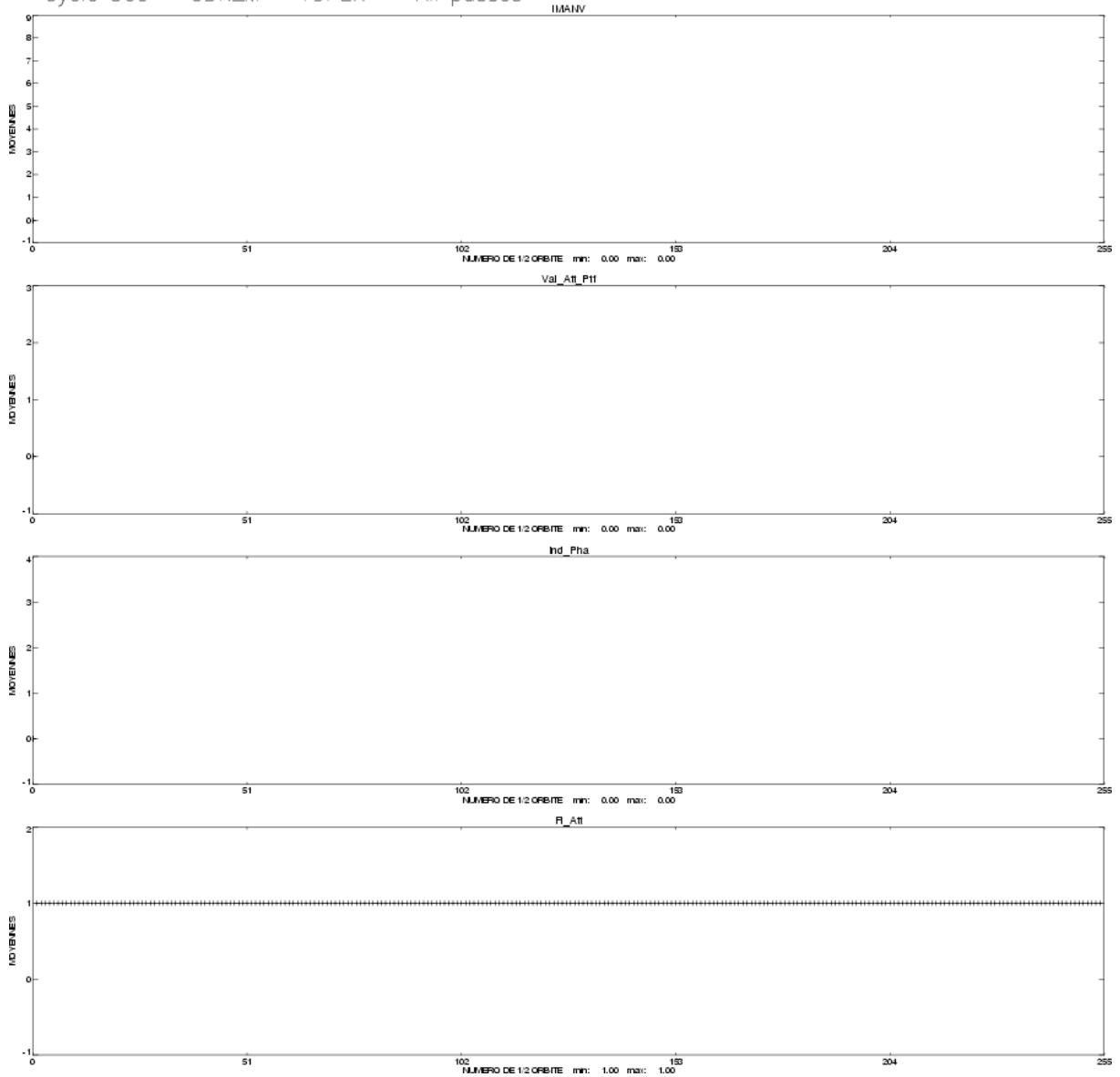


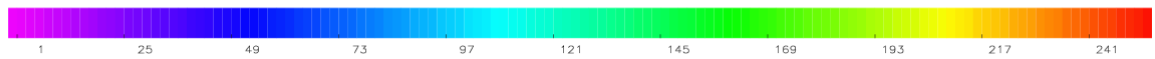
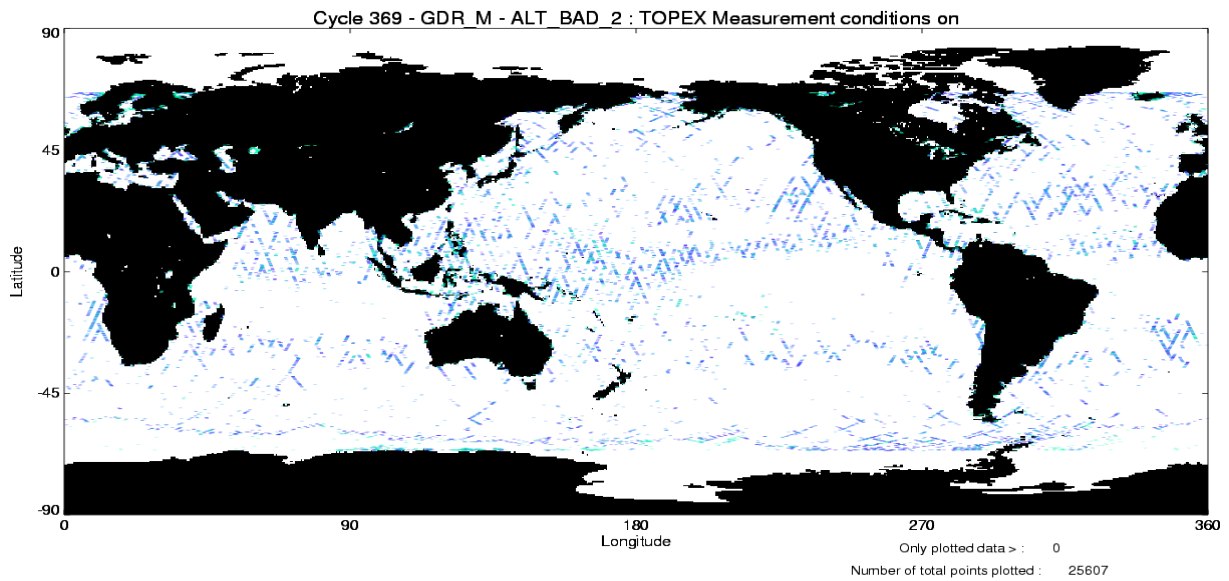
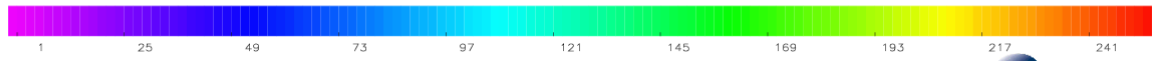
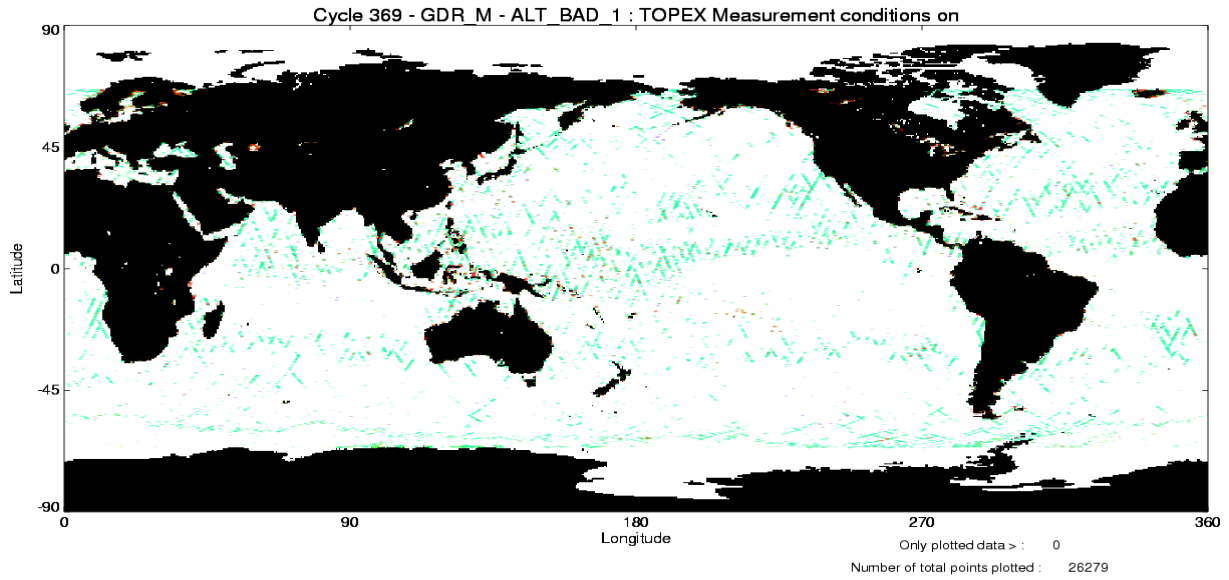
Cycle 369 – GDR\_M – TOPEX – All passes –

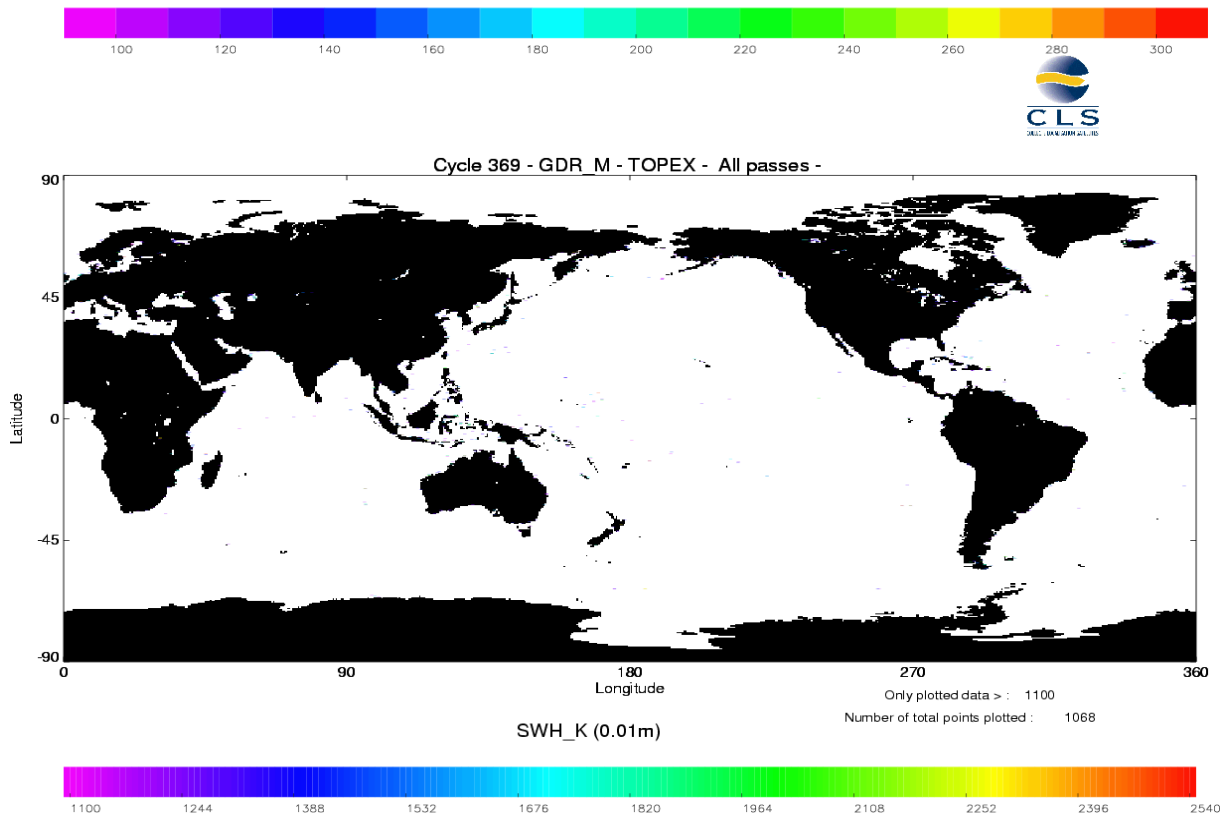
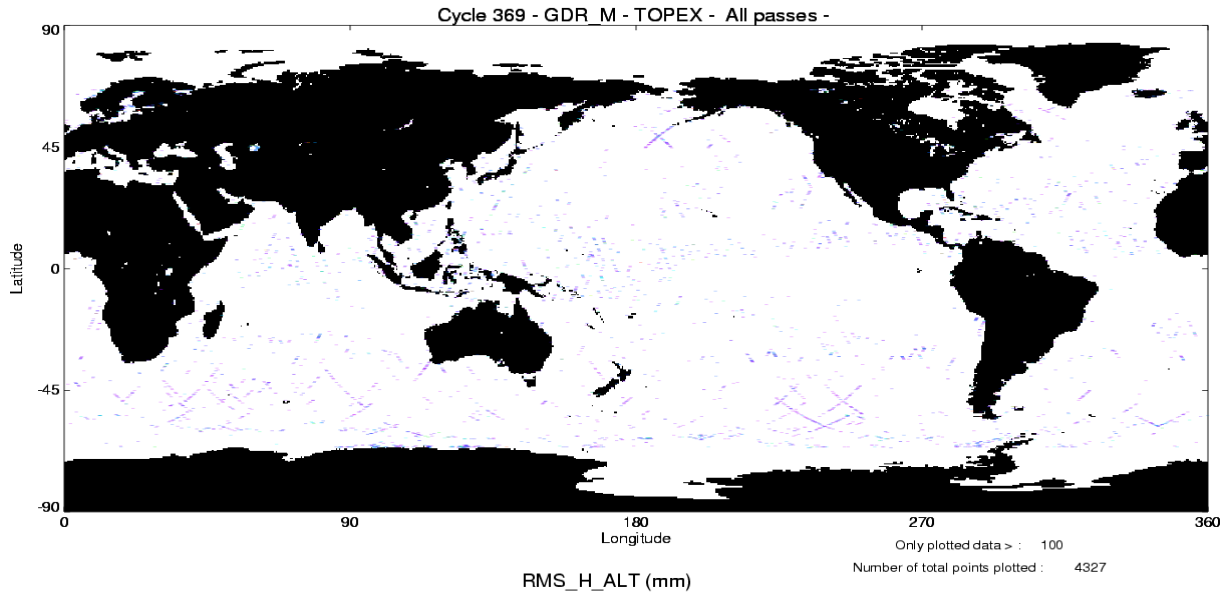


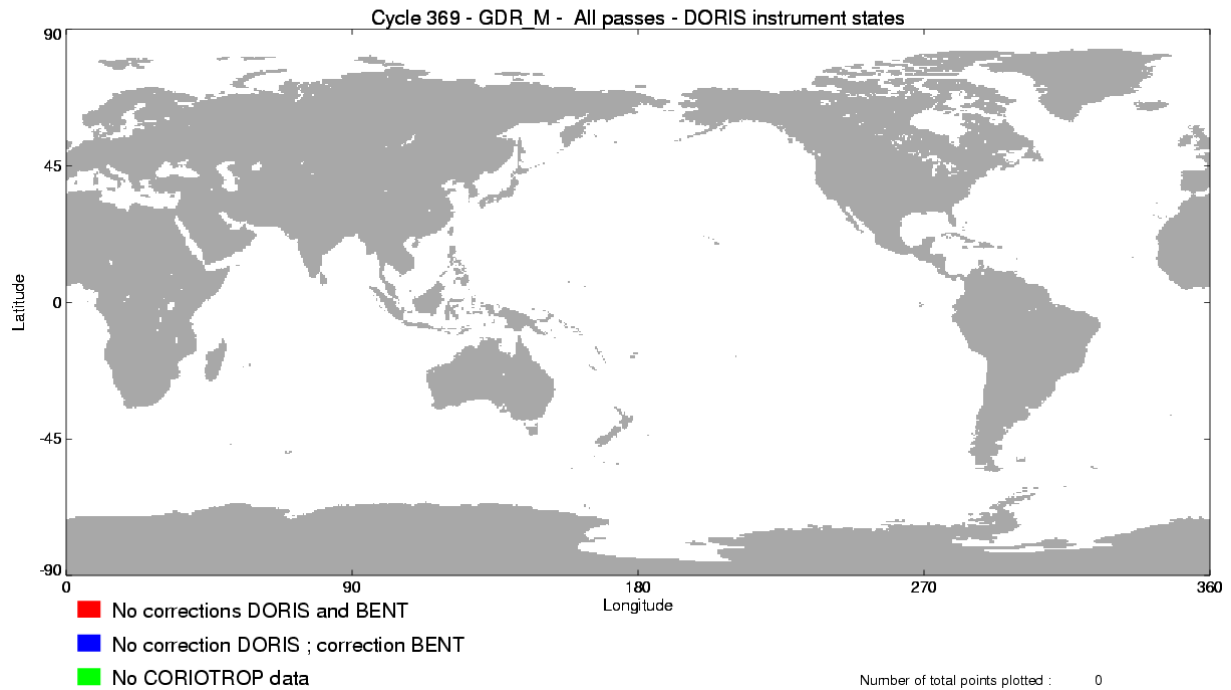


Cycle 369 – GDR\_M – TOPEX – All passes –









### 3.4 Editing

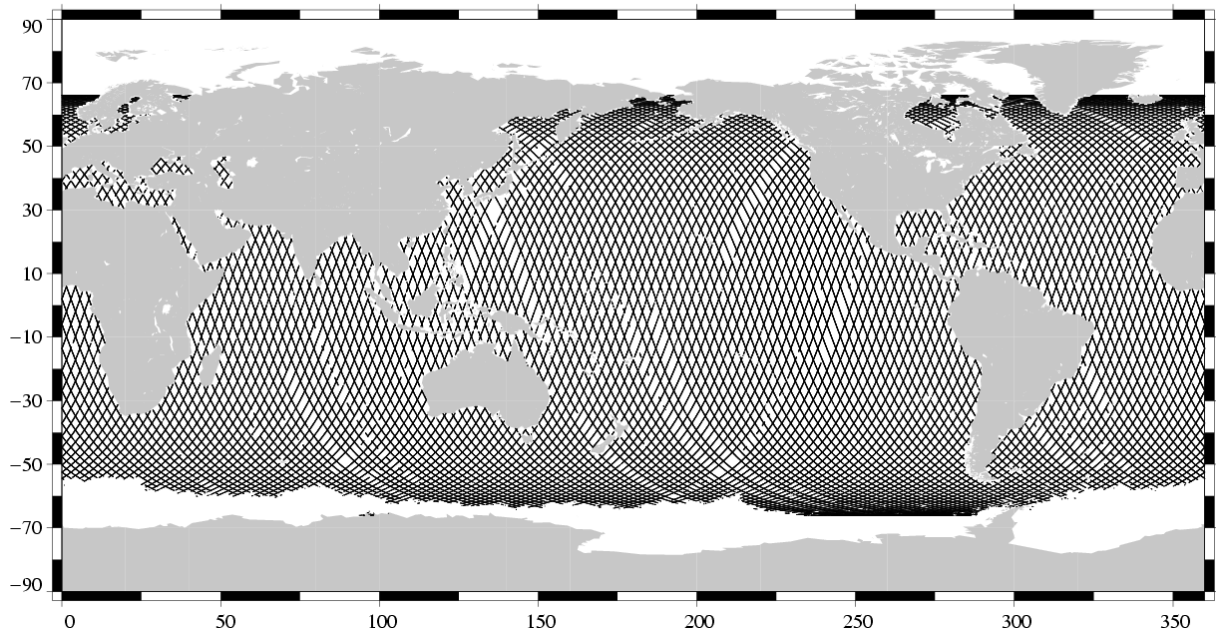
The following table gives for each tested parameter, minimum and maximum thresholds, the number and the percentage of points removed.

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

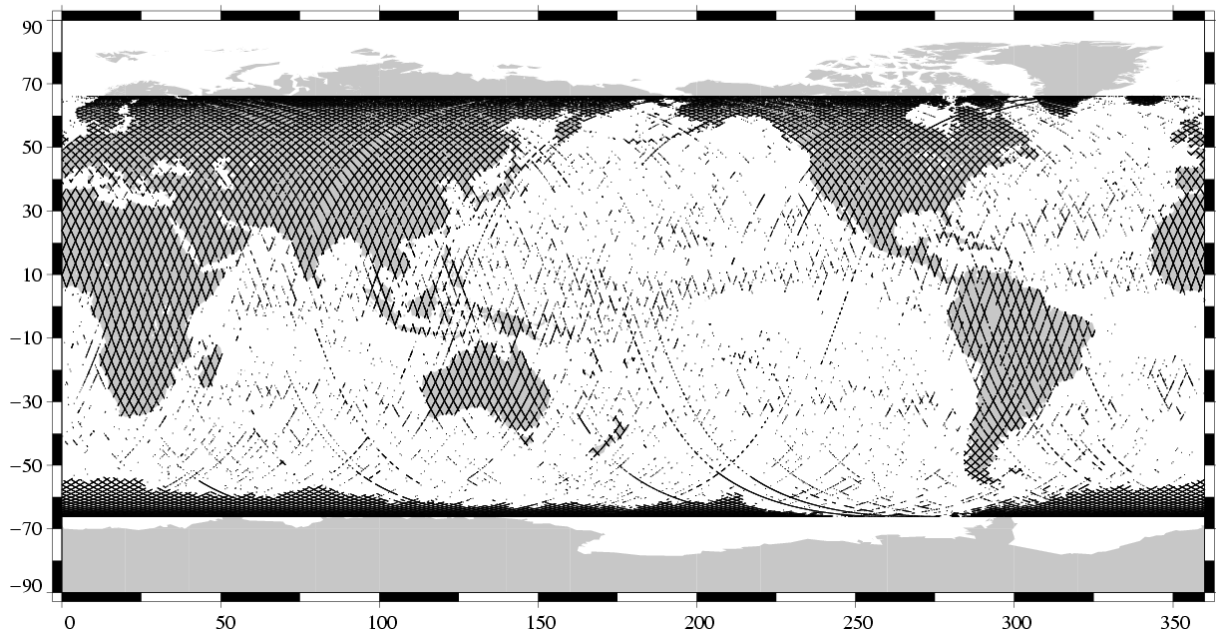
Parameters	Min Thres.	Max Thres.	Unit	Mean % removed in 1997	% removed
Sea surface height	-130.000	100.000	m	1.37	0.20
Number of 20/10Hz valid points Poseidon/TOPEX	5.000	-		1.37	0.32
Std. deviation of range	0.000	0.100	m	1.85	1.02
Off nadir angle from waveform	0.000	0.400	deg	1.36	3.93
Dry tropospheric 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	0.81
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	0.12
Sea state Bias	-0.500	0.000	m	1.39	0.23
Backscatter coefficient	7.000	30.000	dB	1.44	0.22
Ocean tide height	-5.000	5.000	m	0.01	0.26
Earth tide	-1.000	1.000	m	0.00	0.00
Pole tide	-15.000	15.000	m	0.00	0.00
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.

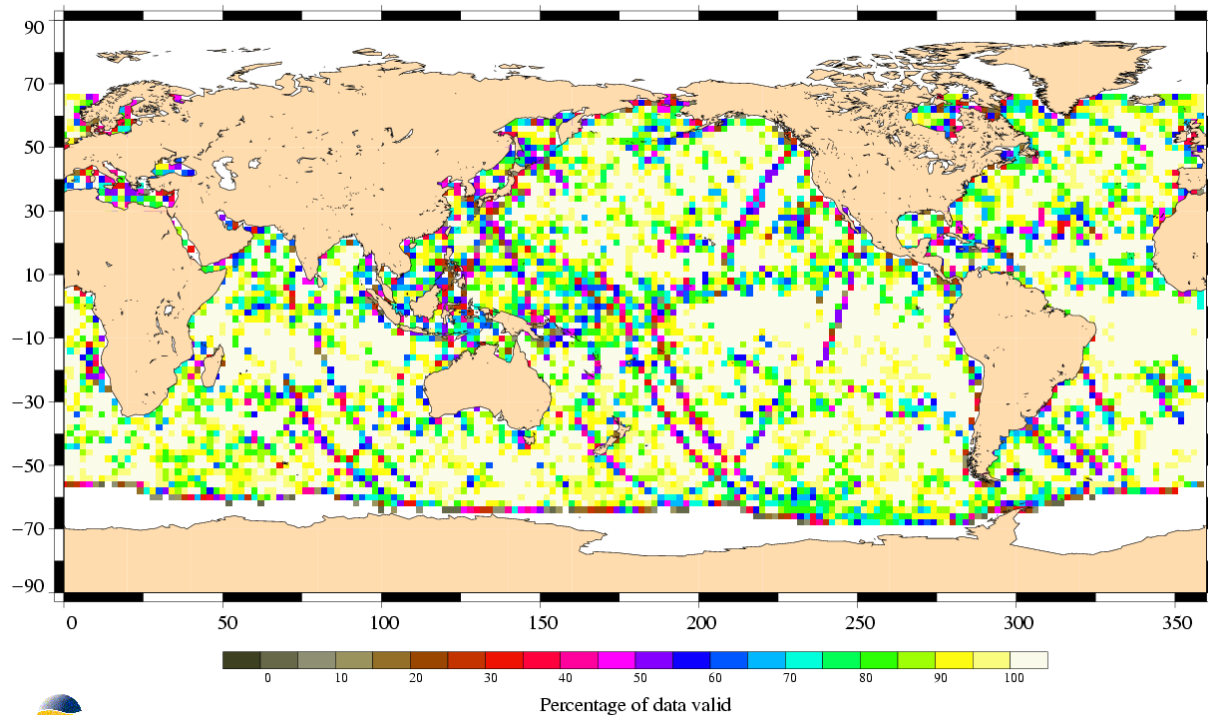
Valid data  
TOPEX/Poseidon Cycle 369 (20/09/2002 / 30/09/2002)



Edited measurements  
TOPEX Cycle 369 (20/09/2002 / 30/09/2002)

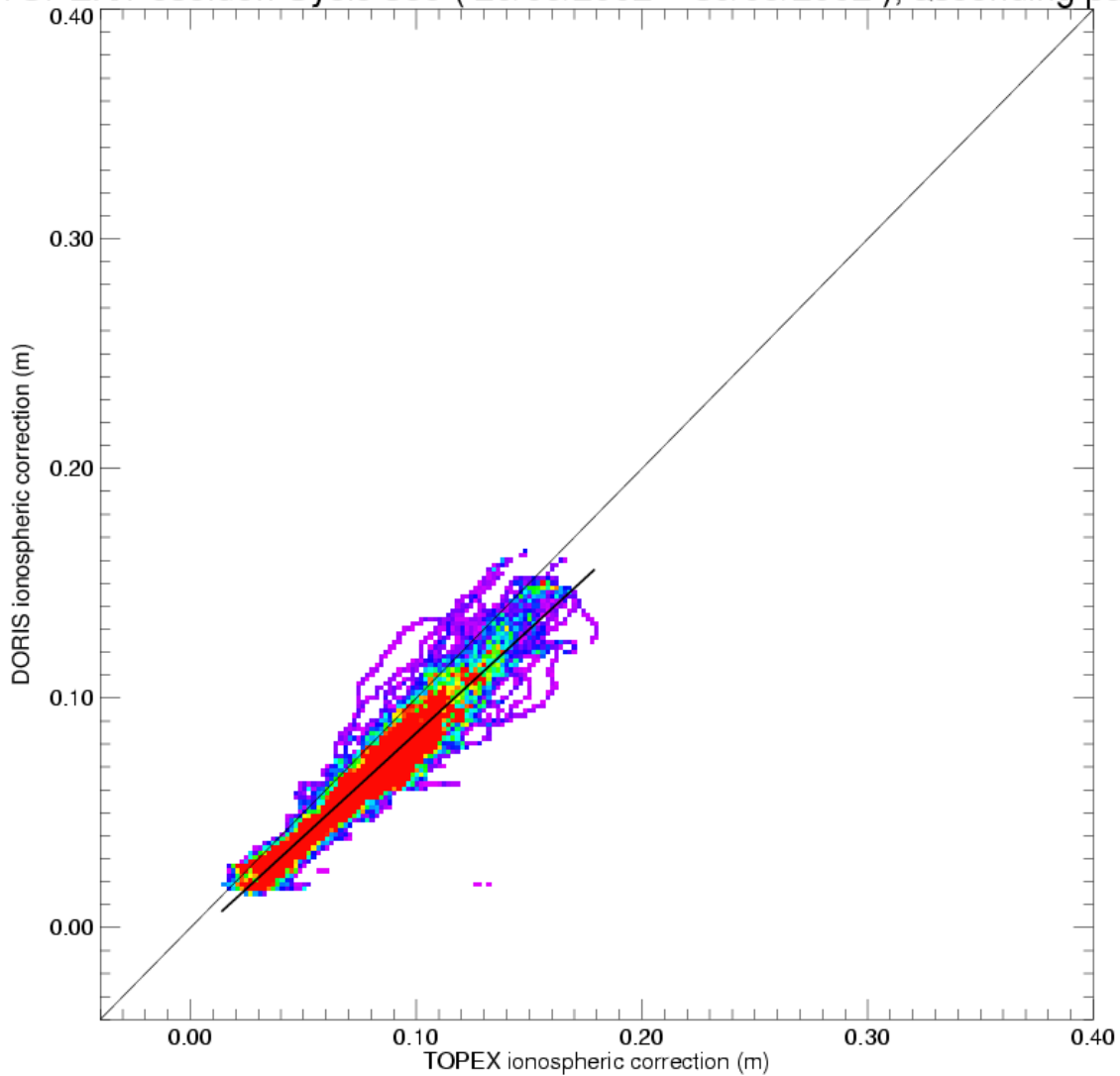


Percentage of valid data relative to the nominal pass  
TOPEX/Poseidon Cycle 369 (20/09/2002 / 30/09/2002)

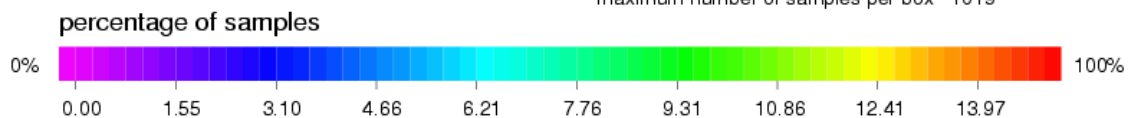


### 3.5 Ionospheric correction

TOPEX/Poseidon Cycle 369 ( 20/09/2002 – 30/09/2002 ), ascending passes



minimum number of samples per box 1  
maximum number of samples per box 1019



#### Statistics Y-X

mean = -0.01321  
rms = 0.01608  
std = 0.00916

#### Order 1 fit polynomial

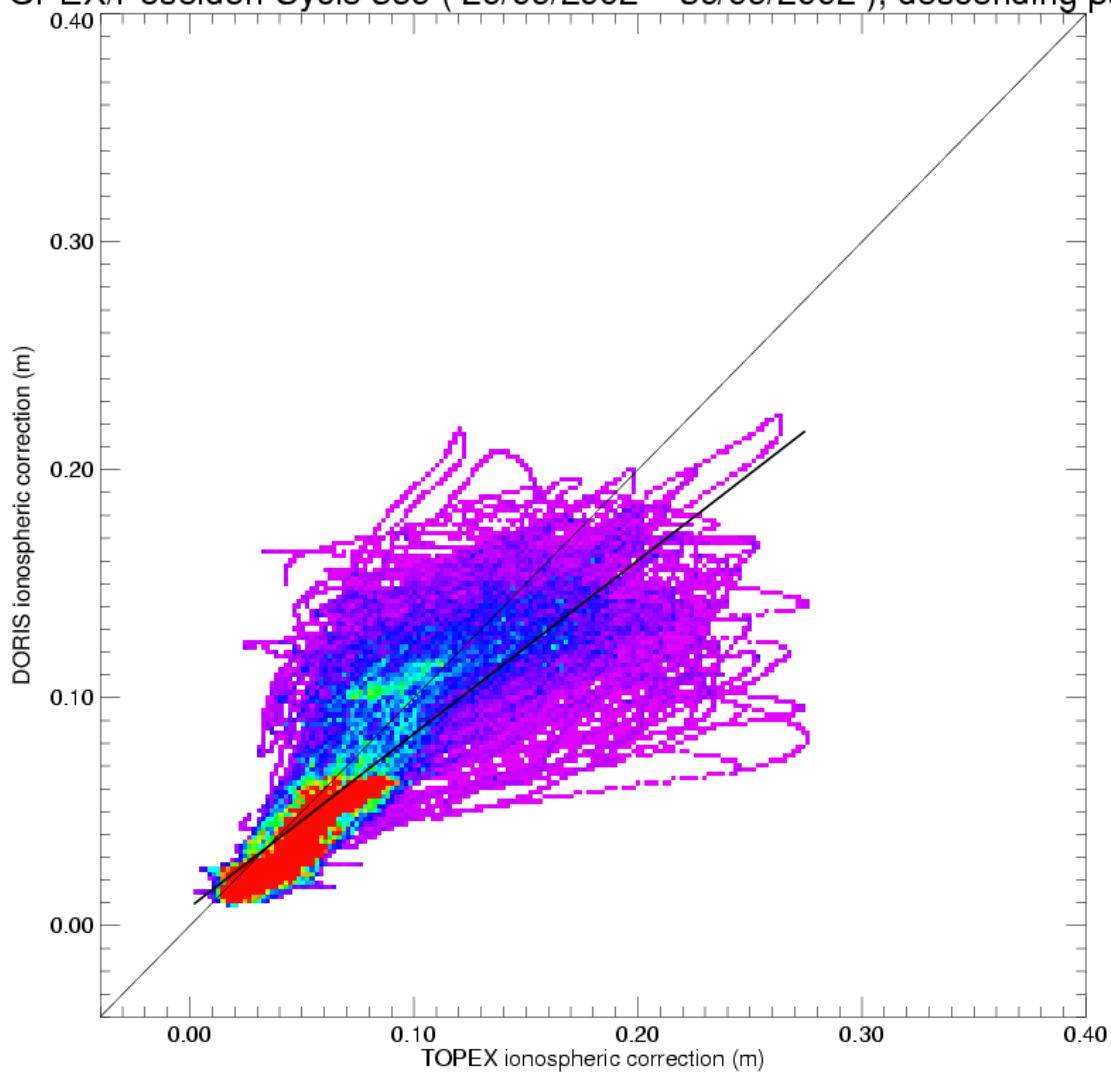
$y = a x + b$   
a = 0.90150982  
b = -0.00538186

#### Legend

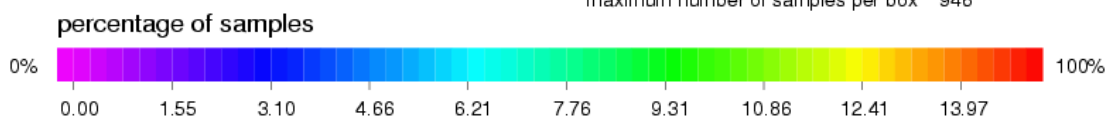
— Order 1 fit polynomial  
— Bisectrix



TOPEX/Poseidon Cycle 369 ( 20/09/2002 – 30/09/2002 ), descending passes



minimum number of samples per box 1  
 maximum number of samples per box 946



**Statistics Y-X**

mean = -0.00910  
 rms = 0.02685  
 std = 0.02526

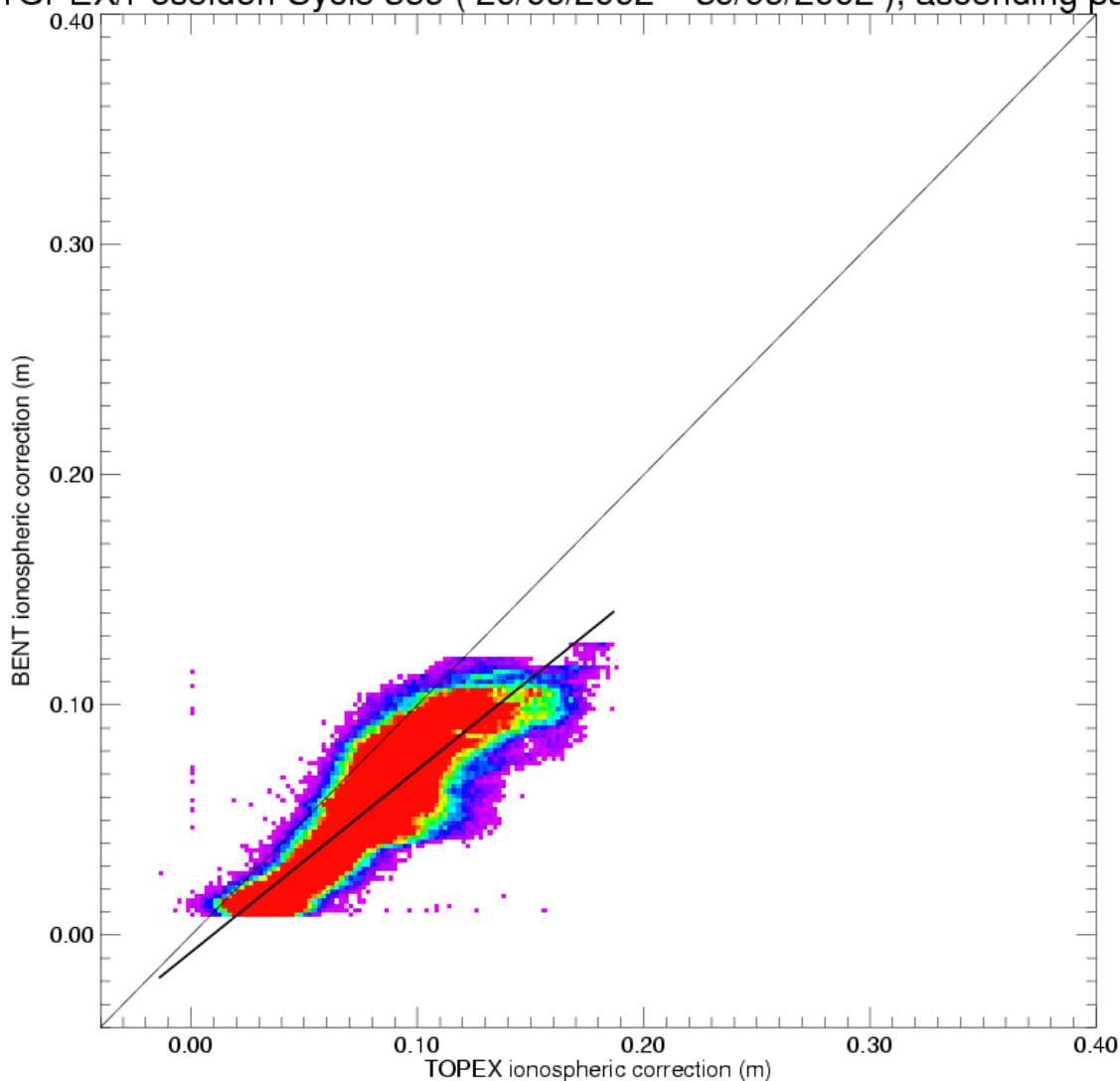
**Order 1 fit polynom**

$y = a x + b$   
 $a = 0.76051885$   
 $b = 0.00813157$

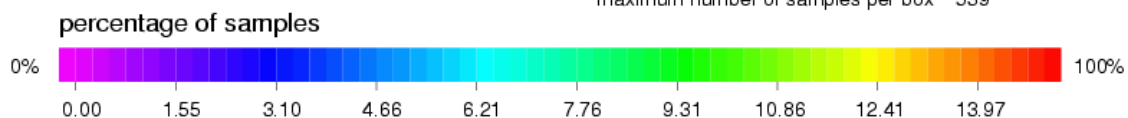
**Legend**

— Order 1 fit polynom  
 - - - Bisectrix

TOPEX/Poseidon Cycle 369 ( 20/09/2002 – 30/09/2002 ), ascending passes



minimum number of samples per box 1  
 maximum number of samples per box 539



**Statistics Y-X**

mean = -0.02401  
 rms = 0.02825  
 std = 0.01490

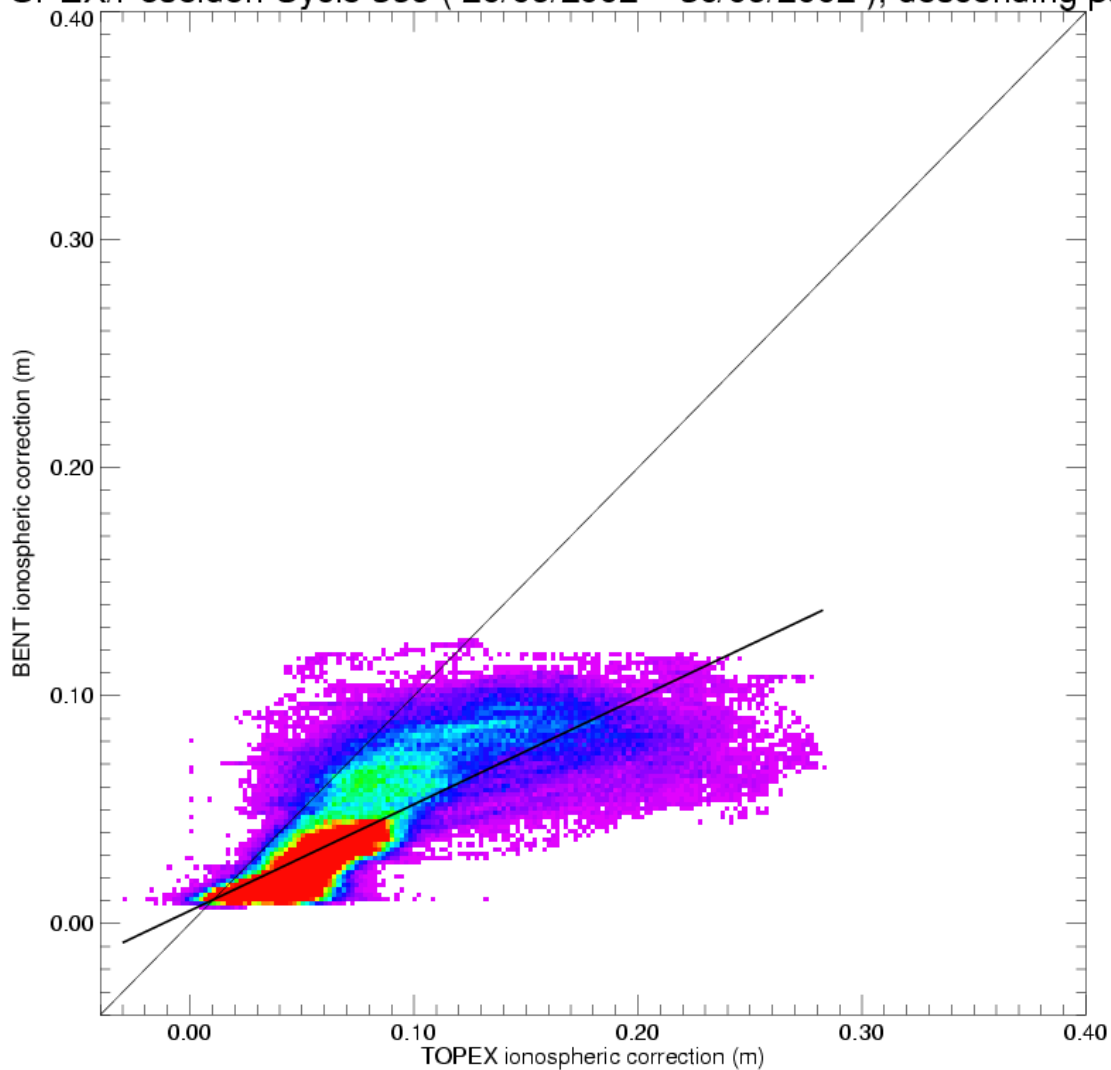
**Order 1 fit polynom**

$y = a x + b$   
 $a = 0.79195899$   
 $b = -0.00737868$

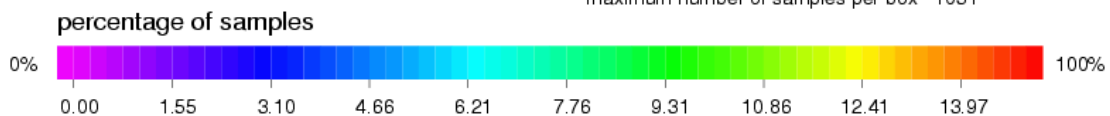
**Legend**

— Order 1 fit polynom  
 — Bisectrix

TOPEX/Poseidon Cycle 369 ( 20/09/2002 – 30/09/2002 ), descending passes



minimum number of samples per box 1  
 maximum number of samples per box 1031



**Statistics Y-X**

mean = -0.03294  
 rms = 0.04391  
 std = 0.02904

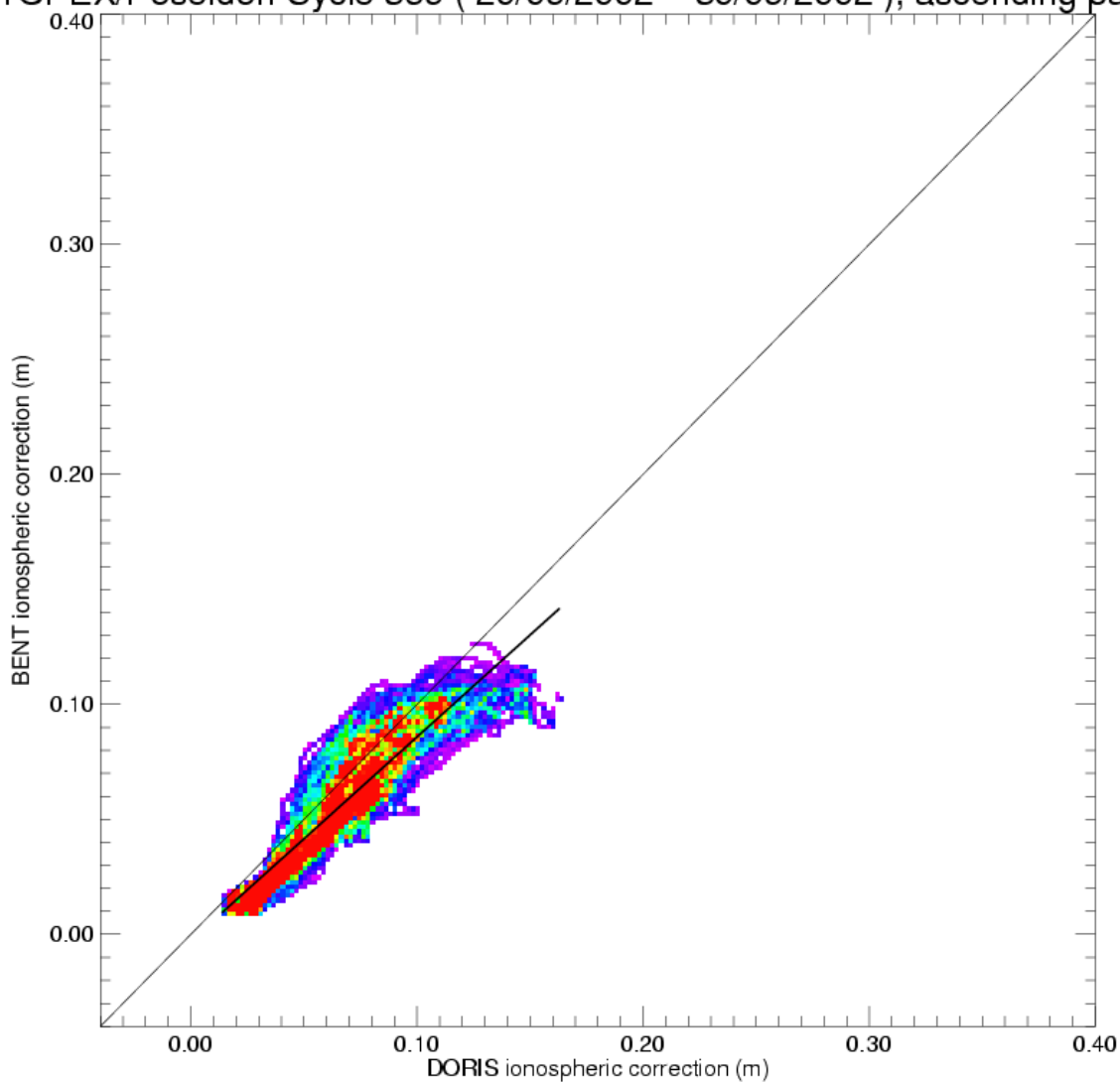
**Order 1 fit polynom**

$y = a x + b$   
 $a = 0.46668488$   
 $b = 0.00567123$

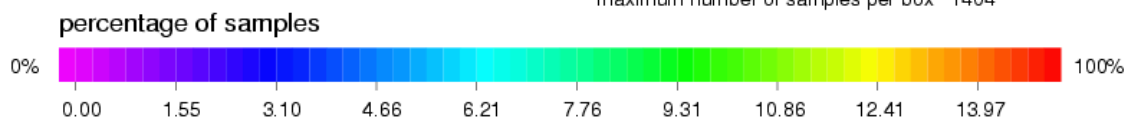
**Legend**

— Order 1 fit polynom  
 - - - Bisectrix

TOPEX/Poseidon Cycle 369 ( 20/09/2002 – 30/09/2002 ), ascending passes



minimum number of samples per box 1  
 maximum number of samples per box 1404



**Statistics Y-X**

mean = -0.01033  
 rms = 0.01580  
 std = 0.01196

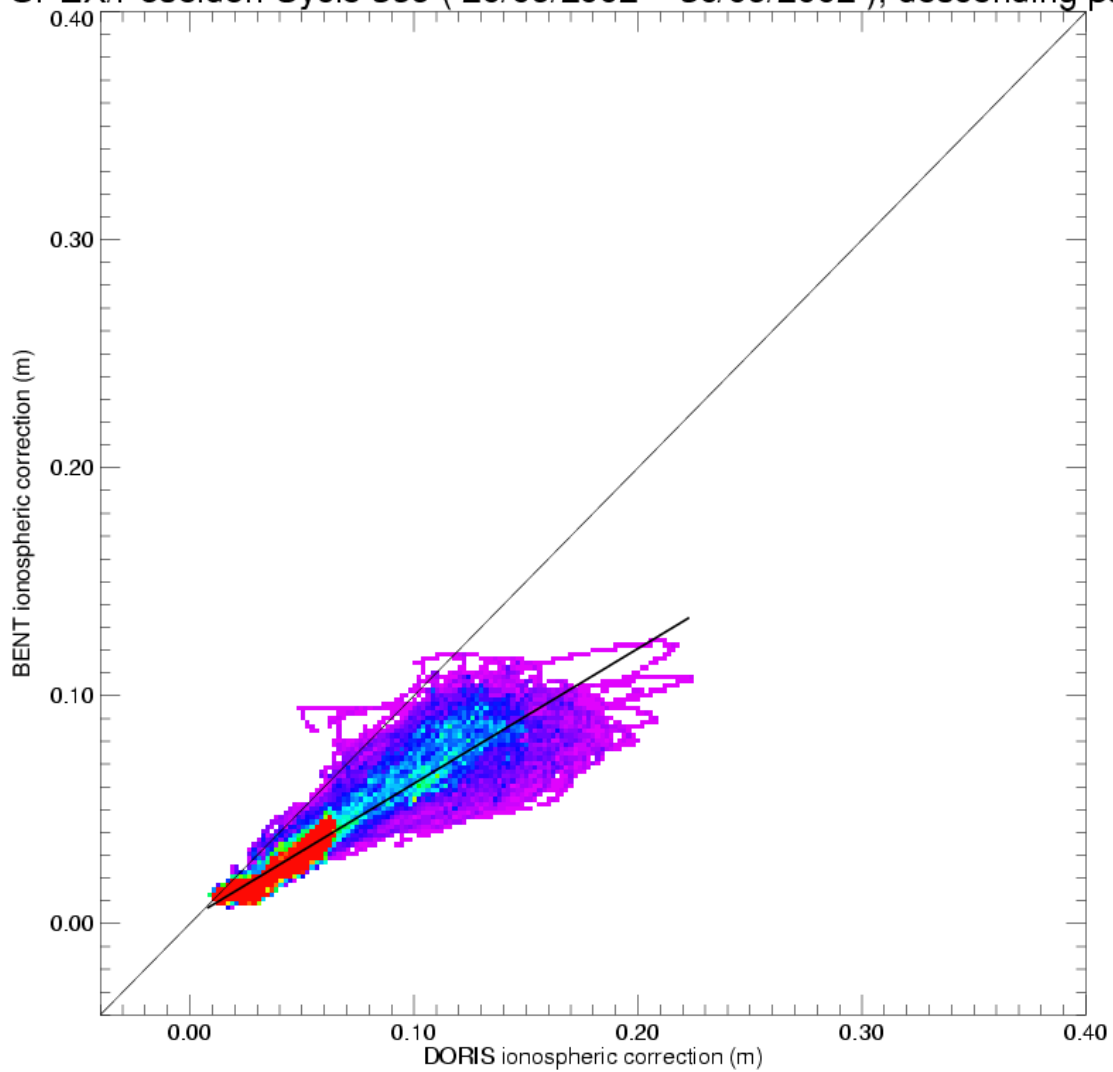
**Order 1 fit polynom**

$y = a x + b$   
 $a = 0.88604629$   
 $b = -0.00277808$

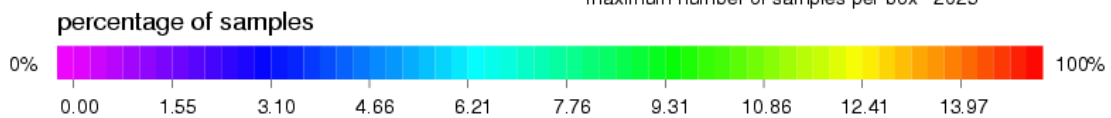
**Legend**

— Order 1 fit polynom  
 — Bisectrix

TOPEX/Poseidon Cycle 369 ( 20/09/2002 – 30/09/2002 ), descending passes



minimum number of samples per box 1  
 maximum number of samples per box 2025



**Statistics Y-X**

mean = -0.02338  
 rms = 0.03046  
 std = 0.01953

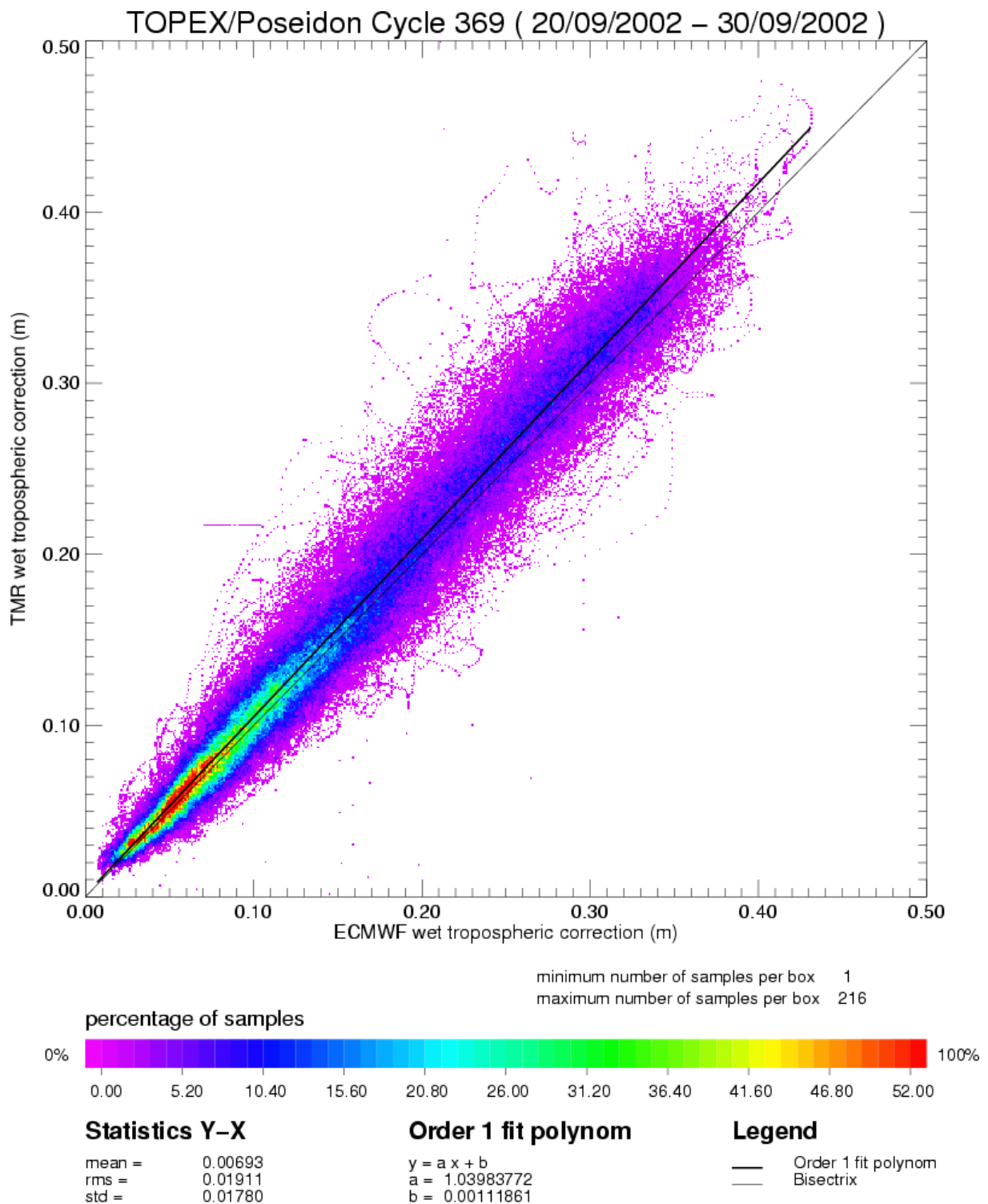
**Order 1 fit polynom**

$y = a x + b$   
 $a = 0.59219307$   
 $b = 0.00224756$

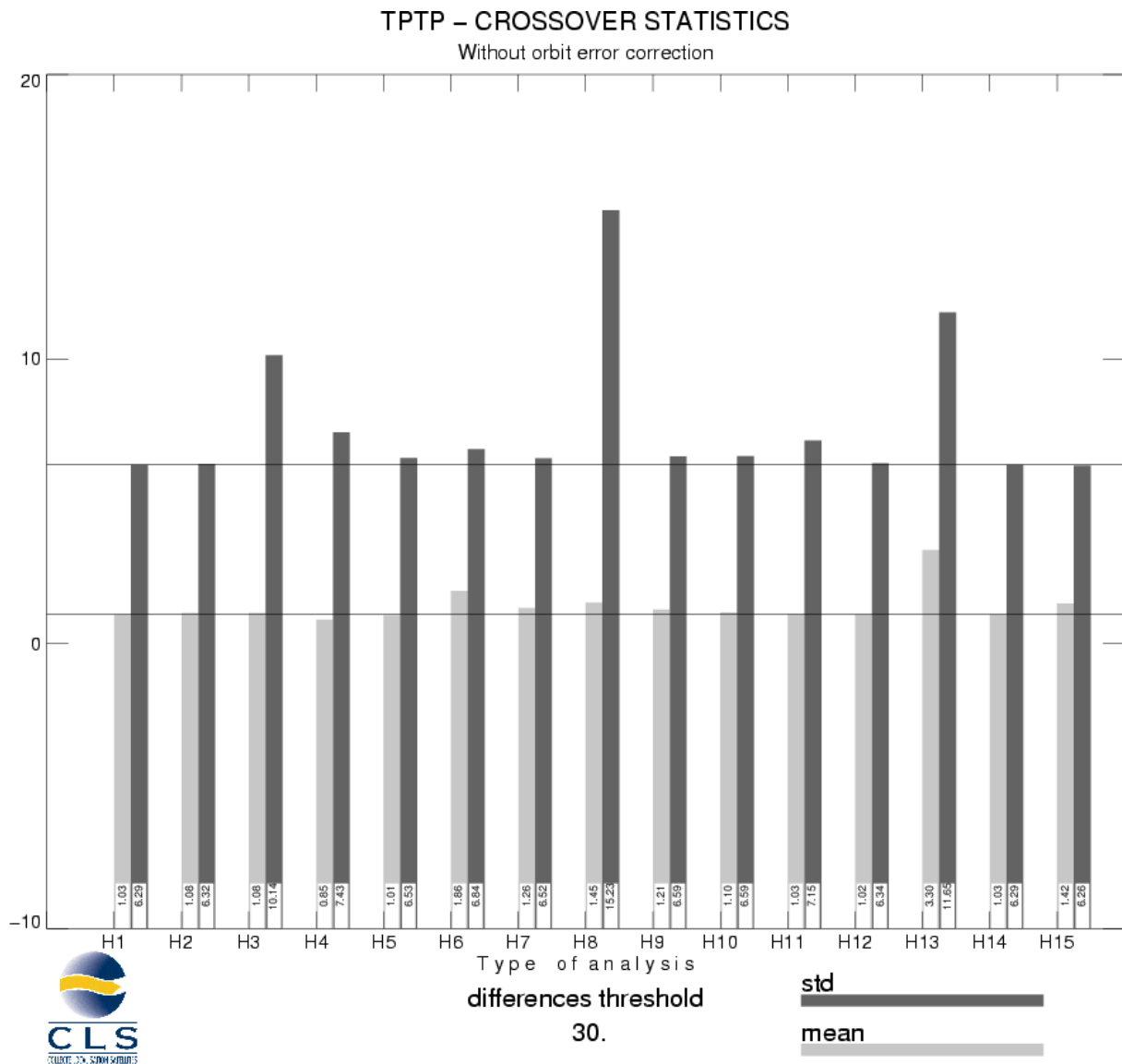
**Legend**

— Order 1 fit polynom  
 — Bisectrix

### 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 thopospheric 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

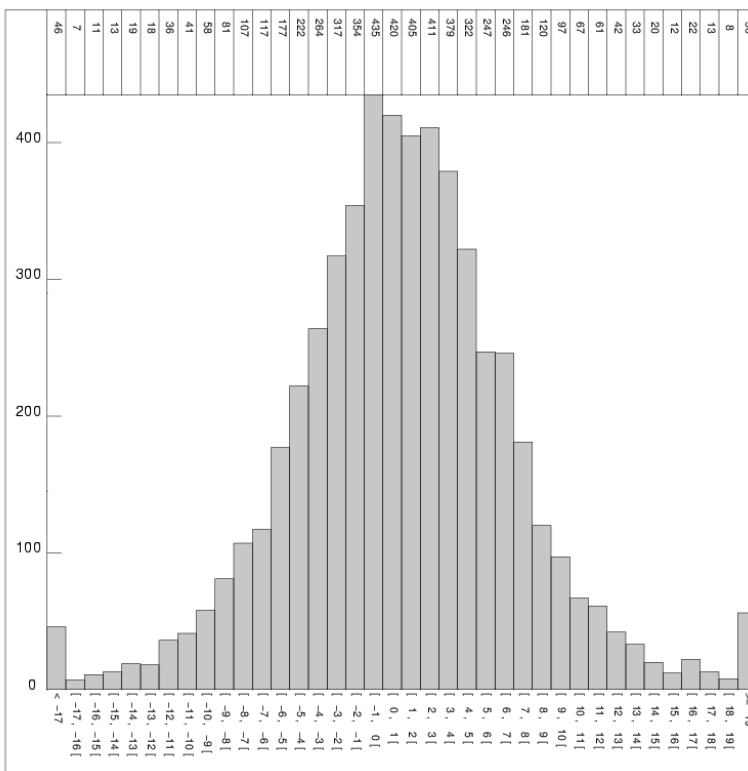
Type de points de croisement: TPTP  
 Zone géographique (deg): -90 / 90 , 0 / 360  
 Seuil sur les écarts d'analyse 0.00 (moy)  
 30.00 (seuil)  
 Selection(s) sur les champs :  
 CL Arc 1 :=INTERP\_SPLN  
 CL Arc 2 :=INTERP\_SPLN  
 Seuil Min +: 0.0000000  
 Seuil Max : 0.0000000

Selection(s) sur les écarts :  
 Aucune

#### RESULTATS STATISTIQUES

Valeur minimale : -29.5400  
 Valeur maximale : 29.5600  
 Différence Max – Min: 59.1000  
 Nombre de points lus: 5647  
 Nombre de points sélectionnés: 5485  
 Moyenne : 1.02670  
 Écart-type : 6.28754  
 Moyenne Quadratique : 6.37081

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### TPTP – CROSSOVER STATISTICS

With orbit error correction

SSH = Corrected sea surface height

#### RAPPEL DES SELECTIONS

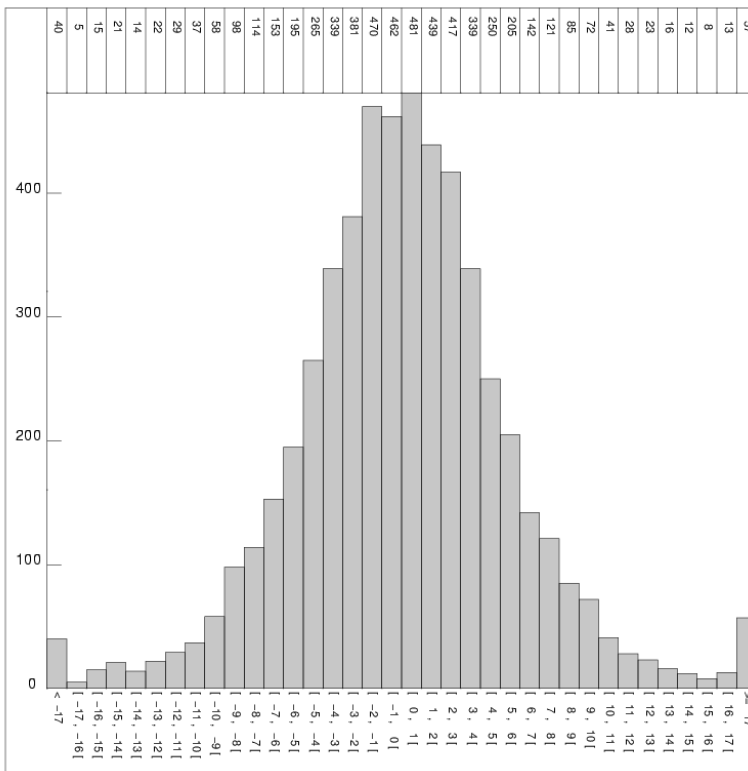
Type de points de croisement: TPTP  
 Zone géographique (deg): -90 / 90 , 0 / 360  
 Seuil sur les écarts d'analyse 0.00 (moy)  
 30.00 (seuil)  
 Selection(s) sur les champs :  
 CL Arc 1 :=INTERP\_SPLN  
 CL Arc 2 :=INTERP\_SPLN  
 Seuil Min +: 0.0000000  
 Seuil Max : 0.0000000

Selection(s) sur les écarts :  
 Aucune

#### RESULTATS STATISTIQUES

Valeur minimale : -29.7800  
 Valeur maximale : 29.7400  
 Différence Max – Min: 59.5200  
 Nombre de points lus: 5647  
 Nombre de points sélectionnés: 5468  
 Moyenne : 0.0576170  
 Écart-type : 5.76565  
 Moyenne Quadratique : 5.76594

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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**

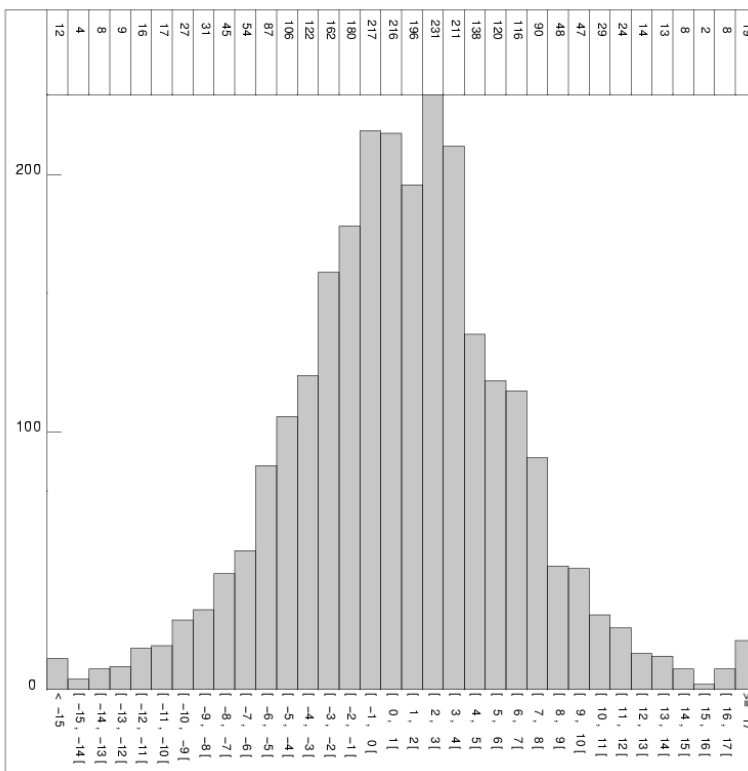
**RAPPEL DES SELECTIONS**

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 : -26.8500  
 Valeur maximale : 43.0800  
 Différence Max – Min: 69.9300  
 Nombre de points lus: 2889  
 Nombre de points sélectionnés: 2627  
 Moyenne : 1.00469  
 Écart-type : 5.50463  
 Moyenne Quadratique : 5.59557

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## 3.8 SSH variability

### 3.8.1 Sea Level Anomaly

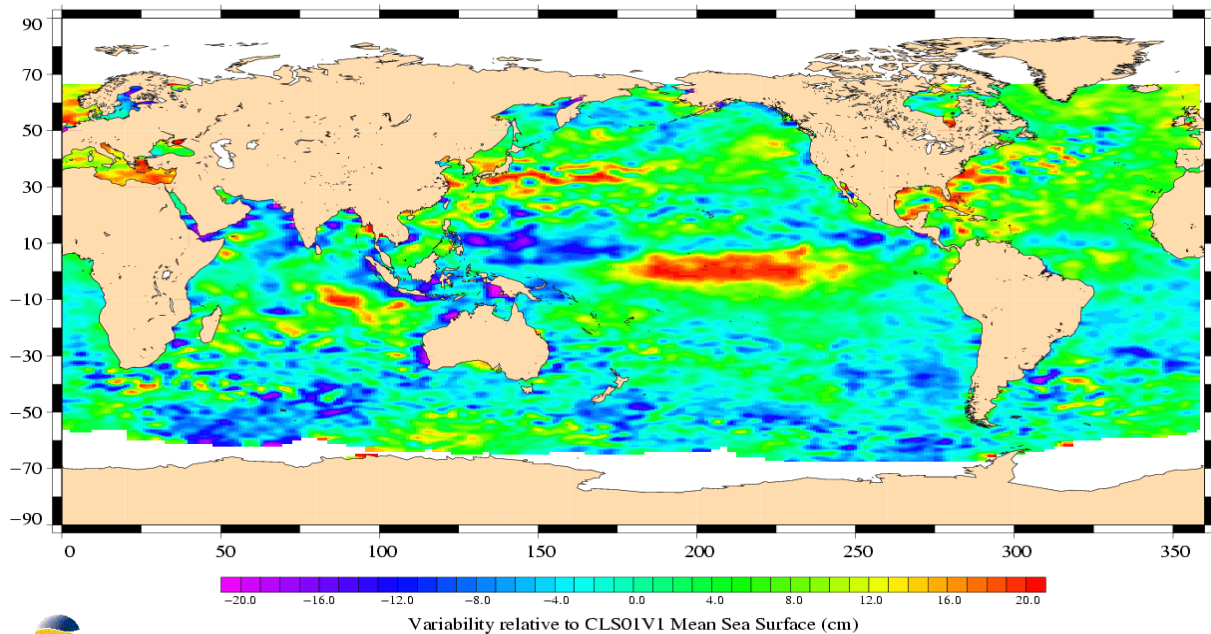
Cycle 369 is the first cycle on the new T/P tandem mission orbit. Thus it is not possible to compute SLA relative to the previous cycle.

Furthermore, SLA relative to a mean reference profile needs the computation of a mean profile along the new ground track. This will be possible when a sufficient amount of data is available (e.g. 20 cycles). Then, using SLA variability estimation methods using Jason-1 data, a specific calculation will be performed in order to build this new reference mean profile.

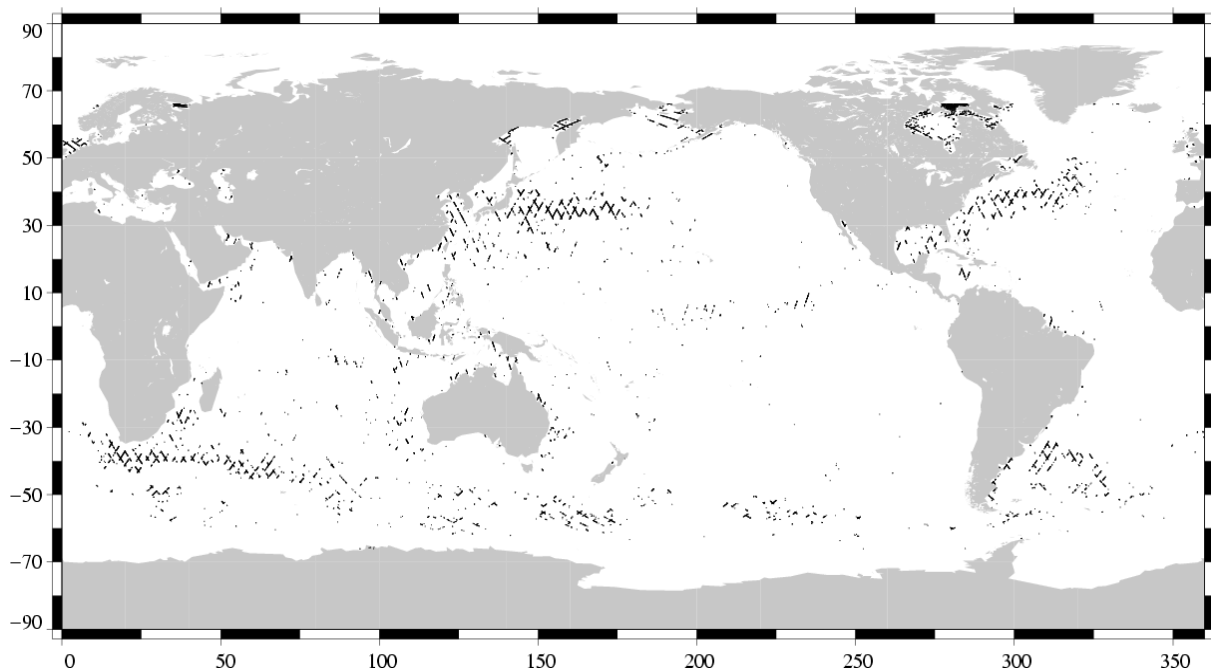
### 3.8.2 Comparison to a precise Mean Sea Surface

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 apart from isolated measurements, higher differences are located in high ocean variability areas, as expected.

TOPEX/Poseidon, cycle 369  
Period : 20/09/2002 – 30/09/2002

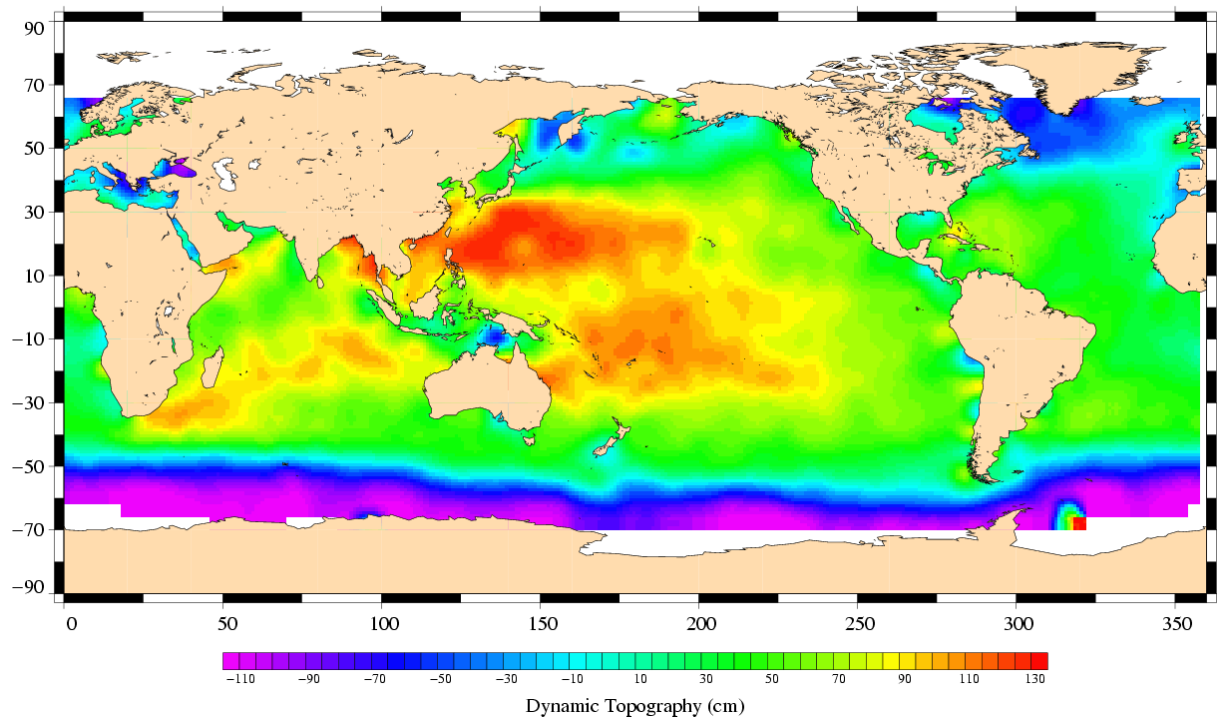


(SSH – MSS) differences greater than 0.3 m  
TOPEX/Poseidon Cycle 369 (20/09/2002 / 30/09/2002)



### 3.9 Dynamic topography

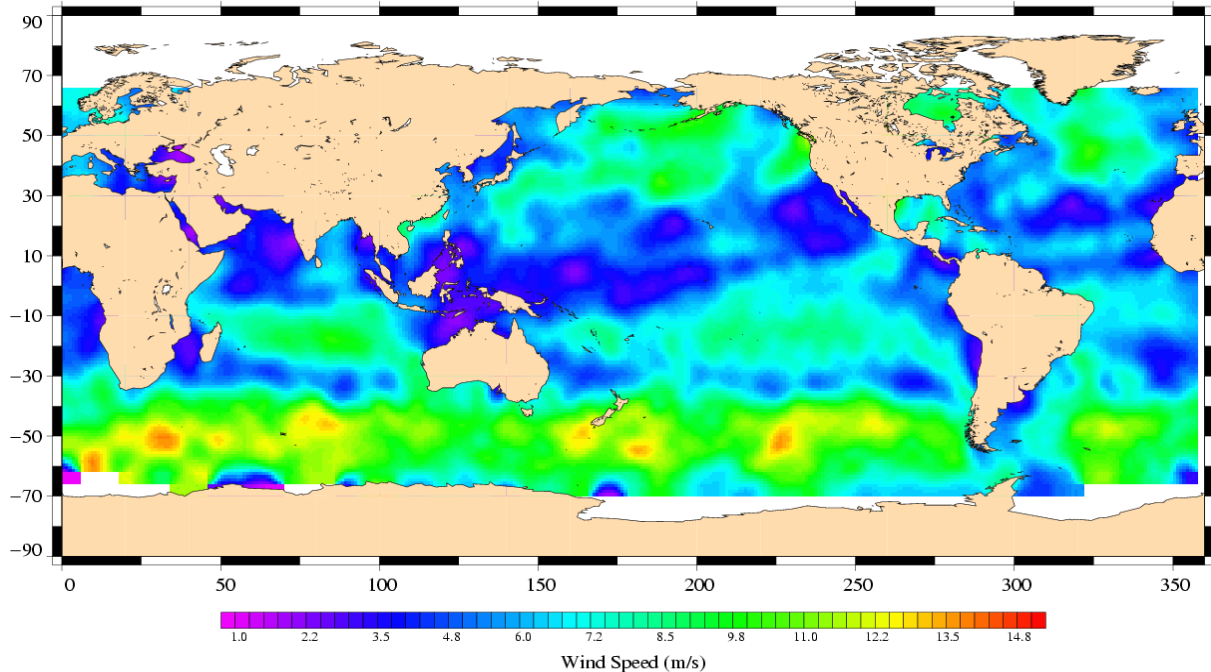
TOPEX/Poseidon, cycle 369  
Period : 20/09/2002 – 30/09/2002



### 3.10 Wind and wave maps

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

TOPEX/Poseidon, cycle 369  
Period : 20/09/2002 – 30/09/2002



TOPEX/Poseidon, cycle 369  
Period : 20/09/2002 – 30/09/2002

