



TOPEX/Poseidon MGRD Quality Assessment Report

Cycle 389

06-04-2003 16-04-2003

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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 6.94 cm rms, and the standard deviation of Sea Level Anomalies (SLA) relative to a Mean Sea Surface is 9.52 cm.

2.2 Warnings and recommendations

- Tape recorder failures : There is a lot of data gaps due to tape recorder anomalies, especially in the Indian Ocean, in the south Atlantic Ocean between the South America and Antarctic coast and in the Pacific Ocean near the South America coast.
- Problems in the interpolation of the TMR parameters : 4.44% of the measurements are removed by the TMR correction criterion, mainly due to tape recorder failures. However, even after applying TMR editing criteria, some anomalous measurements remain, as evidenced by the scatter plot between TMR and ECMWF wet tropospheric corrections.

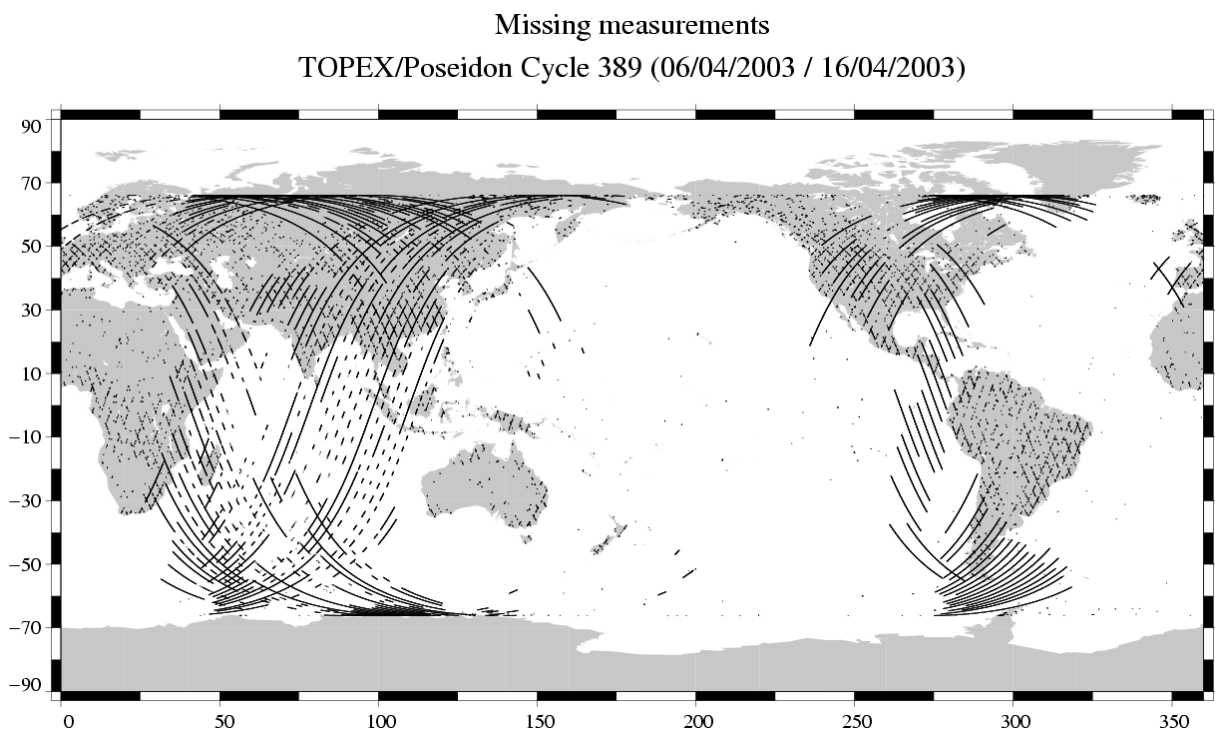
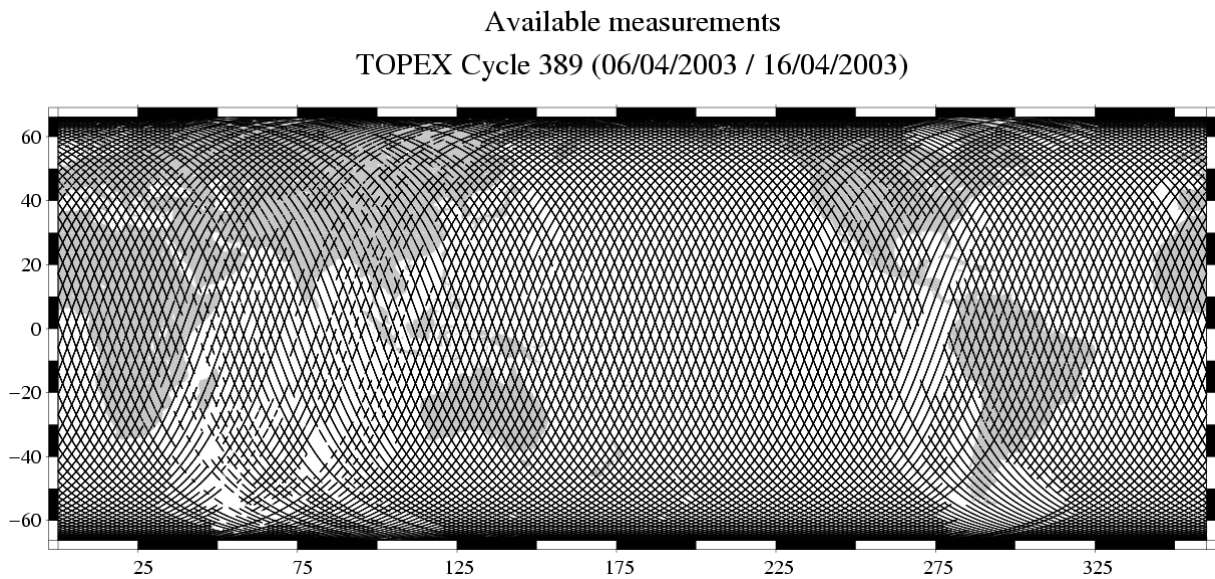
3 CALVAL main results

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

704045 altimeter measurements are present, and 90438 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.



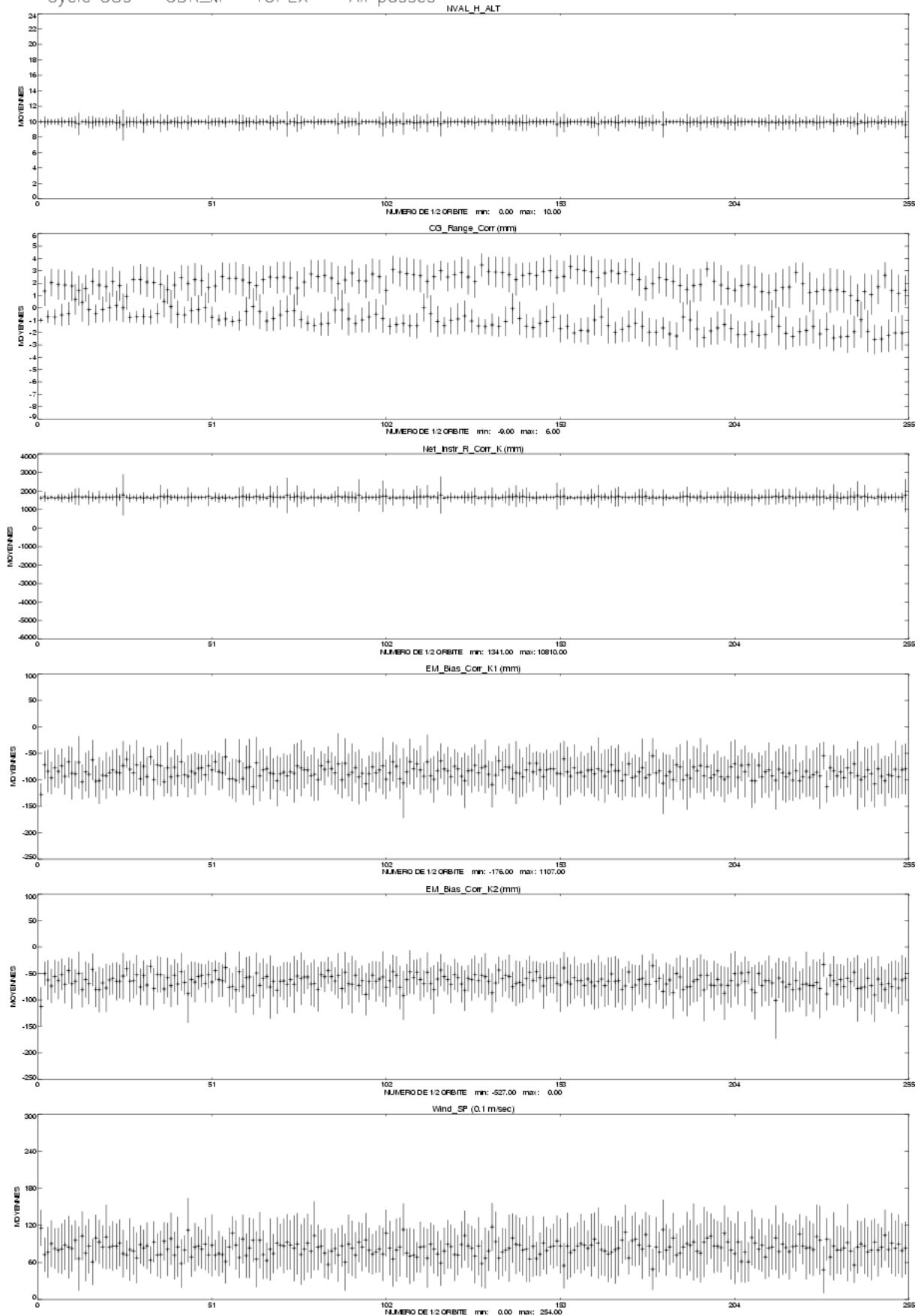
3.2 M-GDR quality flags

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

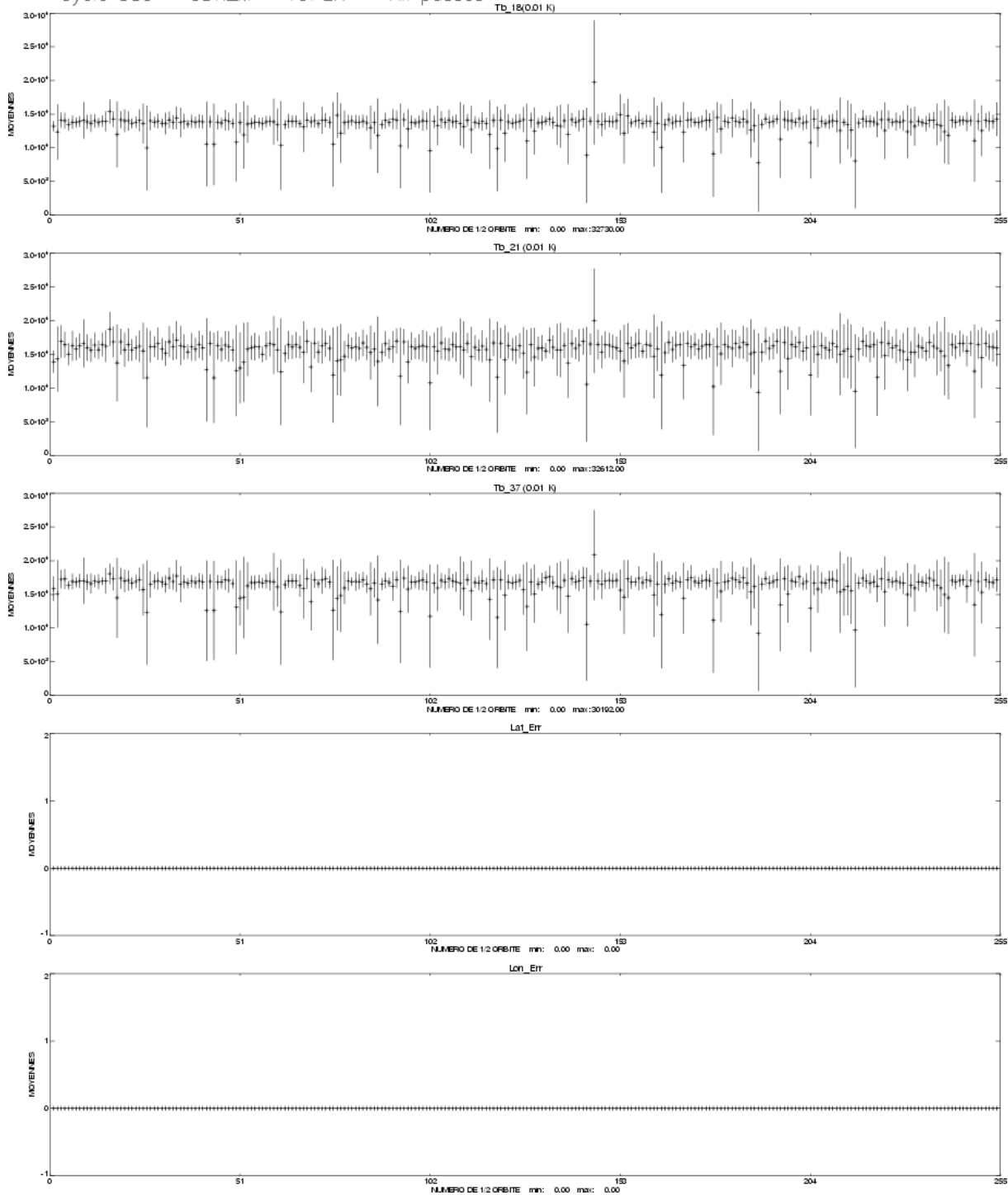
Name	Description	% bad
Geo_Bad_1	altimeter land flag	26.51
Geo_Bad_1	ice flag	3.85
Geo_Bad_1	radiometer land flag	28.07
Alt_Bad_1	conditions 1 altimeter	4.43
Alt_Bad_2	conditions 2 altimeter	4.31
Geo_Bad_2	rain (liquid water in excess)	6.29
Geo_Bad_2	less than 4 points for CSR3.0 tide calculation	0.35
Geo_Bad_2	less than 4 points for FES95.2.1 tide calculation	2.44
TOPEX	TOPEX not valid	0.00
TMR	TMR not valid	0.00
TMR_Bad	Brightness temperatures not valid	5.57
DORIS	DORIS not valid	0.00

3.3 M-GDR parameter plots

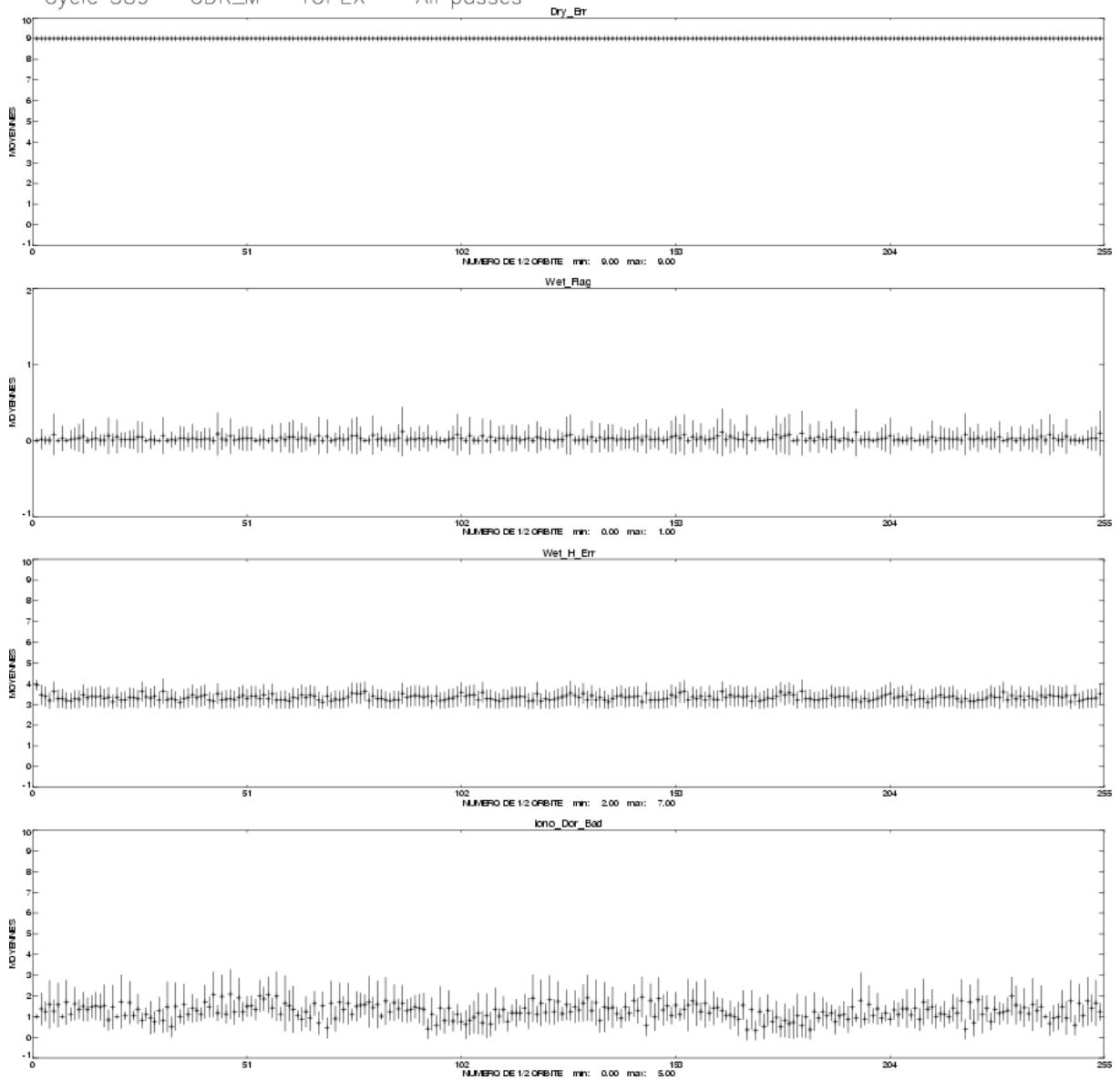
Cycle 389 – GDR_M – TOPEX – All passes –



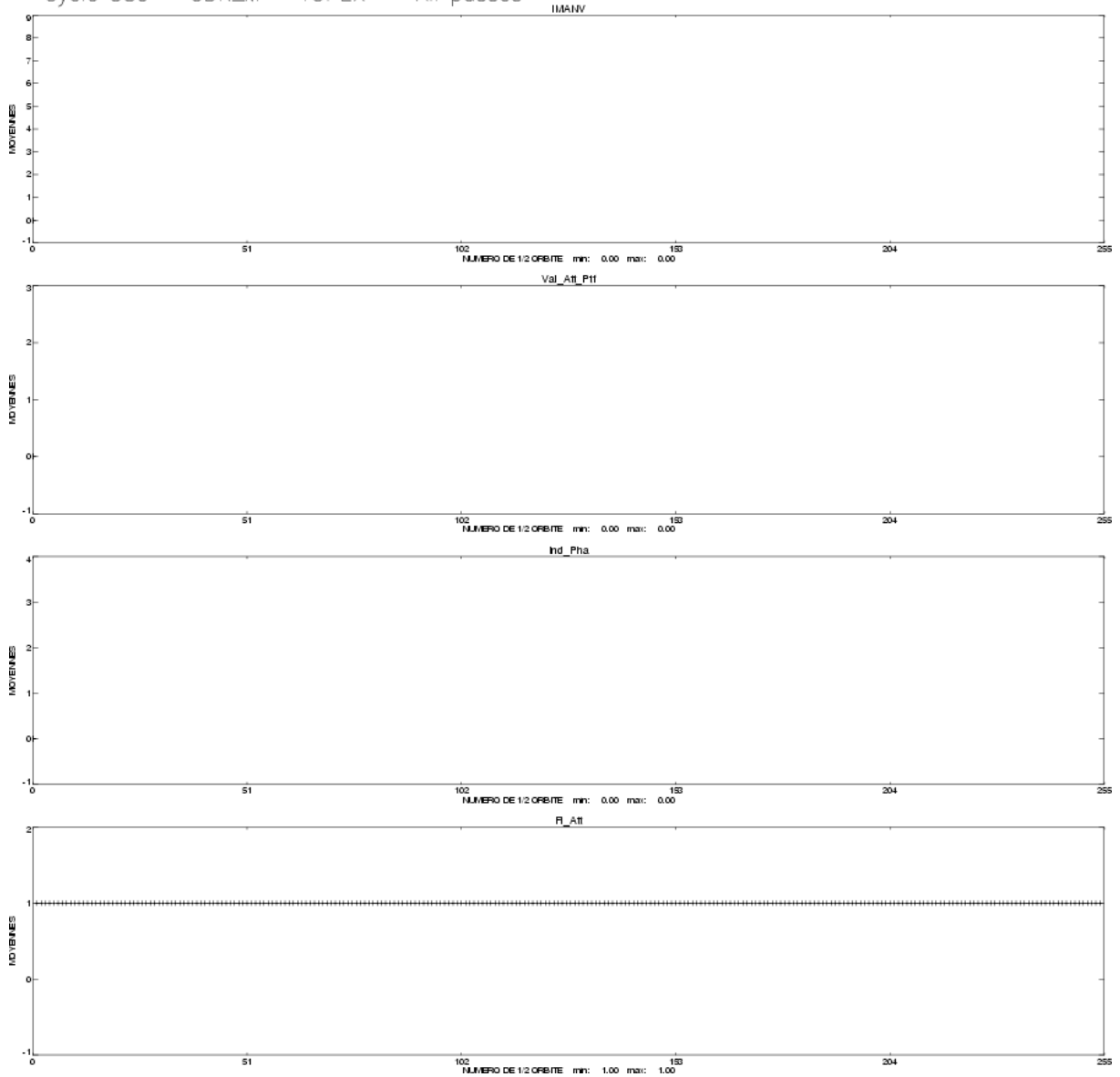
Cycle 389 – GDR_M – TOPEX – All passes –

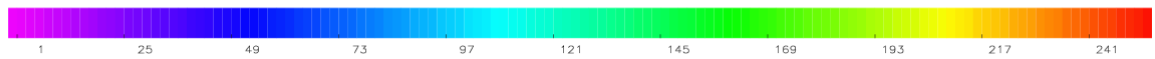
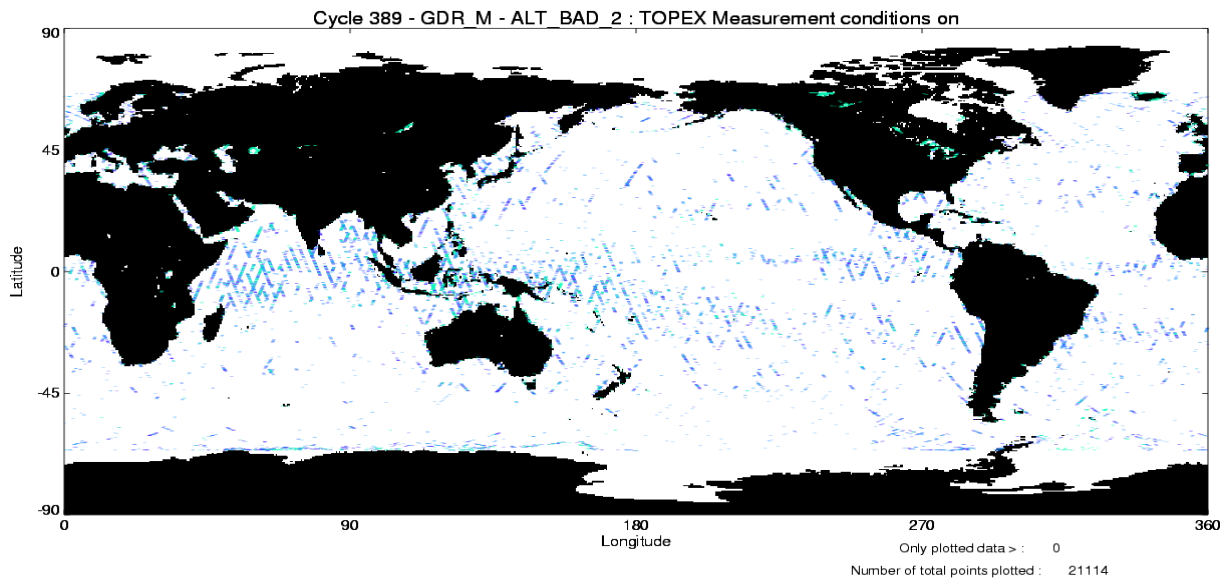
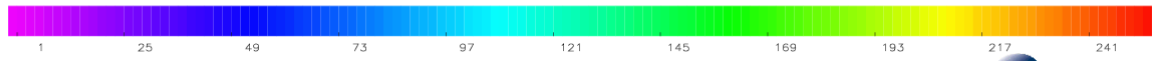
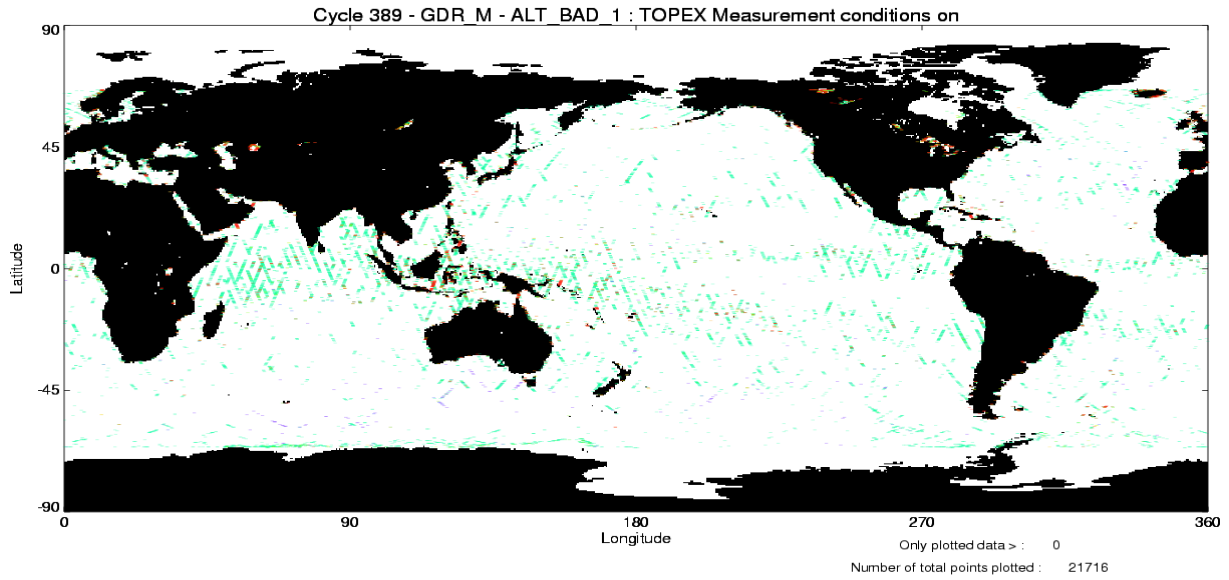


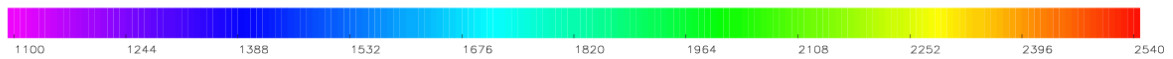
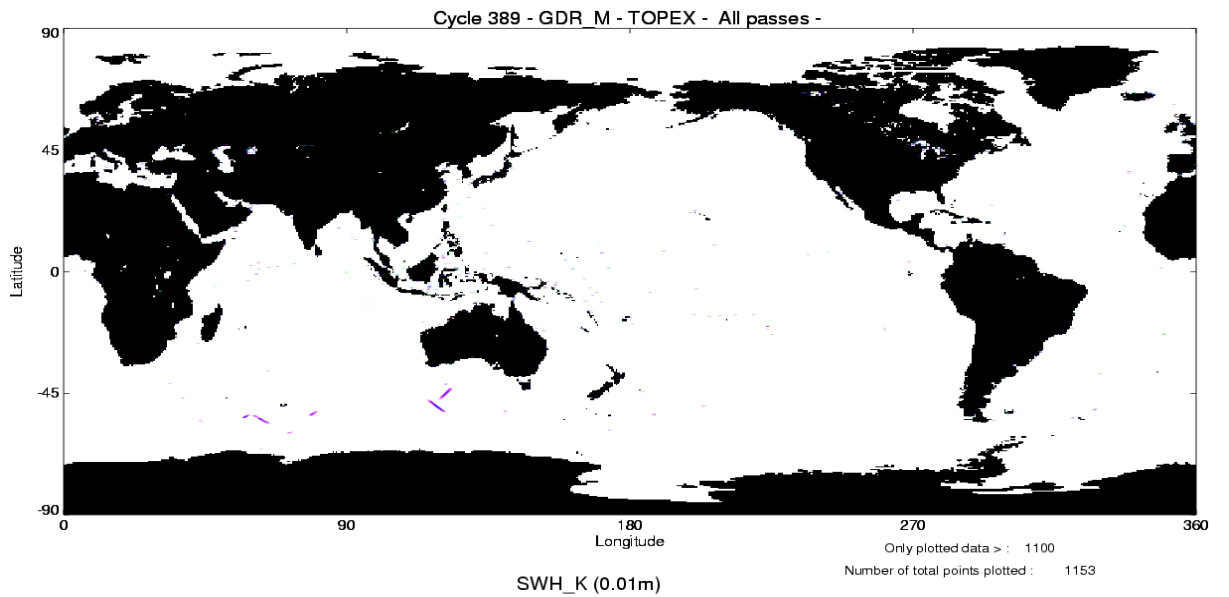
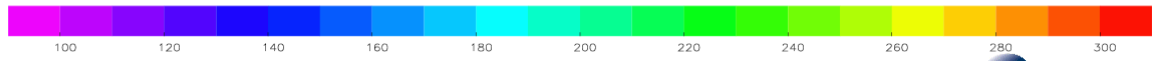
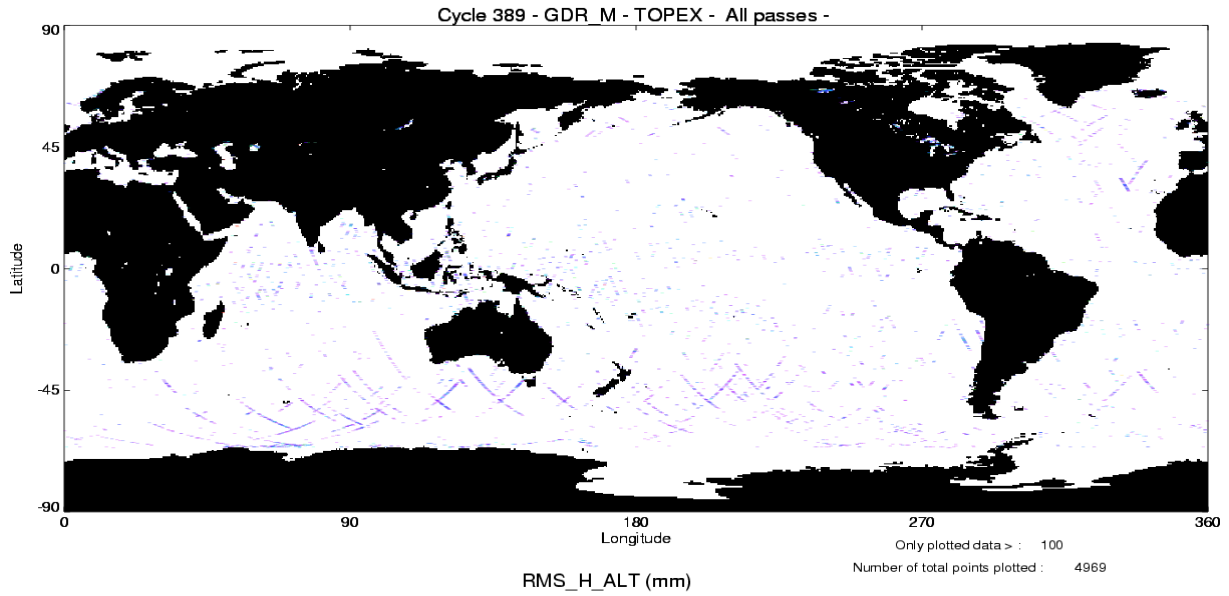
Cycle 389 – GDR_M – TOPEX – All passes –

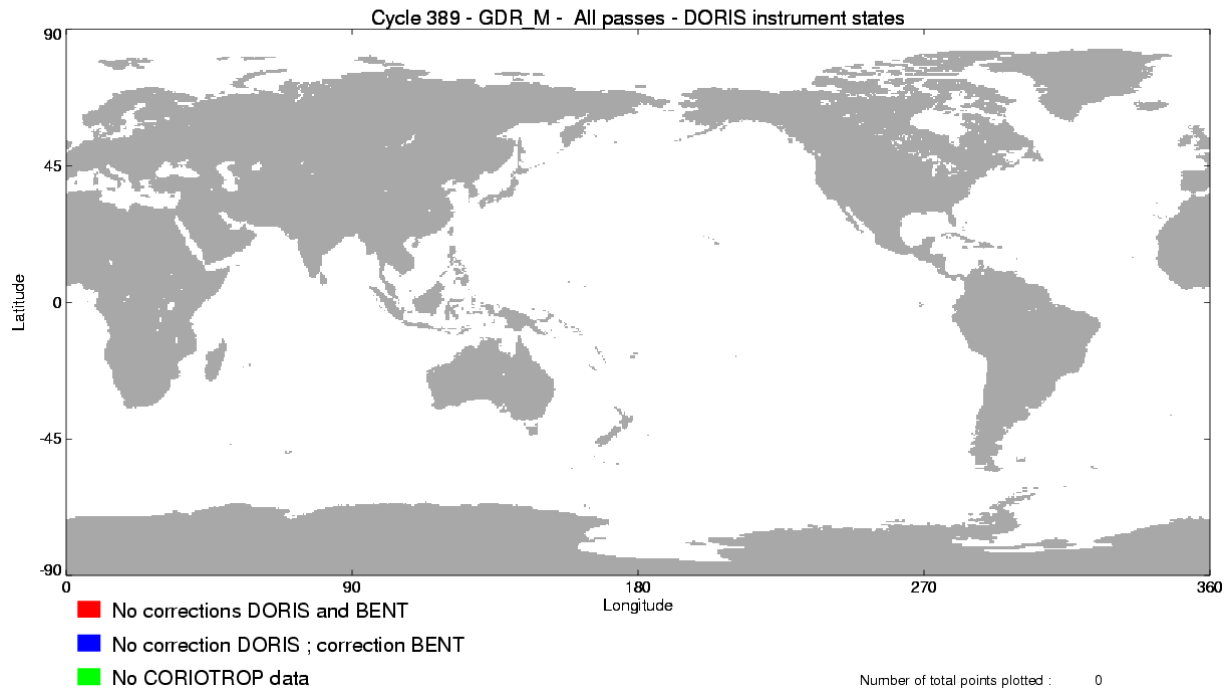


Cycle 389 – GDR_M – TOPEX – All passes –









3.4 Editing

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

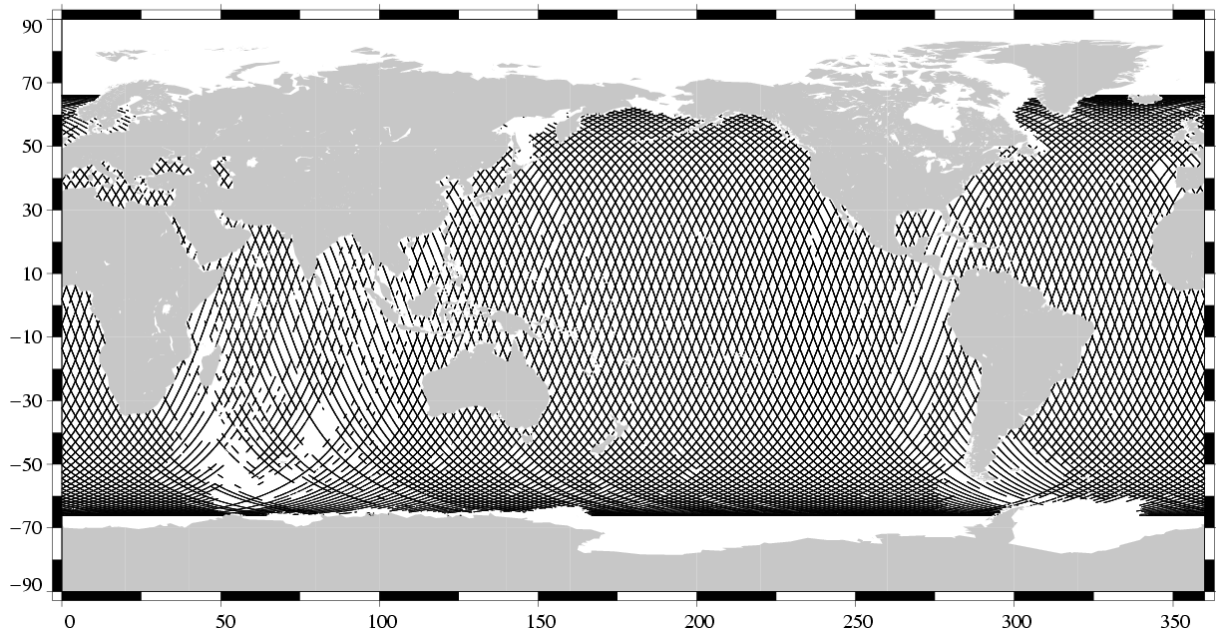
As a comparison, the mean percentage over one year (1997) is also given.

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.

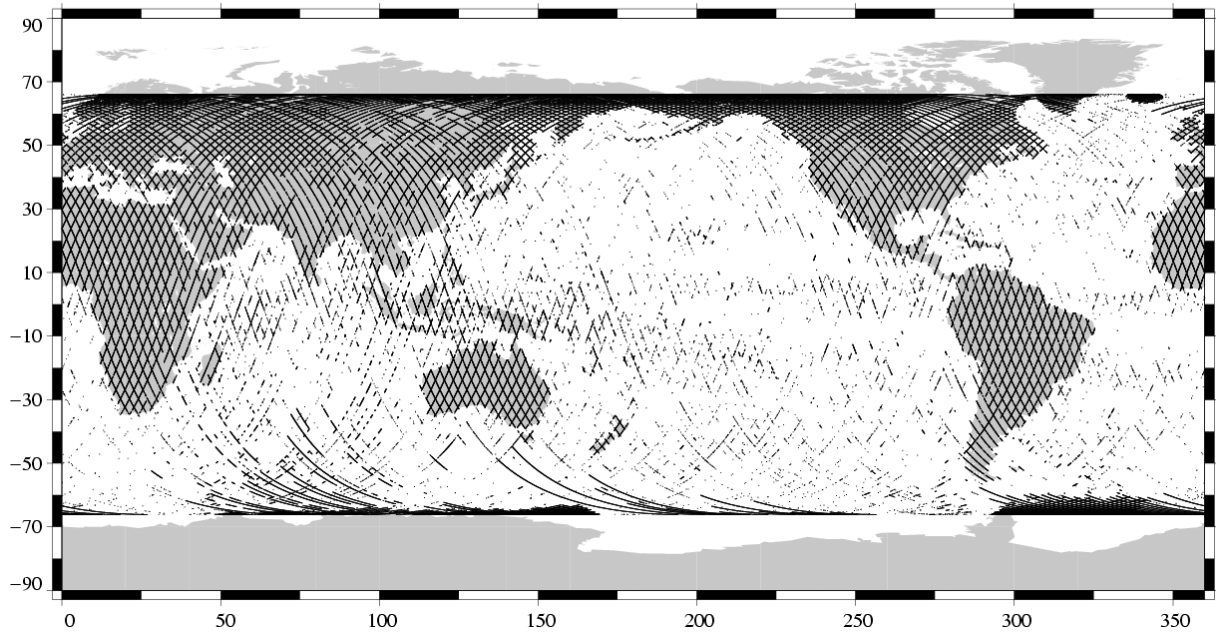
Parameters	Min Thres.	Max Thres.	Unit	Mean % removed in 1997	% removed
Sea surface height	-130.000	100.000	m	1.37	0.92
Number of 20/10Hz valid points Poseidon/TOPEX	5.000	-		1.37	1.22
Std. deviation of range	0.000	0.100	m	1.85	2.14
Off nadir angle from waveform	0.000	0.400	deg	1.36	4.43
Dry tropospheric 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	4.44
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	0.52
Sea state Bias	-0.500	0.000	m	1.39	0.81
Backscatter coefficient	7.000	30.000	dB	1.44	0.73
Ocean tide height	-5.000	5.000	m	0.01	1.13
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	1.24
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.

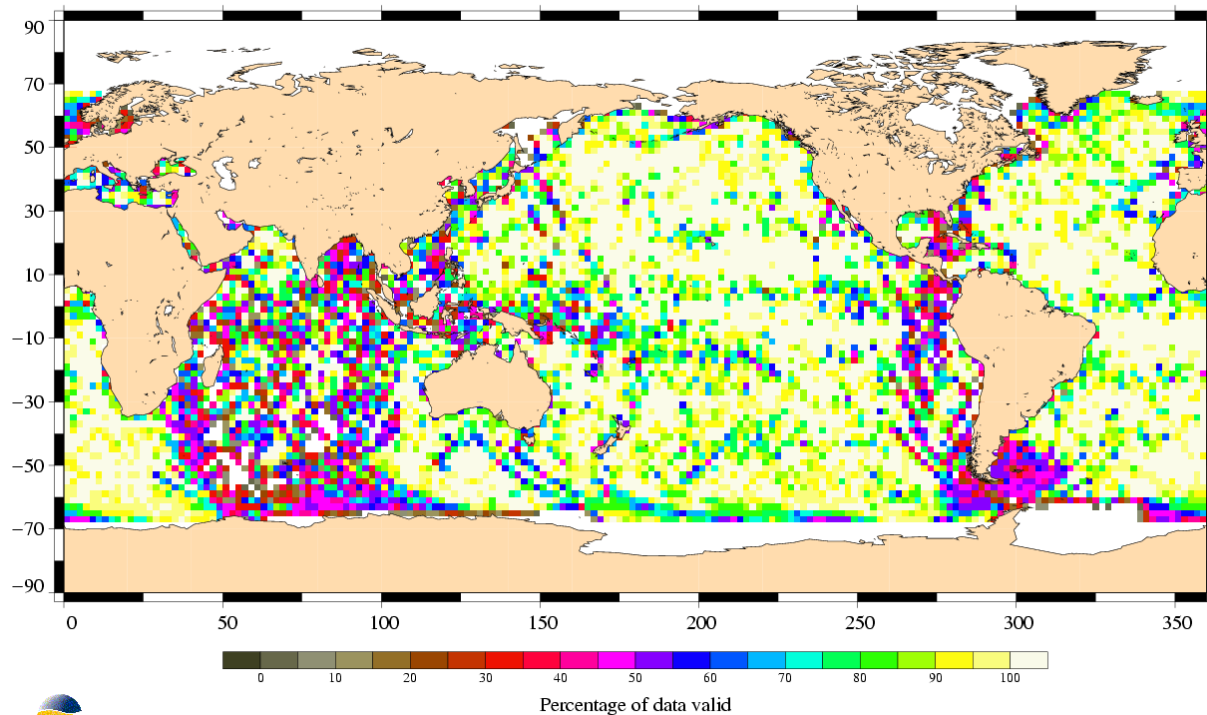
Valid data
TOPEX/Poseidon Cycle 389 (06/04/2003 / 16/04/2003)



Edited measurements
TOPEX Cycle 389 (06/04/2003 / 16/04/2003)

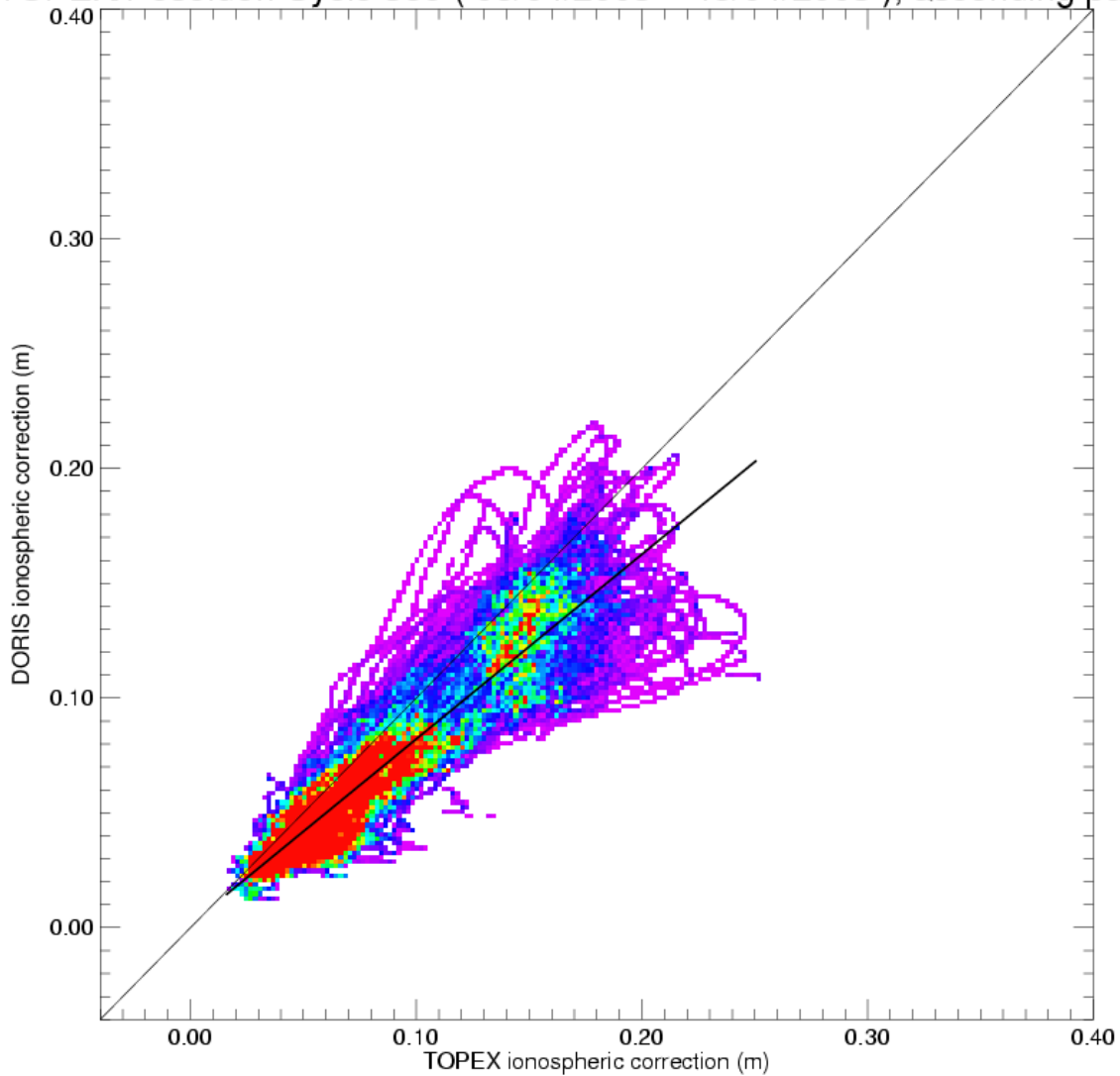


Percentage of valid data relative to the nominal pass
TOPEX/Poseidon Cycle 389 (06/04/2003 / 16/04/2003)

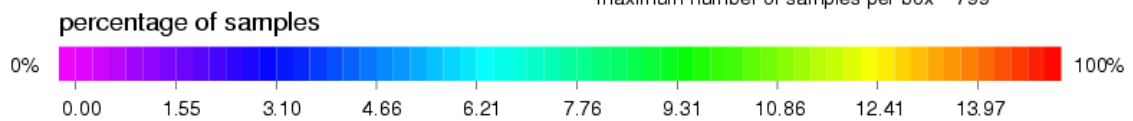


3.5 Ionospheric correction

TOPEX/Poseidon Cycle 389 (06/04/2003 – 16/04/2003), ascending passes



minimum number of samples per box 1
maximum number of samples per box 799



Statistics Y-X

mean = -0.01504
rms = 0.02315
std = 0.01761

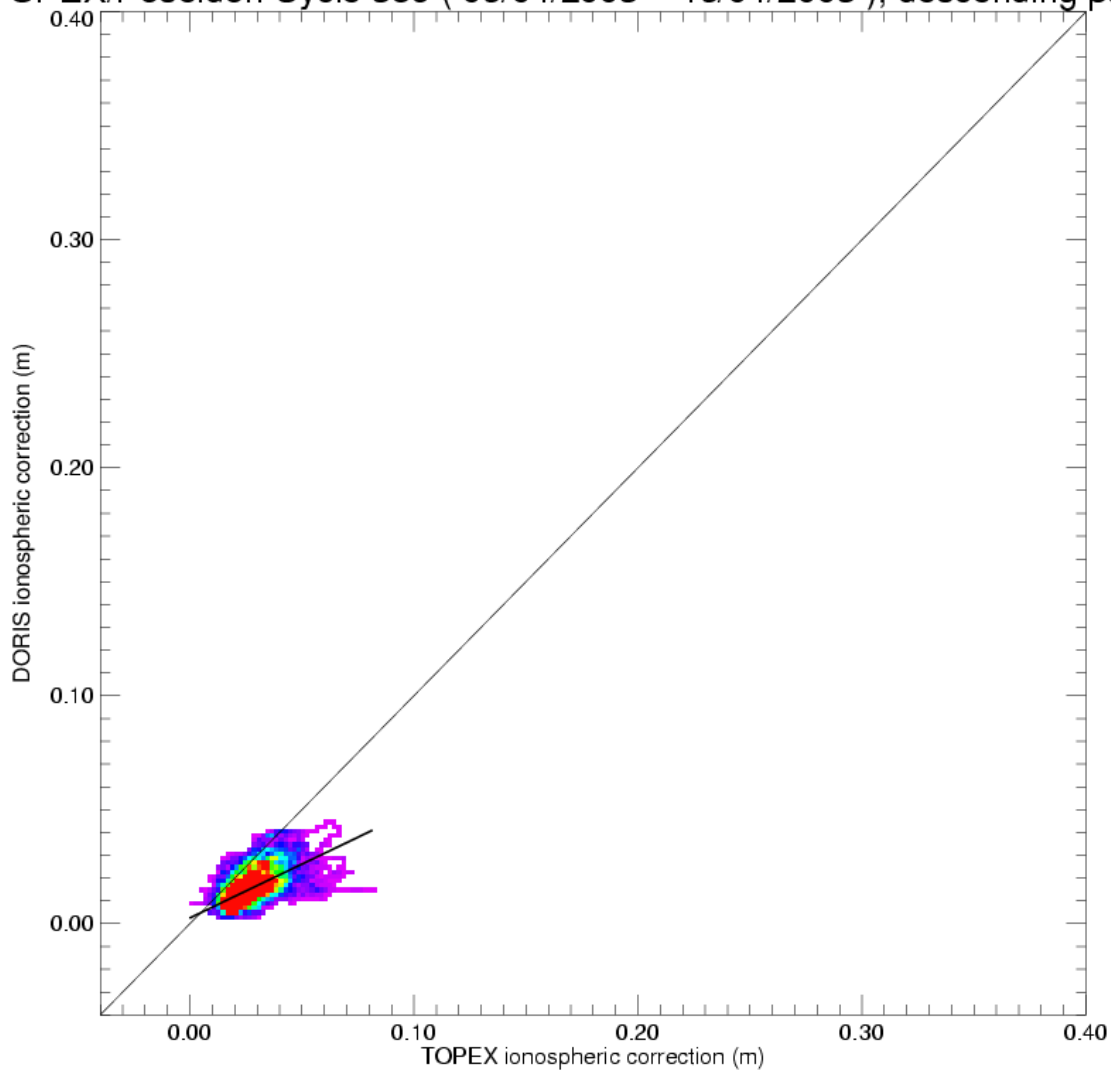
Order 1 fit polynomial

$y = a x + b$
a = 0.80509293
b = 0.00163950

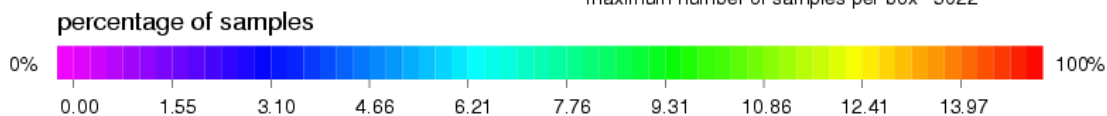
Legend

— Order 1 fit polynomial
— Bisectrix

TOPEX/Poseidon Cycle 389 (06/04/2003 – 16/04/2003), descending passes



minimum number of samples per box 1
 maximum number of samples per box 5022



Statistics Y-X

mean = -0.01120
 rms = 0.01323
 std = 0.00705

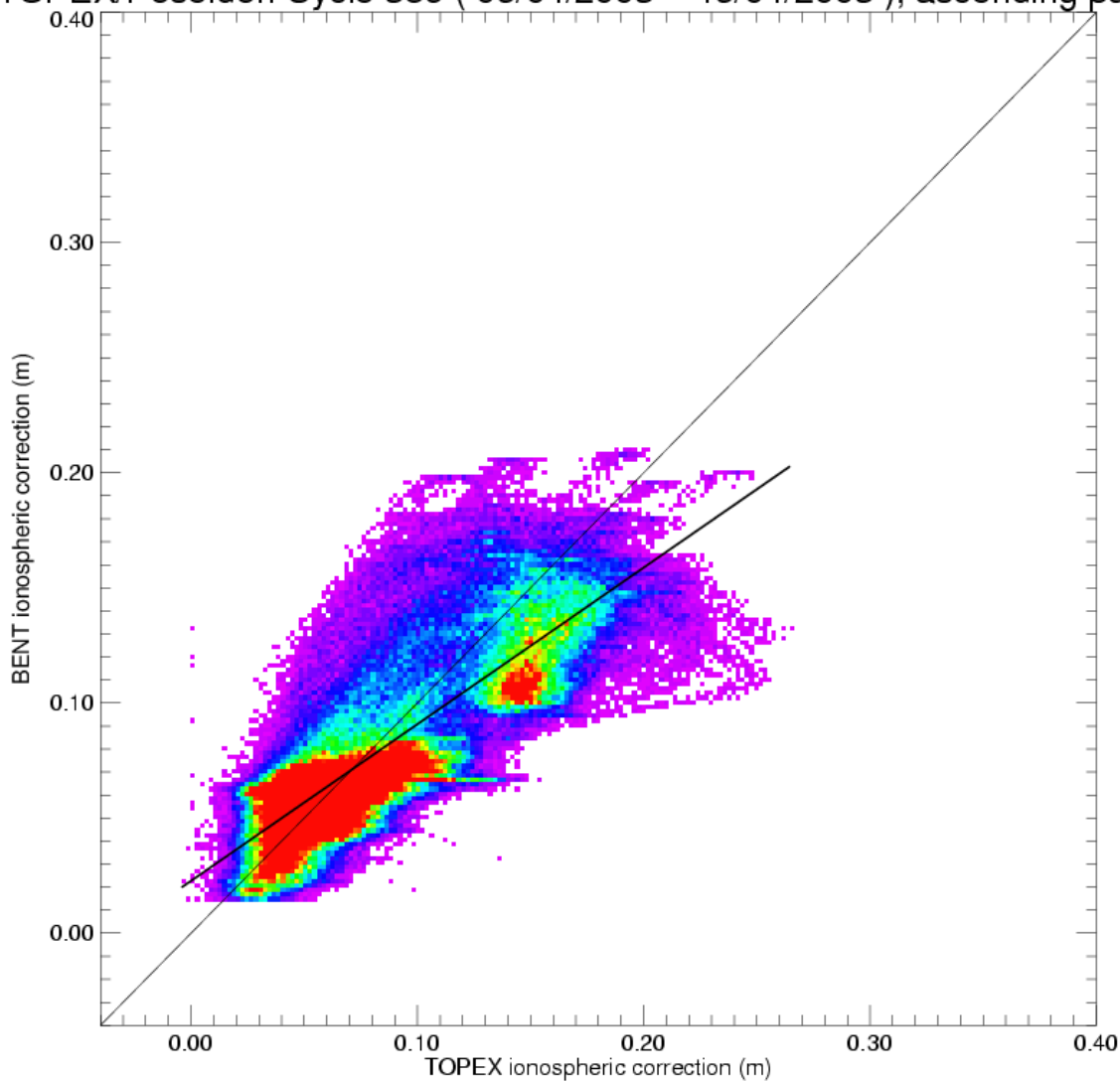
Order 1 fit polynom

$y = a x + b$
 $a = 0.47195232$
 $b = 0.00252305$

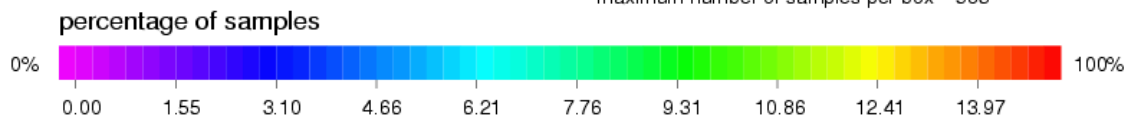
Legend

— Order 1 fit polynom
 — Bisectrix

TOPEX/Poseidon Cycle 389 (06/04/2003 – 16/04/2003), ascending passes



minimum number of samples per box 1
 maximum number of samples per box 583



Statistics Y-X

mean = -0.00476
 rms = 0.02623
 std = 0.02579

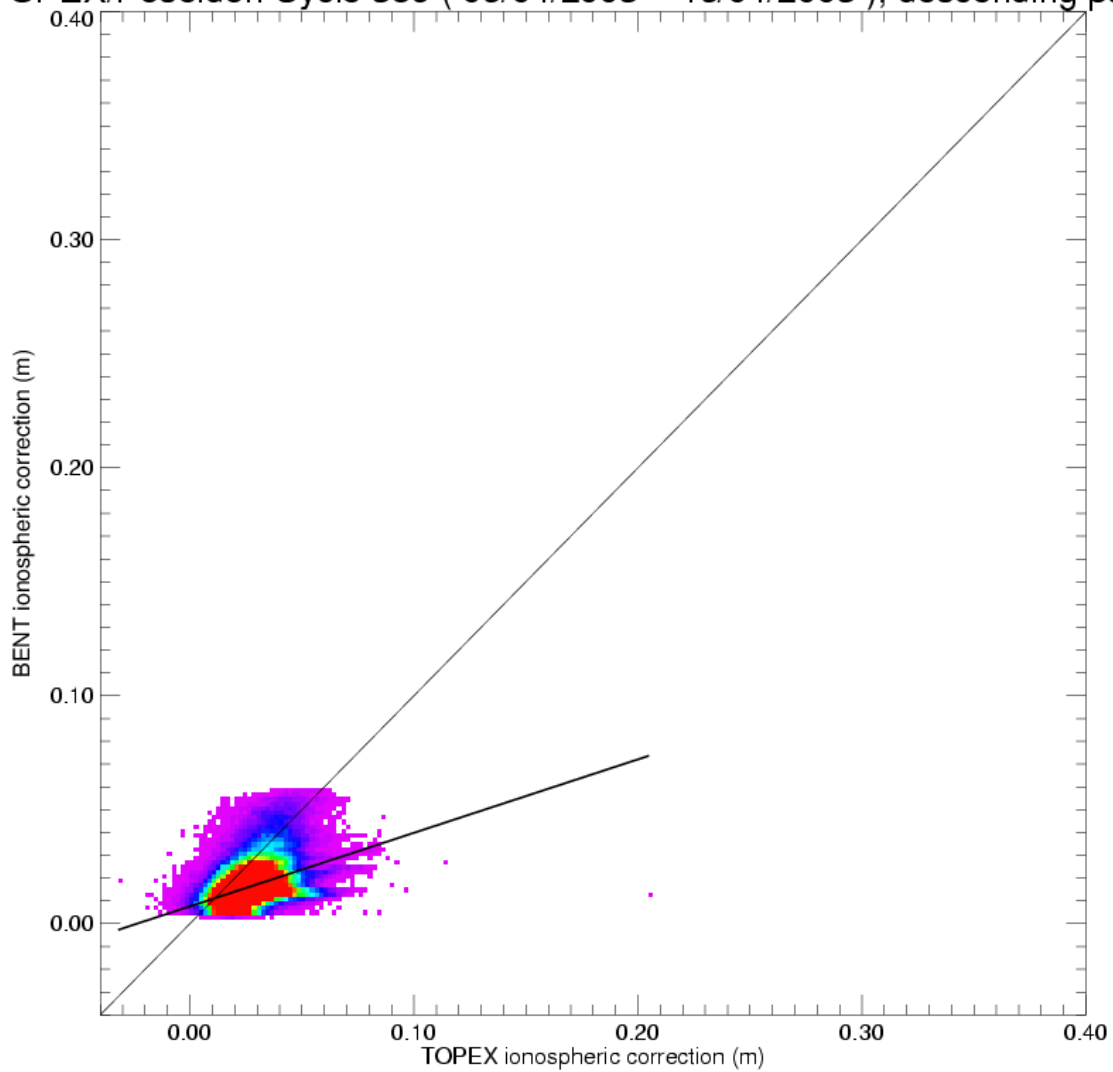
Order 1 fit polynom

$y = a x + b$
 $a = 0.68045461$
 $b = 0.02273287$

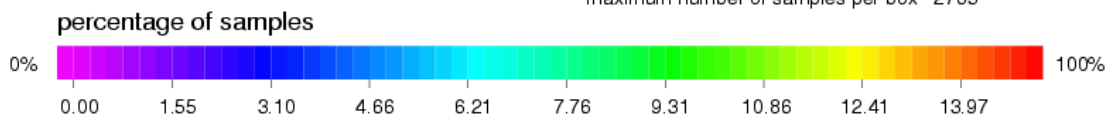
Legend

— Order 1 fit polynom
 — Bisectrix

TOPEX/Poseidon Cycle 389 (06/04/2003 – 16/04/2003), descending passes



minimum number of samples per box 1
 maximum number of samples per box 2765



Statistics Y-X

mean = -0.01032
 rms = 0.01467
 std = 0.01043

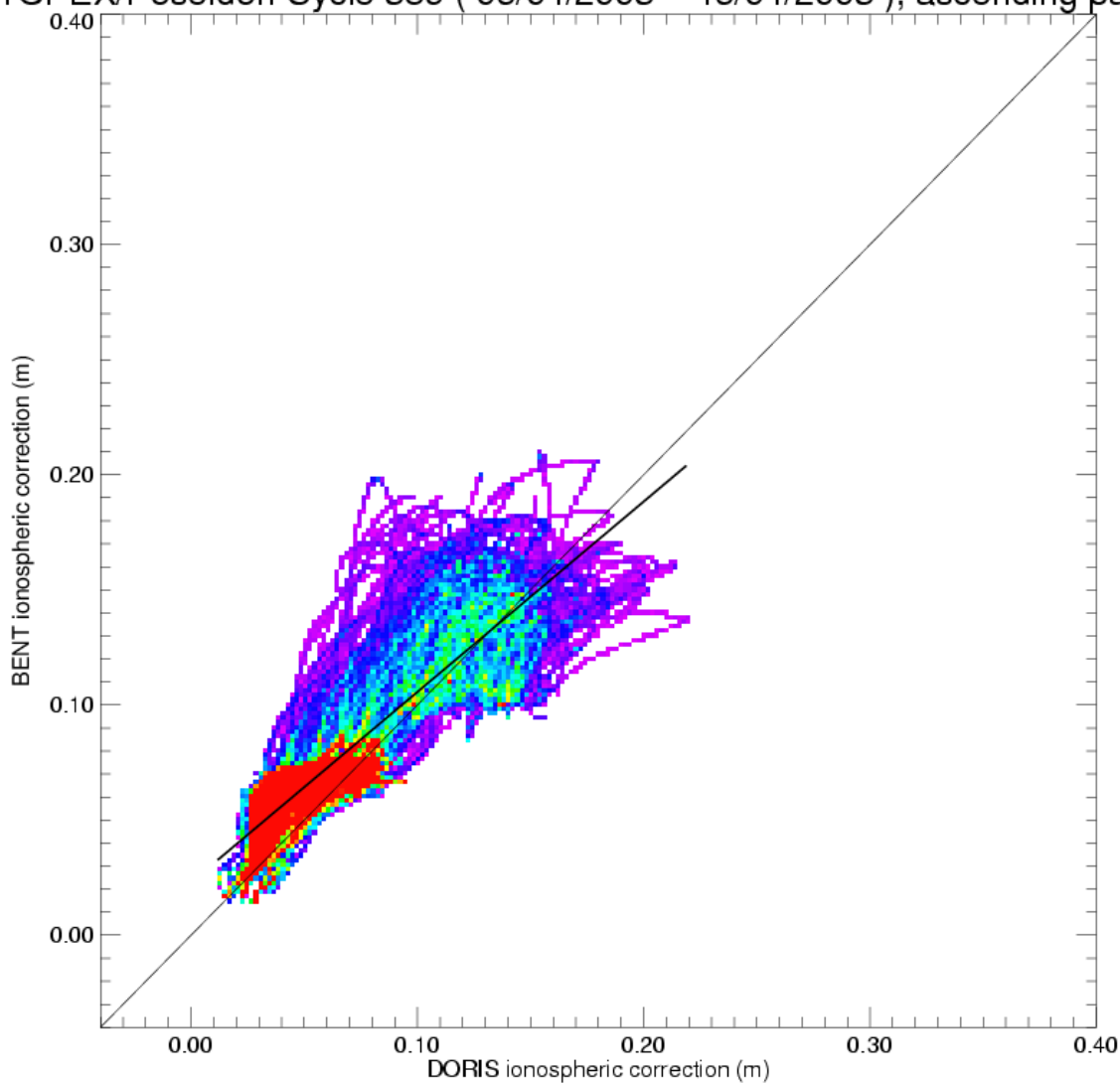
Order 1 fit polynom

$y = a x + b$
 $a = 0.32243061$
 $b = 0.00760483$

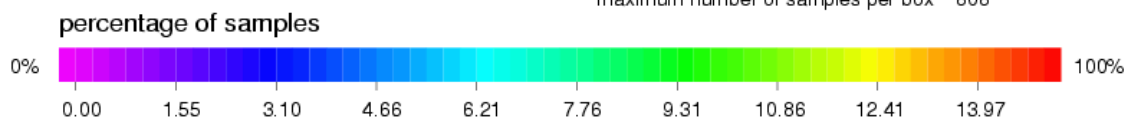
Legend

— Order 1 fit polynom
 — Bisectrix

TOPEX/Poseidon Cycle 389 (06/04/2003 – 16/04/2003), ascending passes



minimum number of samples per box 1
 maximum number of samples per box 808



Statistics Y-X

mean = 0.01075
 rms = 0.02274
 std = 0.02004

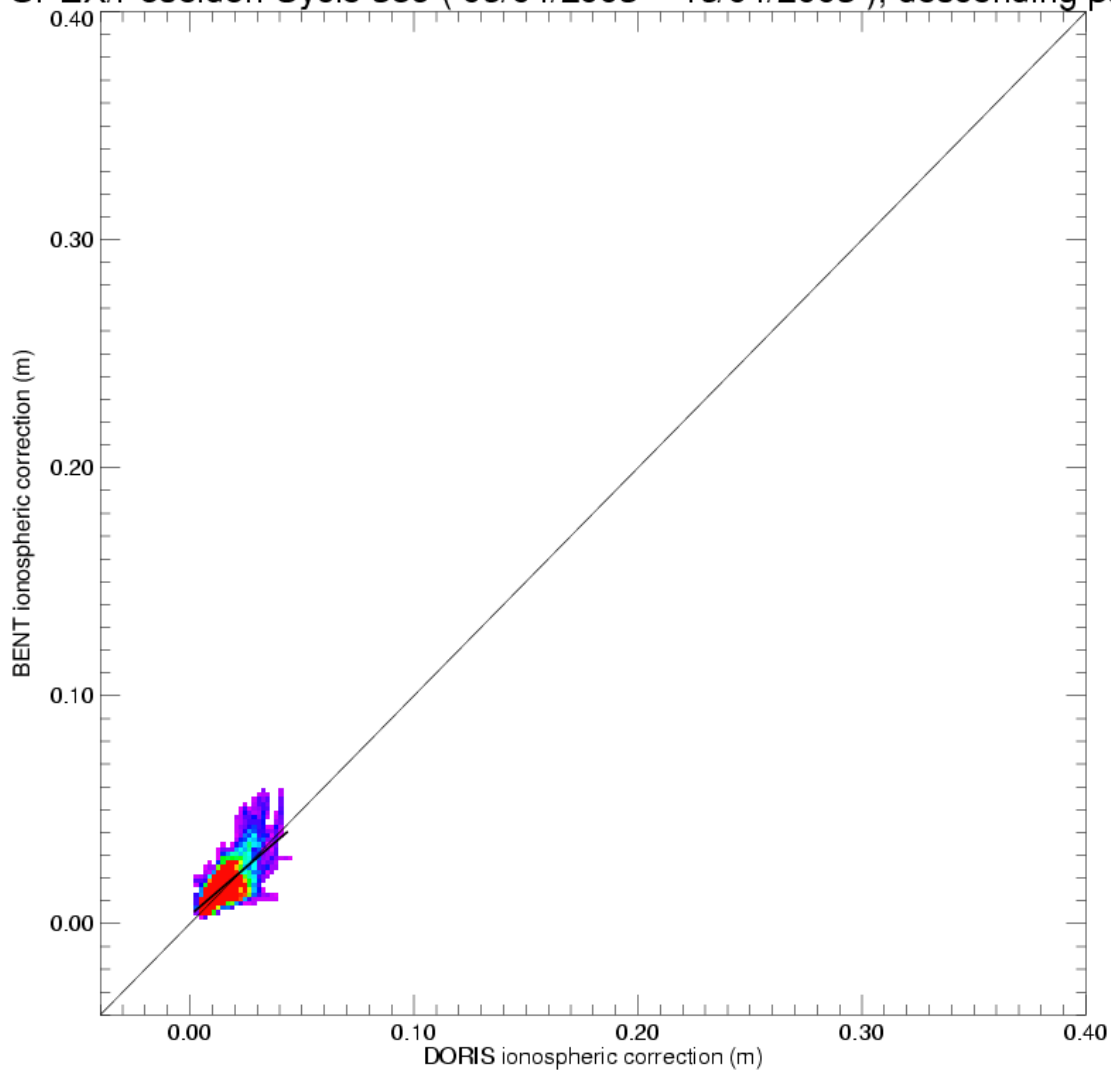
Order 1 fit polynom

$y = a x + b$
 $a = 0.82717943$
 $b = 0.02294024$

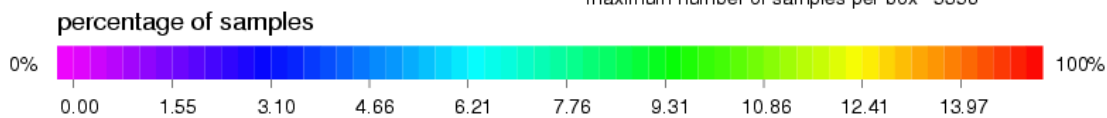
Legend

— Order 1 fit polynom
 — Bisectrix

TOPEX/Poseidon Cycle 389 (06/04/2003 – 16/04/2003), descending passes



minimum number of samples per box 1
 maximum number of samples per box 5356



Statistics Y-X

mean = 0.00135
 rms = 0.00631
 std = 0.00616

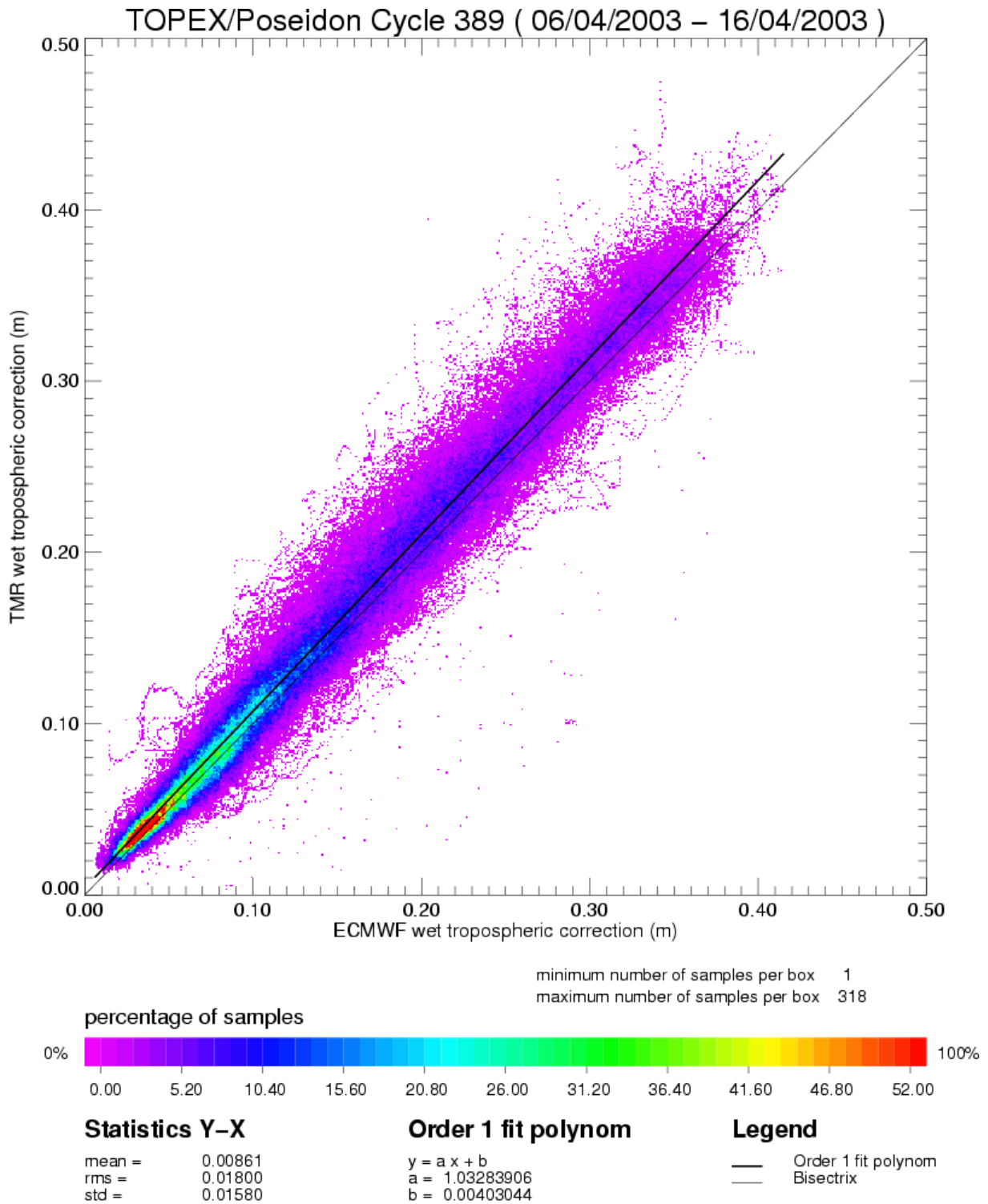
Order 1 fit polynom

$y = a x + b$
 $a = 0.84145218$
 $b = 0.00369218$

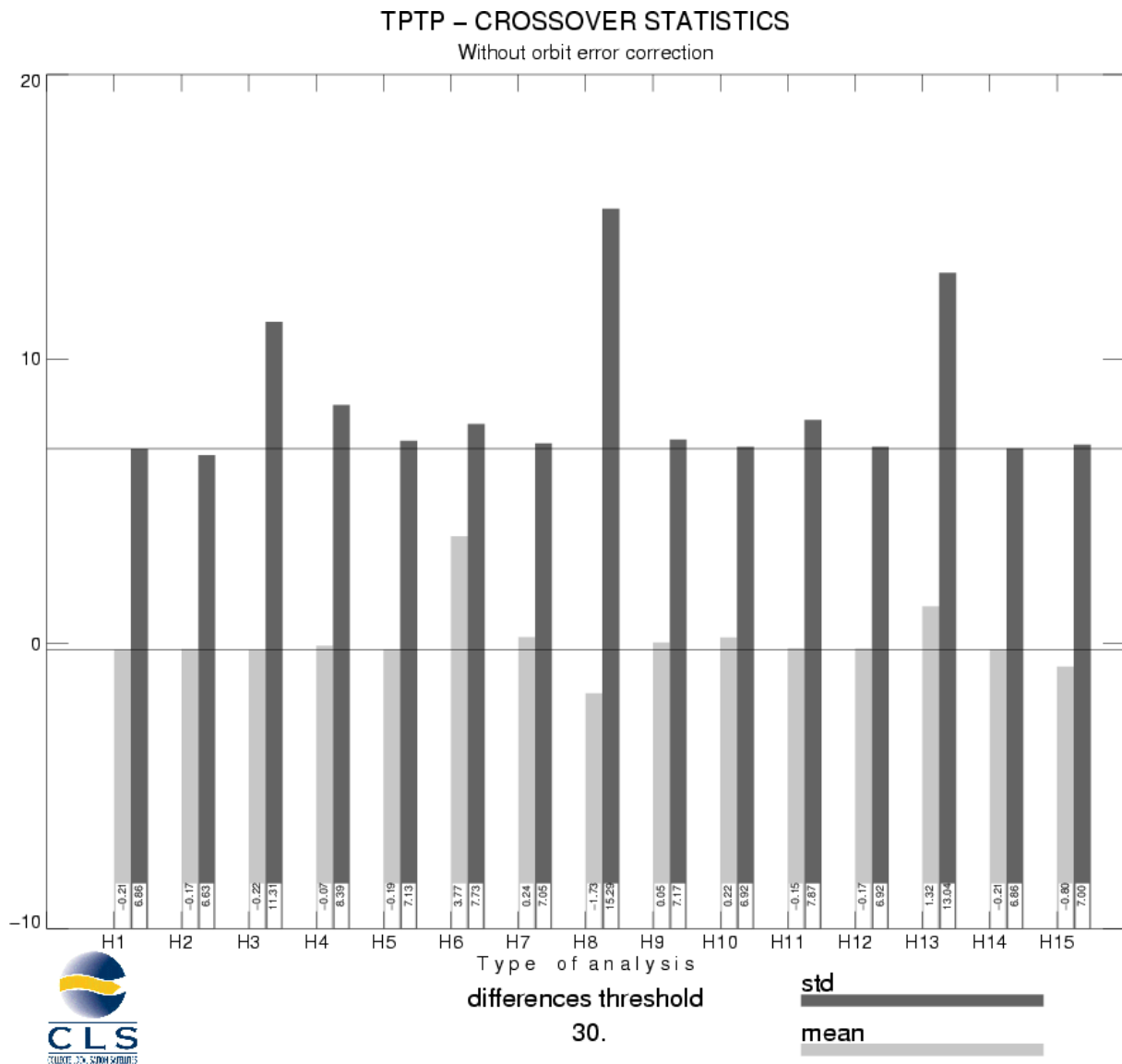
Legend

— 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 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

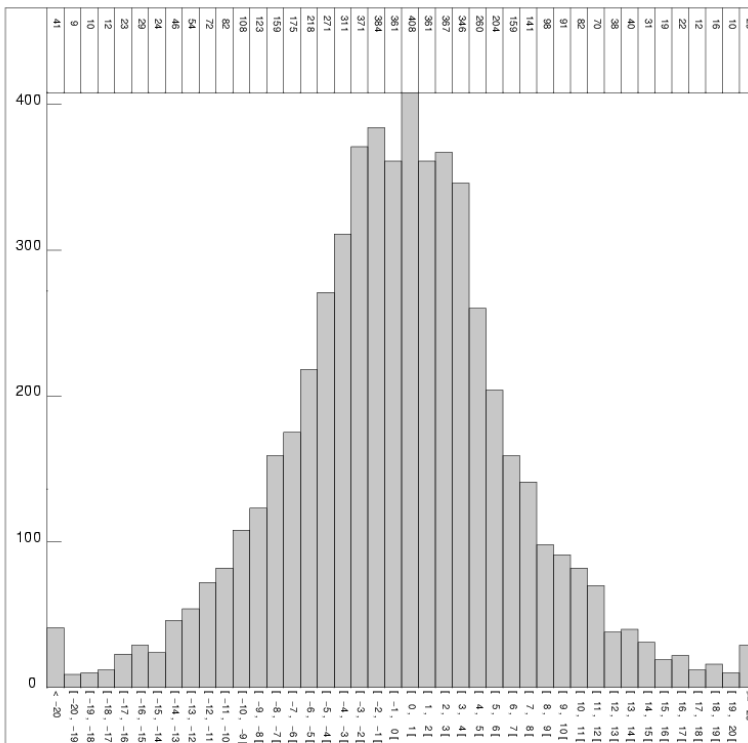
Type de points de croisement: TPTP
 Zone géographique (deg): -90 / 90 , 0 / 360
 Seuil sur les écarts d'analyse 0.00 (moy)
 30.00 (seuil)
 Selection(s) sur les champs :
 CL Arc 1 :=INTERP_SPLN
 CL Arc 2 :=INTERP_SPLN
 Seuil Min +: 0.0000000
 Seuil Max : 0.0000000

Selection(s) sur les écarts :
 Aucune

RESULTATS STATISTIQUES

Valeur minimale : -29.5400
 Valeur maximale : 29.0300
 Différence Max – Min: 58.5700
 Nombre de points lus: 5791
 Nombre de points sélectionnés: 5687
 Moyenne : -0.208532
 Écart-type : 6.85773
 Moyenne Quadratique : 6.86090

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TPTP – CROSSOVER STATISTICS

With orbit error correction

SSH = Corrected sea surface height

RAPPEL DES SELECTIONS

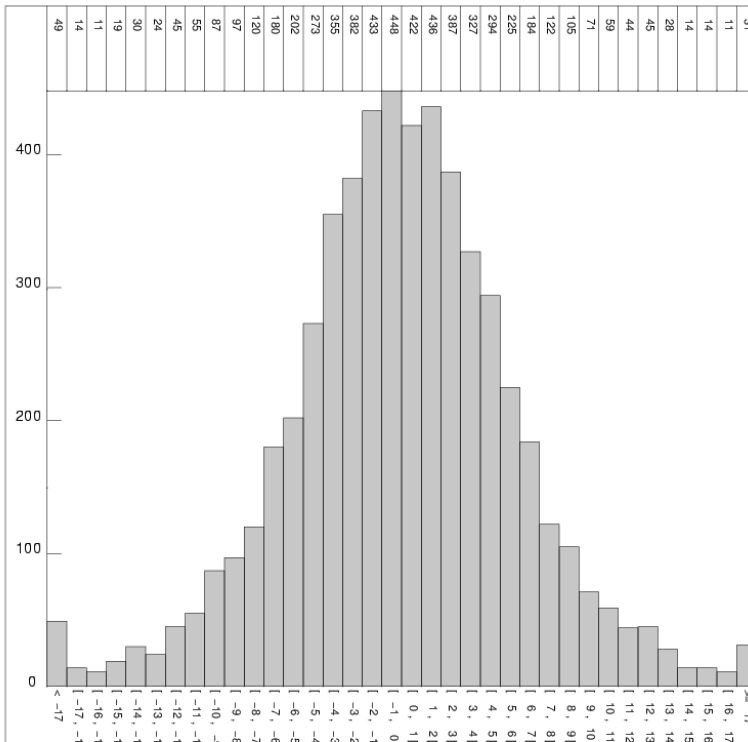
Type de points de croisement: TPTP
 Zone géographique (deg): -90 / 90 , 0 / 360
 Seuil sur les écarts d'analyse 0.00 (moy)
 30.00 (seuil)
 Selection(s) sur les champs :
 CL Arc 1 :=INTERP_SPLN
 CL Arc 2 :=INTERP_SPLN
 Seuil Min +: 0.0000000
 Seuil Max : 0.0000000

Selection(s) sur les écarts :
 Aucune

RESULTATS STATISTIQUES

Valeur minimale : -29.9200
 Valeur maximale : 27.7100
 Différence Max – Min: 57.6300
 Nombre de points lus: 5791
 Nombre de points sélectionnés: 5644
 Moyenne : -0.0233840
 Écart-type : 5.95574
 Moyenne Quadratique : 5.95579

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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

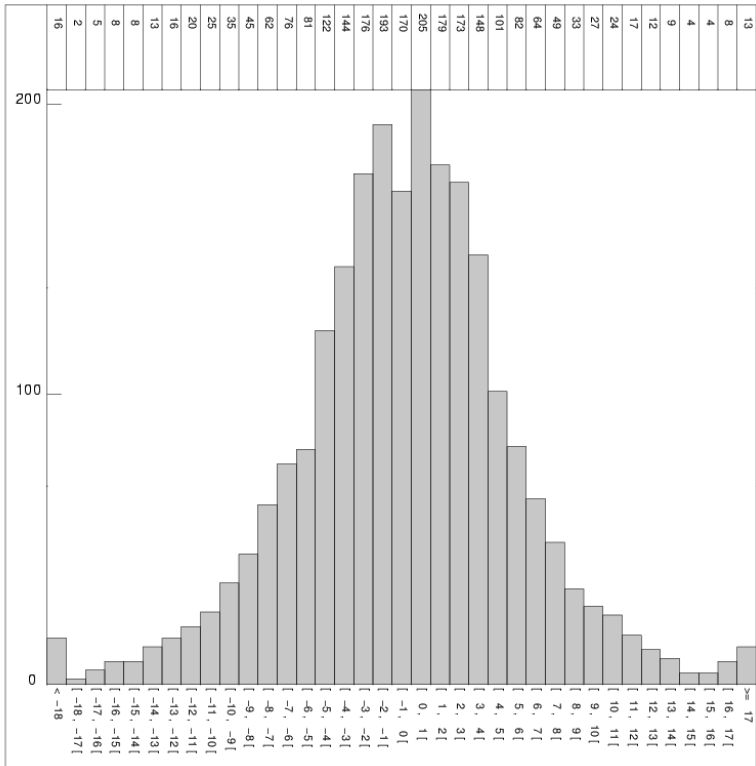
RAPPEL DES SELECTIONS

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 : -31.6900
 Valeur maximale : 36.6700
 Différence Max – Min: 68.3600
 Nombre de points lus: 2575
 Nombre de points sélectionnés: 2369
 Moyenne : -0.321638
 Écart-type : 5.95148
 Moyenne Quadratique : 5.96016

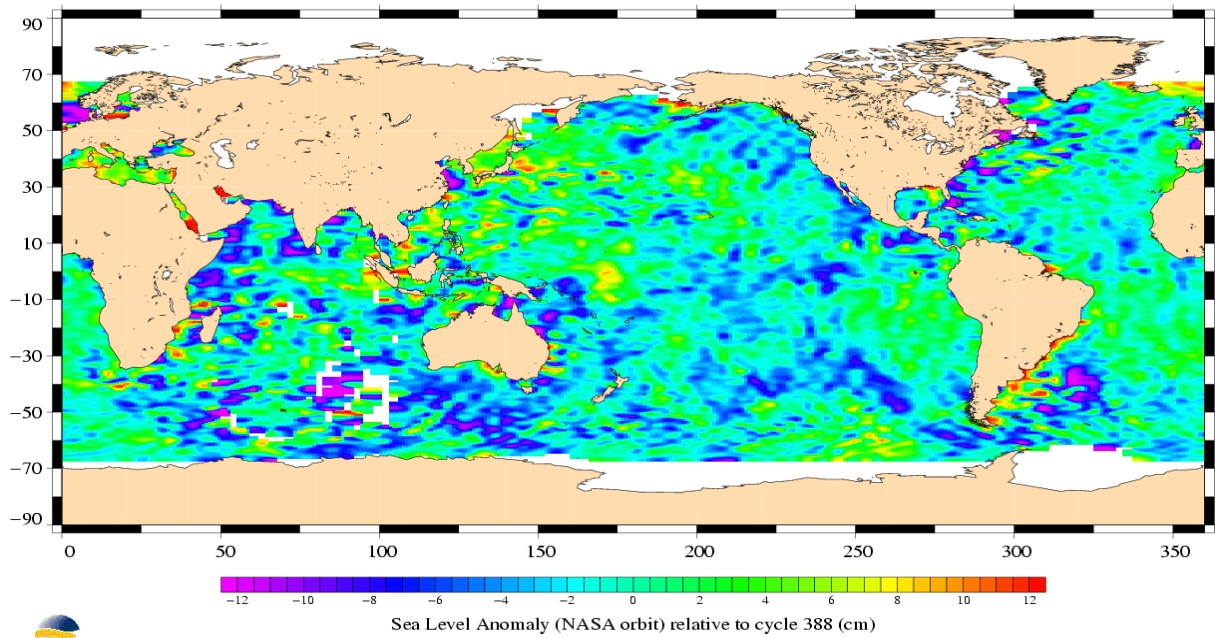
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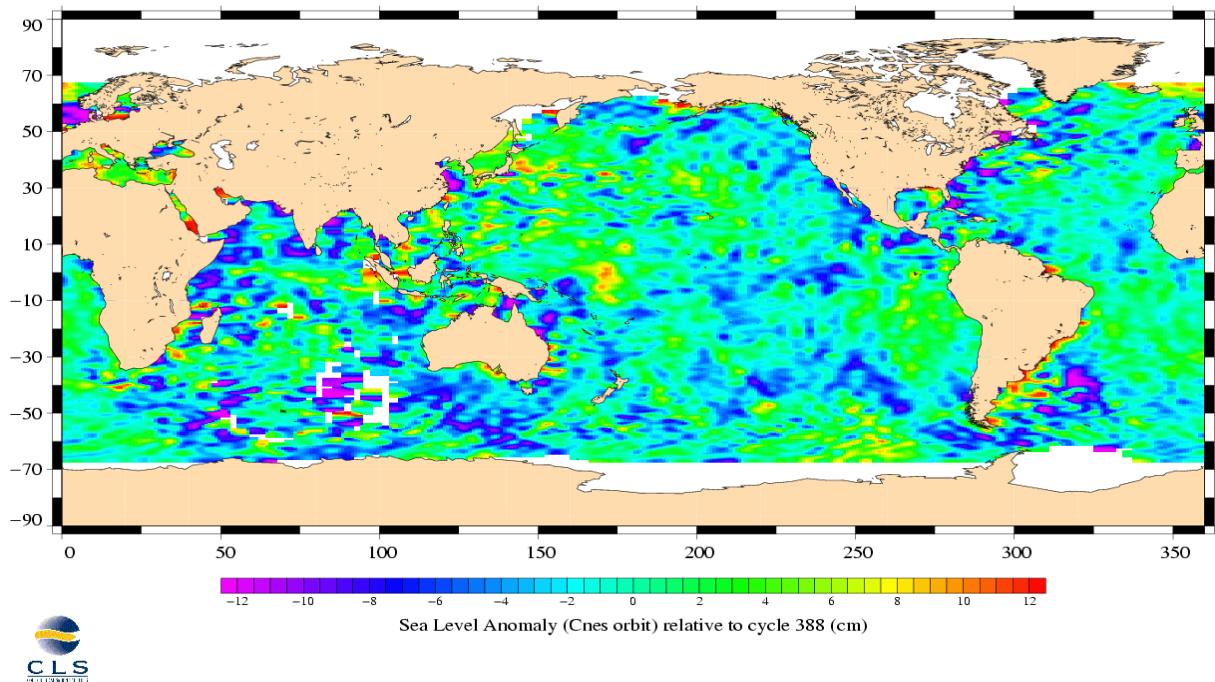
3.8 SSH variability

3.8.1 Sea Level Anomaly

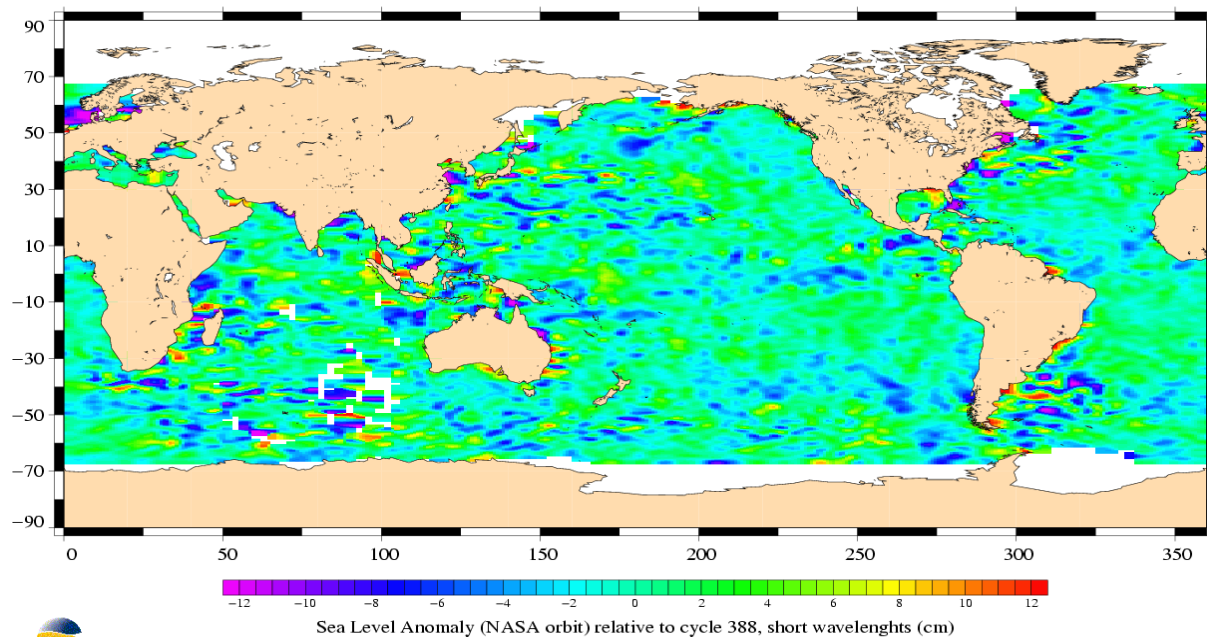
TOPEX/Poseidon, cycle 389
Period : 06/04/2003 – 16/04/2003



TOPEX/Poseidon, cycle 389
Period : 06/04/2003 – 16/04/2003



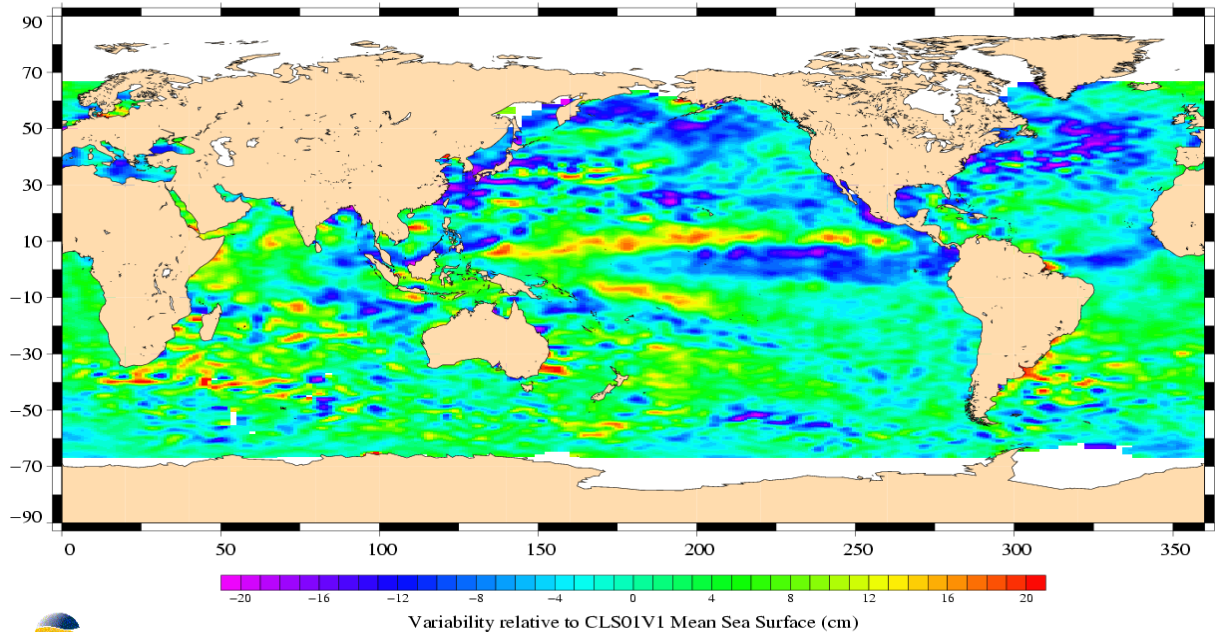
TOPEX/Poseidon, cycle 389
Period : 06/04/2003 – 16/04/2003



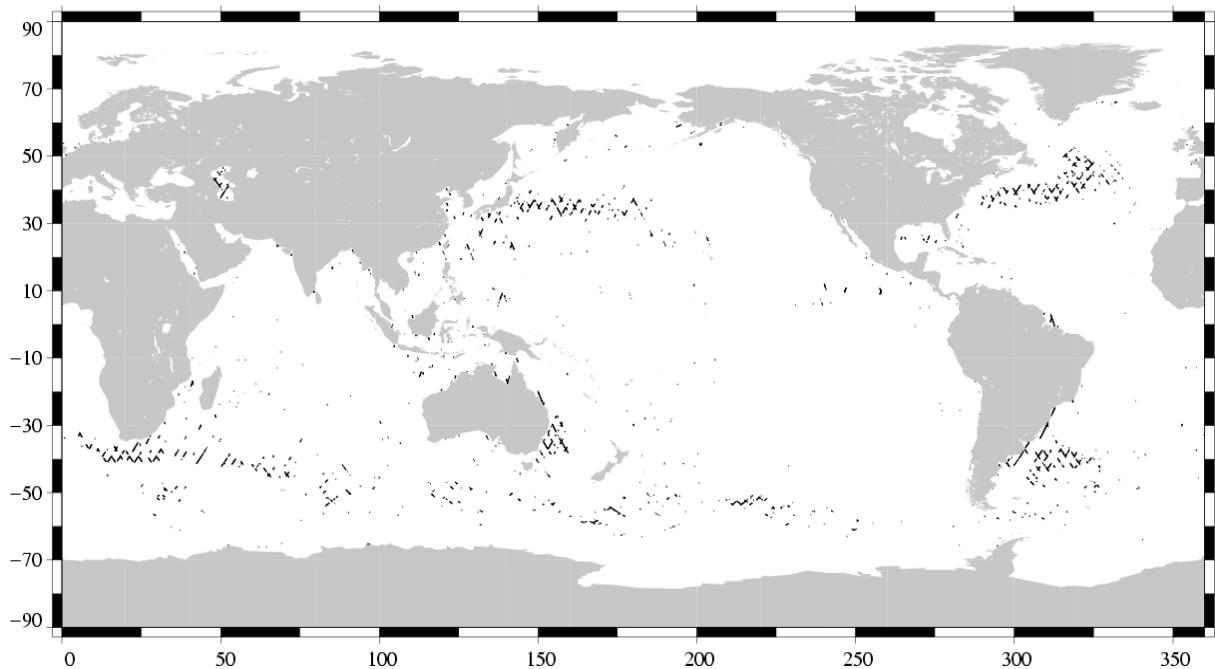
3.8.2 Comparison to a precise Mean Sea Surface

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 389
Period : 06/04/2003 – 16/04/2003

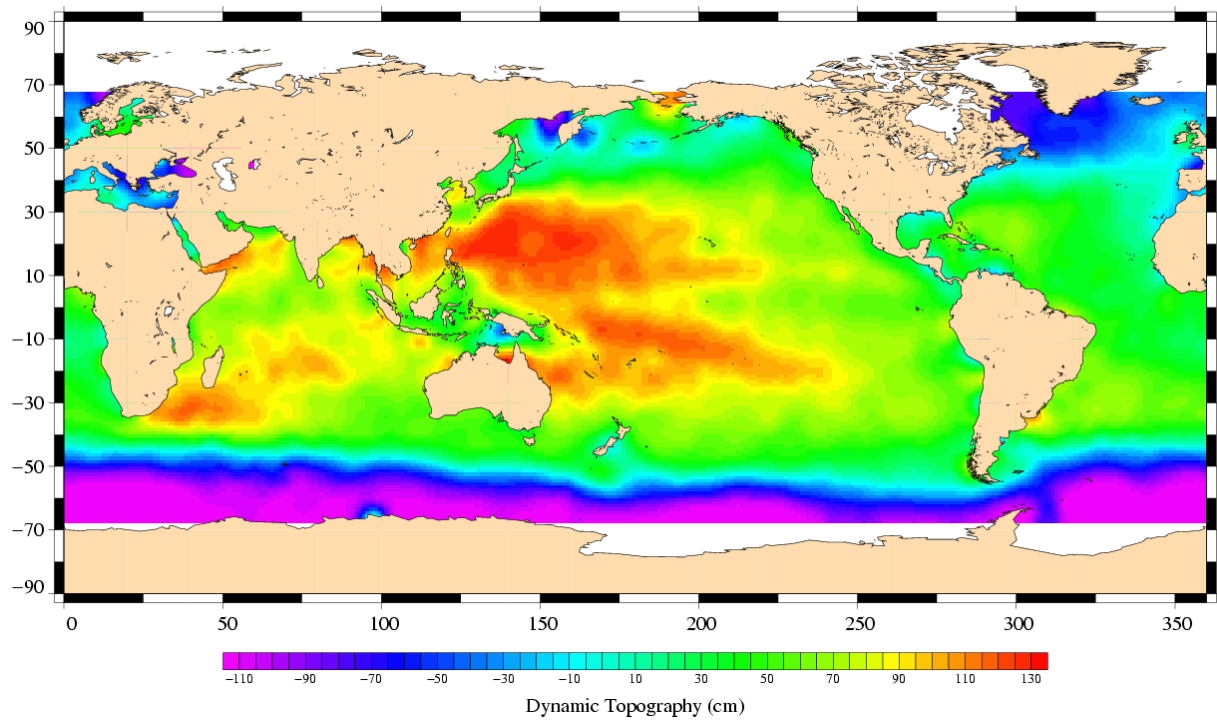


(SSH – MSS) differences greater than 0.3 m
TOPEX/Poseidon Cycle 389 (06/04/2003 / 16/04/2003)



3.9 Dynamic topography

TOPEX/Poseidon, cycle 389
Period : 06/04/2003 – 16/04/2003



3.10 Wind and wave maps

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

TOPEX/Poseidon, cycle 389
Period : 06/04/2003 – 16/04/2003

