



TOPEX/Poseidon MGRD Quality Assessment Report

Cycle 376

28-11-2002 08-12-2002

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SALP-RP-P2-EX-21120-CLS376

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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

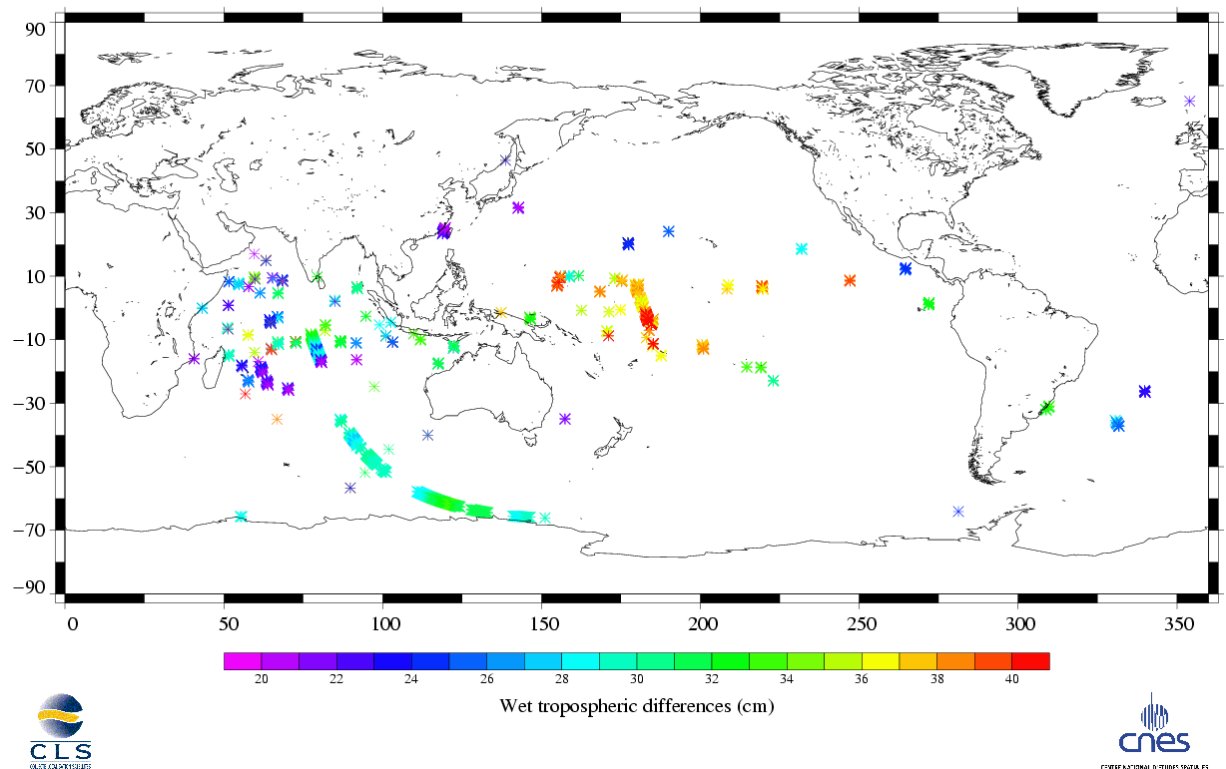
2.1 Cycle quality and performances

Data quality for this cycle appears to be nominal. For this cycle, the crossover standard deviation is 7.11 cm rms, and the standard deviation of Sea Level Anomalies (SLA) relative to a Mean Sea Surface is 9.73 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 4.72% 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 cycle 376 are plotted on the following figure.

Edited parameter : Radiometer and ECMWF wet tropospheric differences
T/P Cycle 376 (28/11/2002 / 08/12/2002)



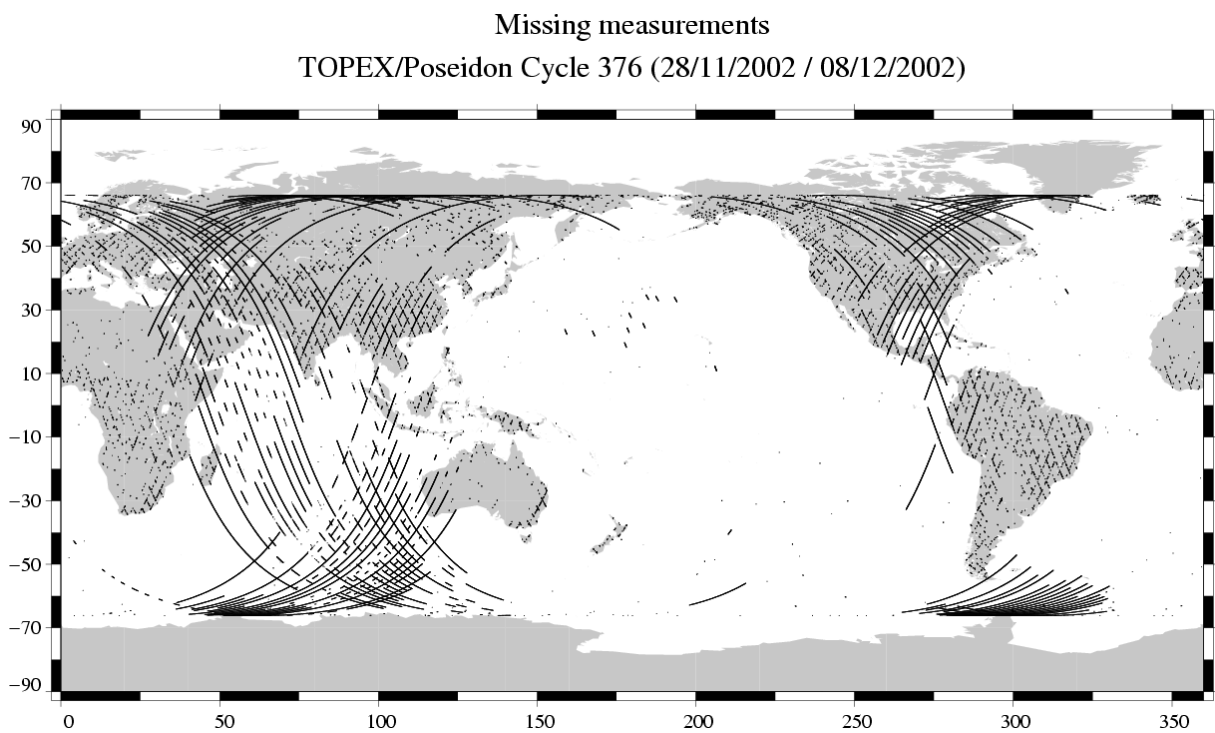
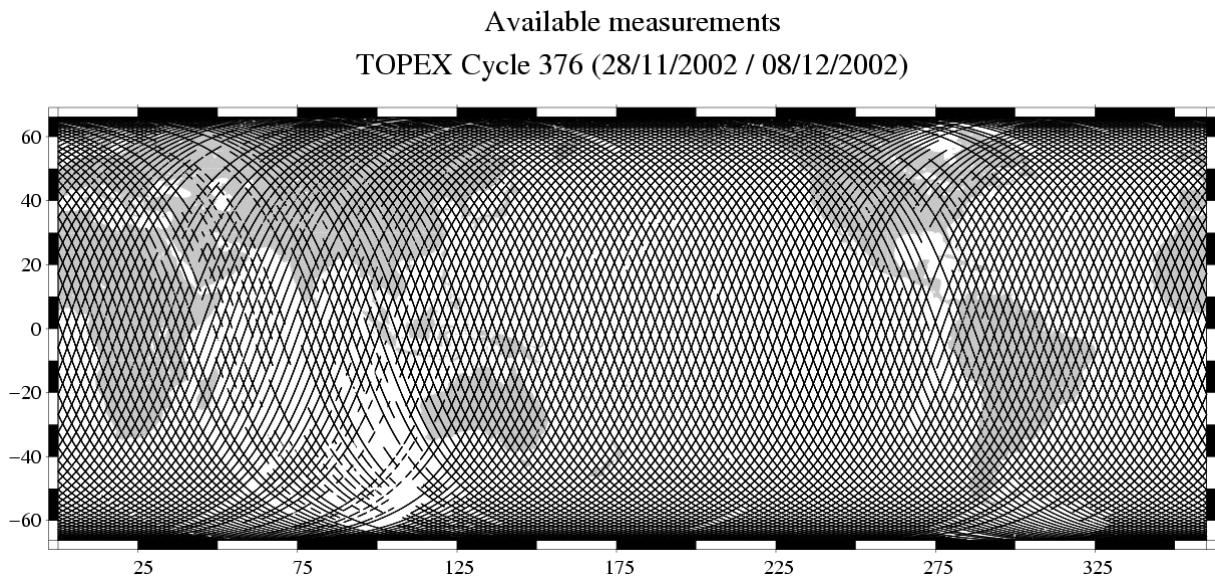
3 CALVAL main results

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

703810 altimeter measurements are present, and 90686 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.



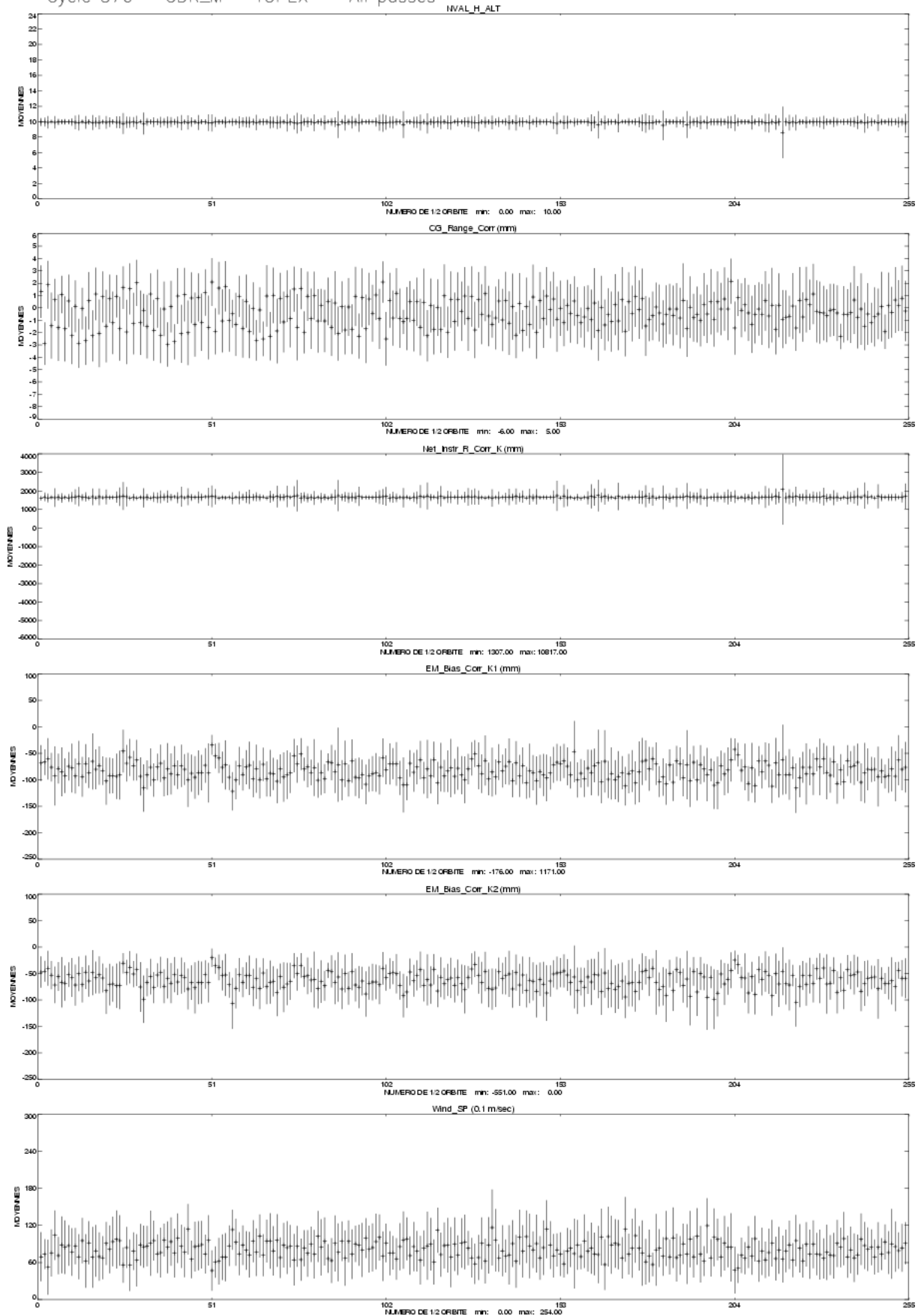
3.2 M-GDR quality flags

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

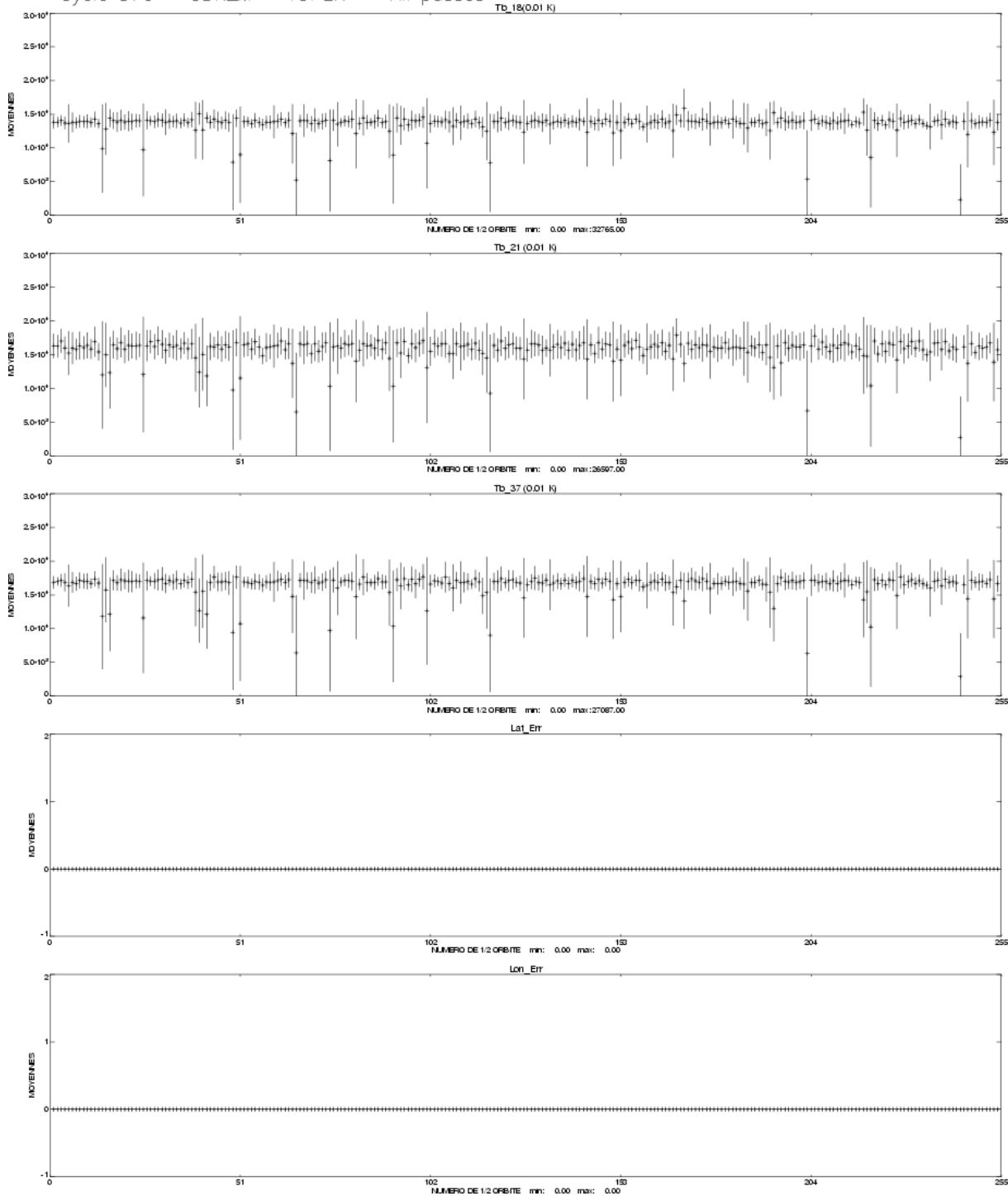
Name	Description	% bad
Geo_Bad_1	altimeter land flag	26.63
Geo_Bad_1	ice flag	6.23
Geo_Bad_1	radiometer land flag	28.13
Alt_Bad_1	conditions 1 altimeter	4.41
Alt_Bad_2	conditions 2 altimeter	4.28
Geo_Bad_2	rain (liquid water in excess)	6.67
Geo_Bad_2	less than 4 points for CSR3.0 tide calculation	0.38
Geo_Bad_2	less than 4 points for FES95.2.1 tide calculation	2.60
TOPEX	TOPEX not valid	0.00
TMR	TMR not valid	0.00
TMR_Bad	Brightness temperatures not valid	6.22
DORIS	DORIS not valid	0.00

3.3 M-GDR parameter plots

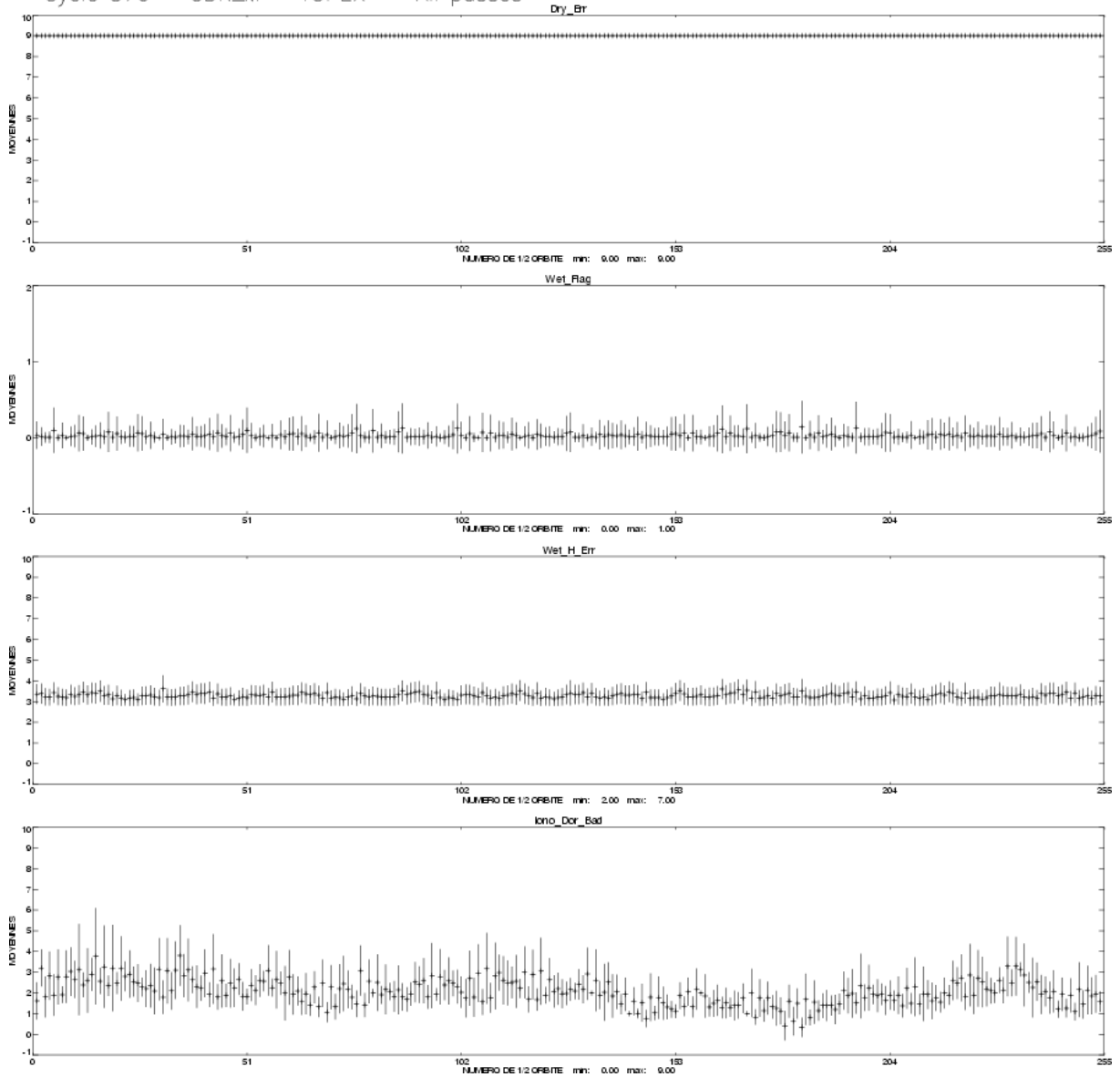
Cycle 376 – GDR_M – TOPEX – All passes –



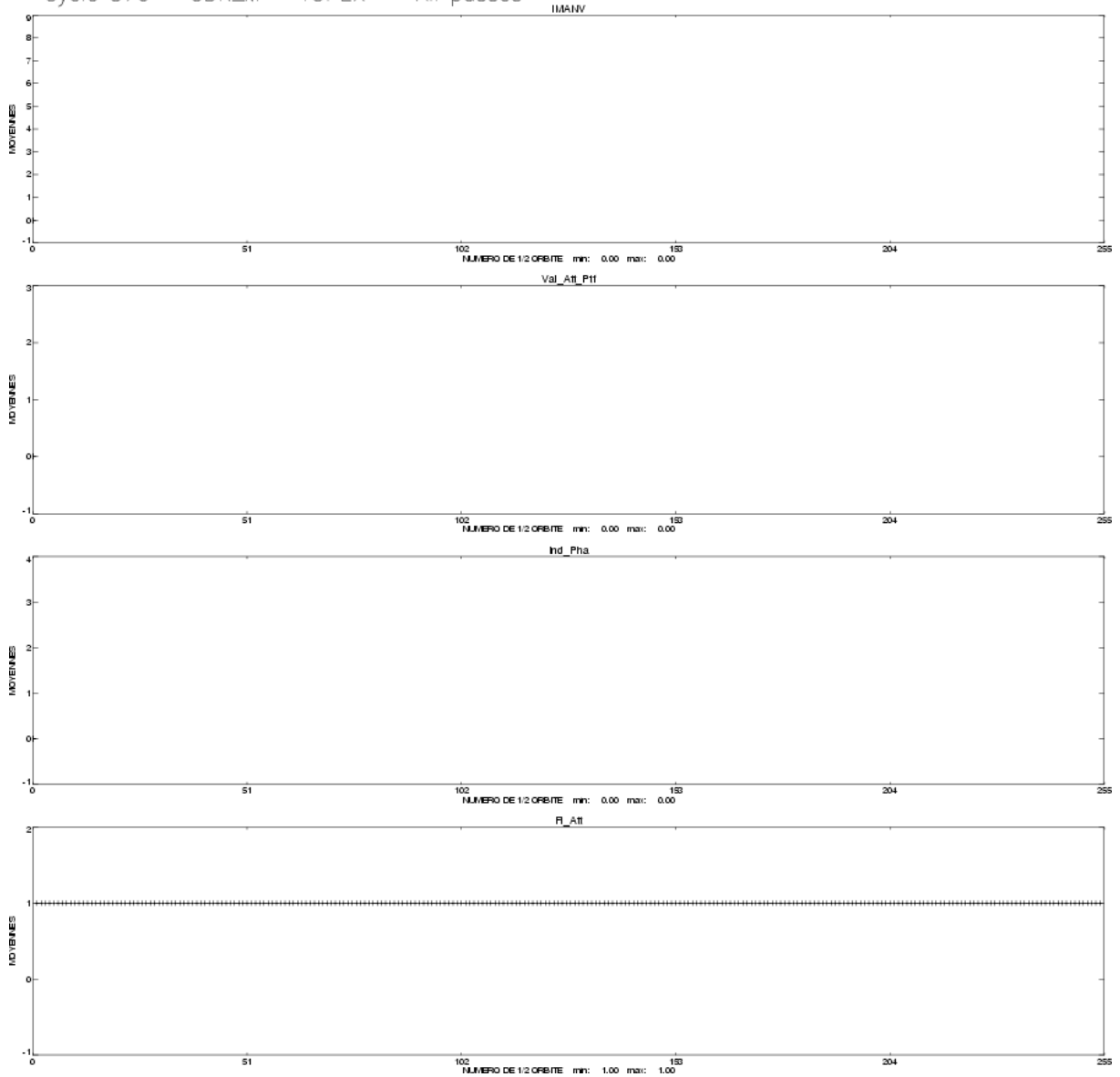
Cycle 376 – GDR_M – TOPEX – All passes –

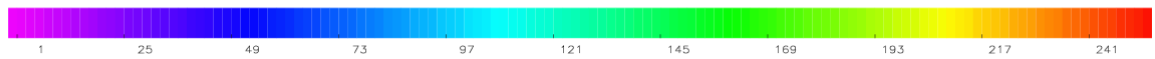
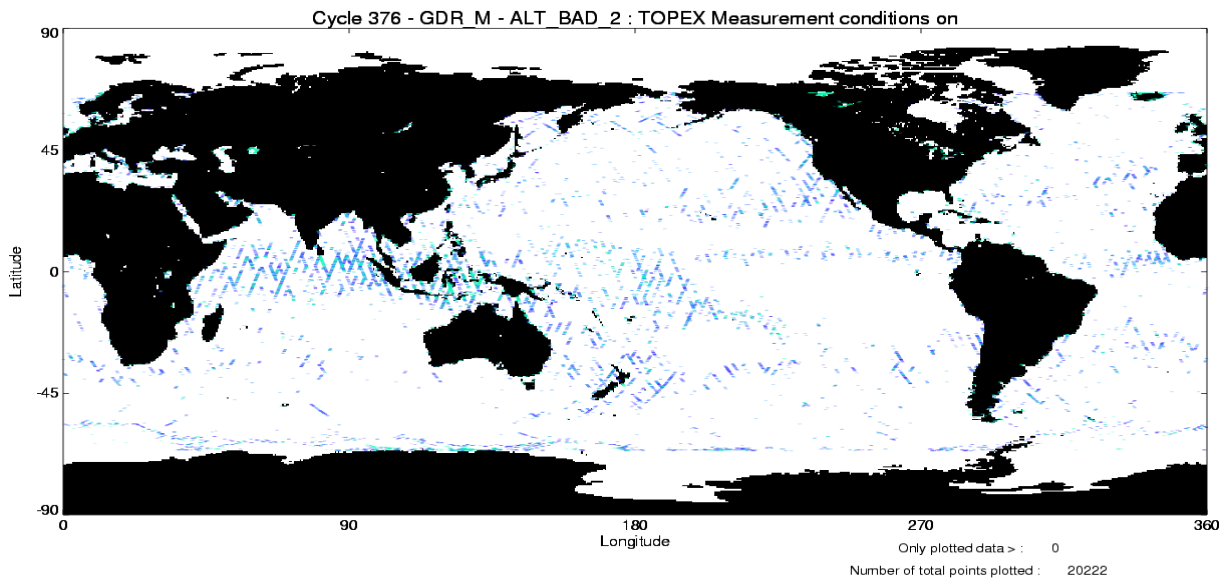
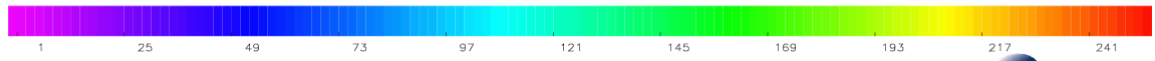
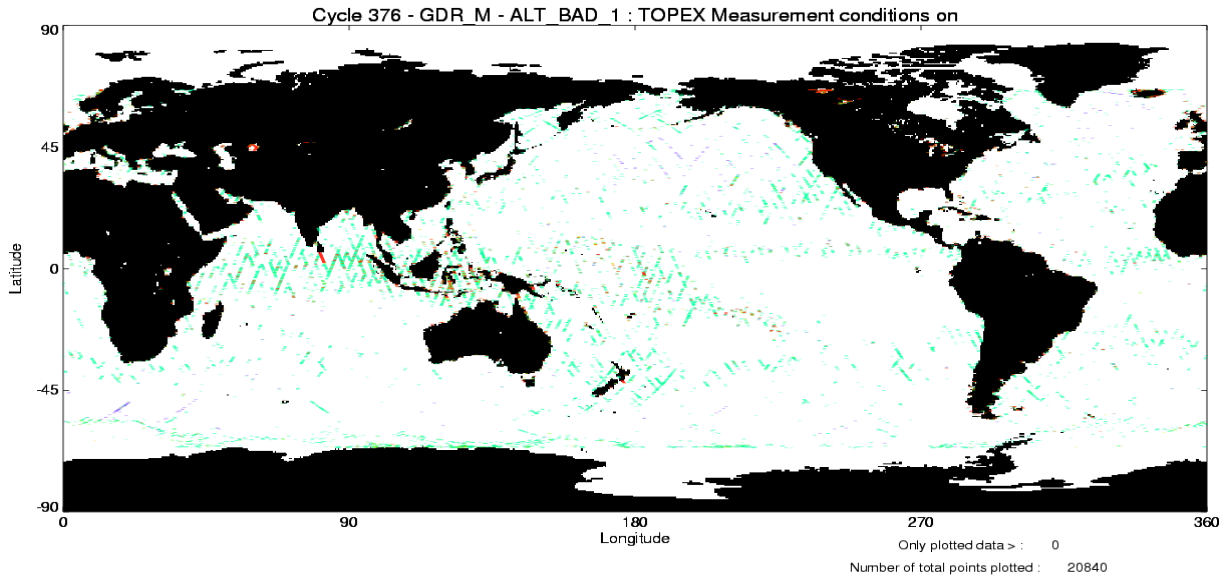


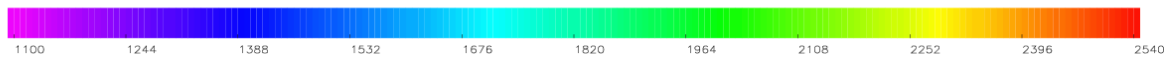
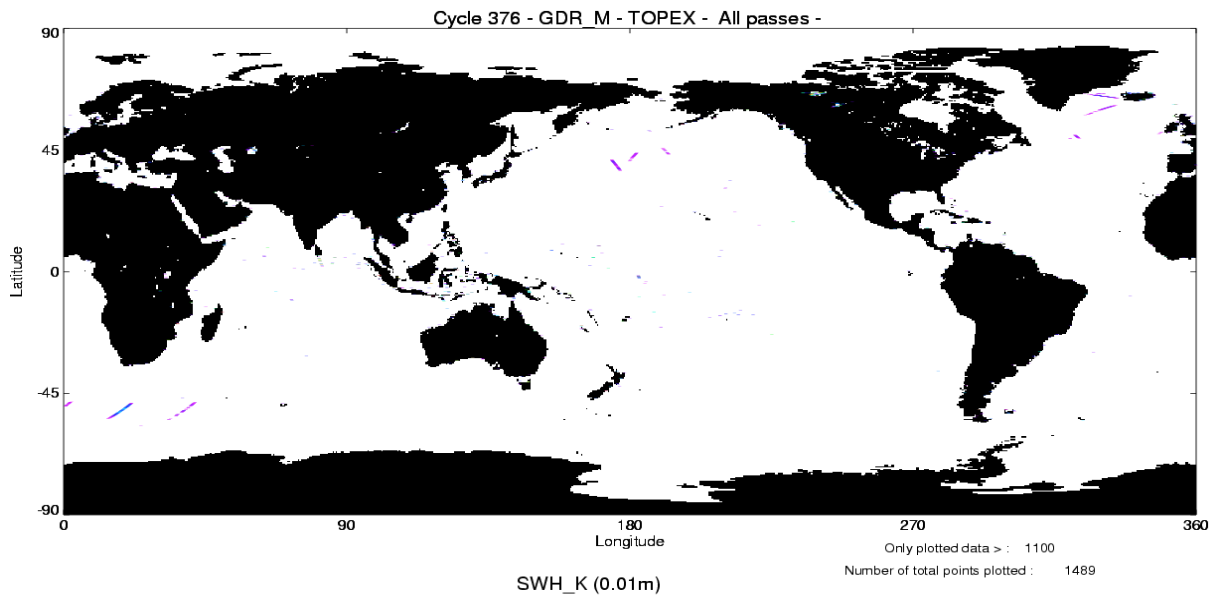
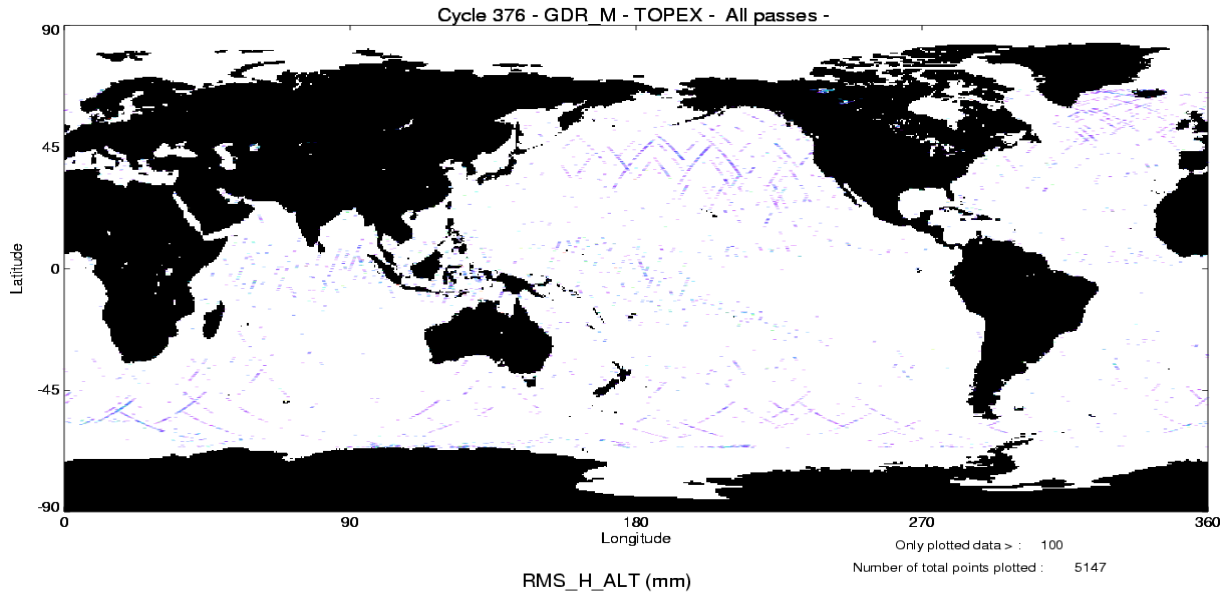
Cycle 376 – GDR_M – TOPEX – All passes –

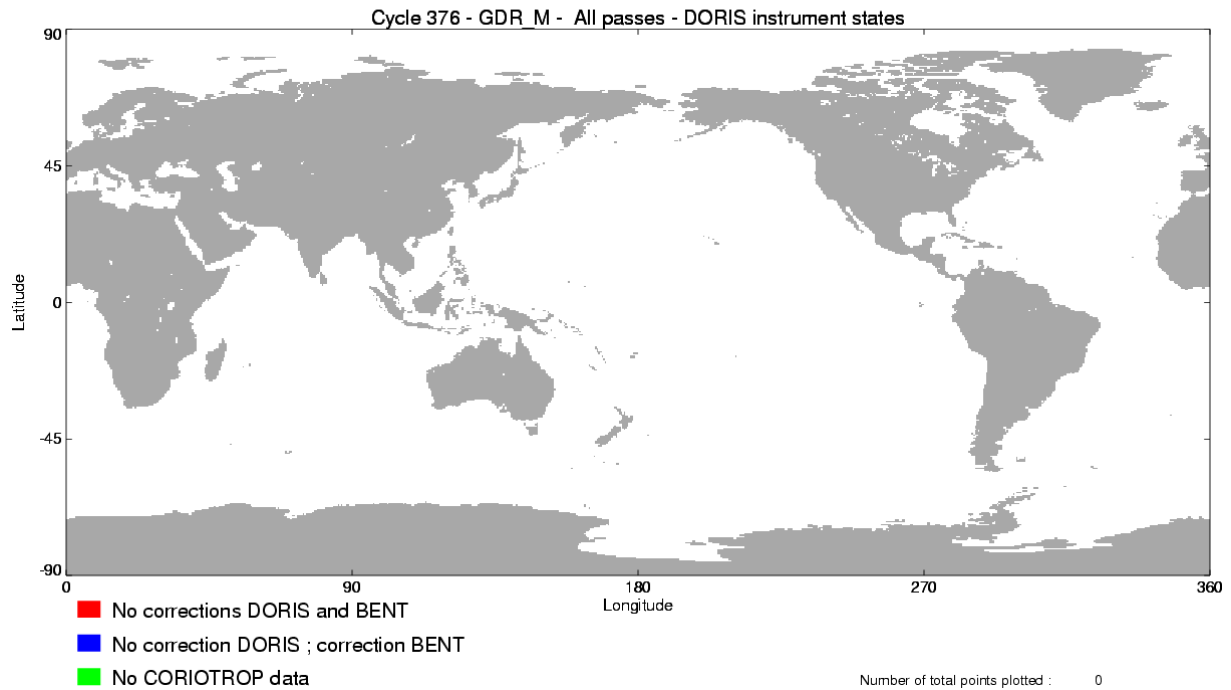


Cycle 376 – GDR_M – TOPEX – All passes –









3.4 Editing

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

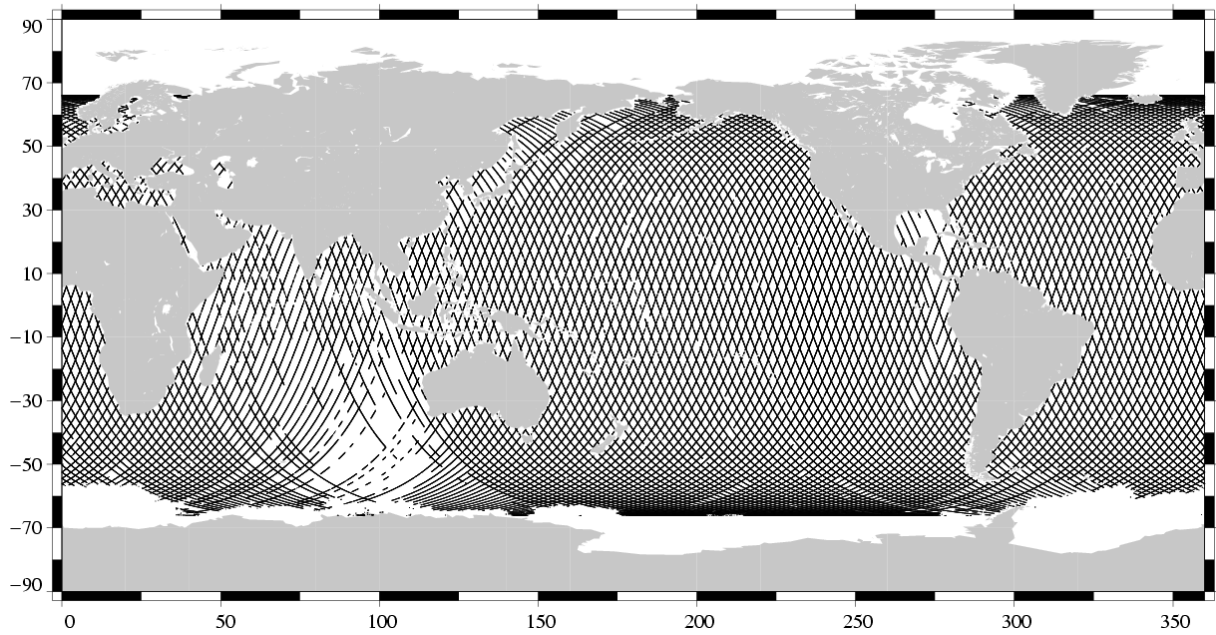
As a comparison, the mean percentage over one year (1997) is also given.

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 absolute value of the difference between the TMR and the ECMWF wet tropospheric corrections is greater than 20 cm.

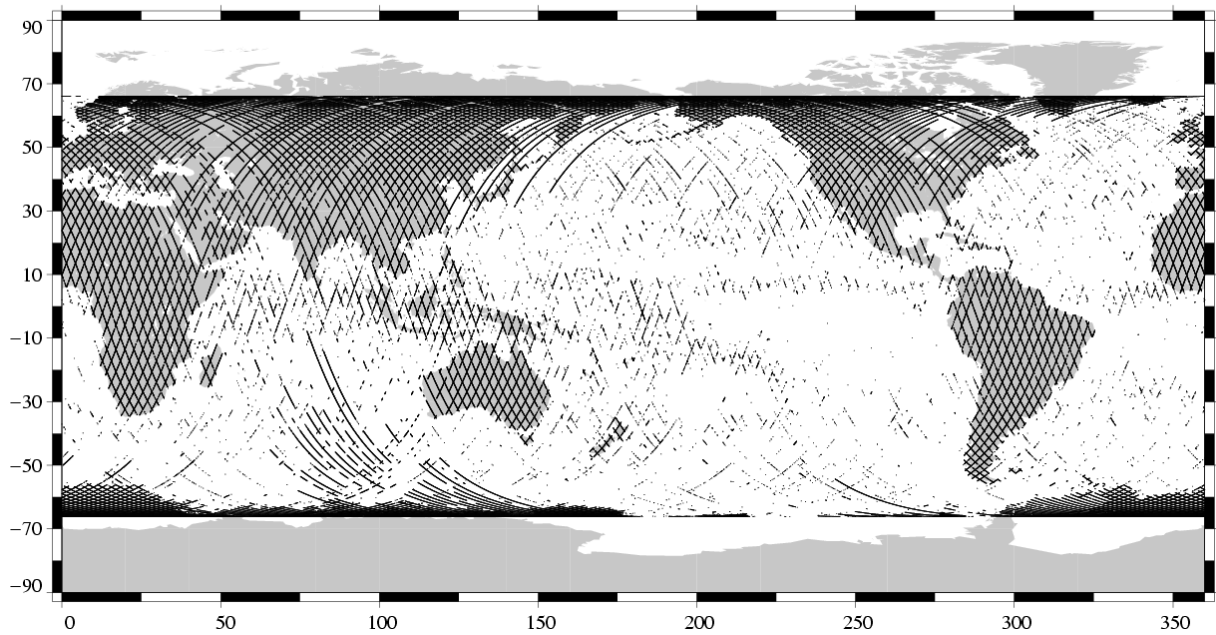
Parameters	Min Thres.	Max Thres.	Unit	Mean % removed in 1997	% removed
Sea surface height	-130.000	100.000	m	1.37	0.61
Number of 20/10Hz valid points Poseidon/TOPEX	5.000	-		1.37	1.09
Std. deviation of range	0.000	0.100	m	1.85	2.08
Off nadir angle from waveform	0.000	0.400	deg	1.36	4.14
Dry tropospheric 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	4.72
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	0.53
Sea state Bias	-0.500	0.000	m	1.39	0.72
Backscatter coefficient	7.000	30.000	dB	1.44	0.66
Ocean tide height	-5.000	5.000	m	0.01	0.99
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	-20.000	20.000	m	NaN	1.02
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.

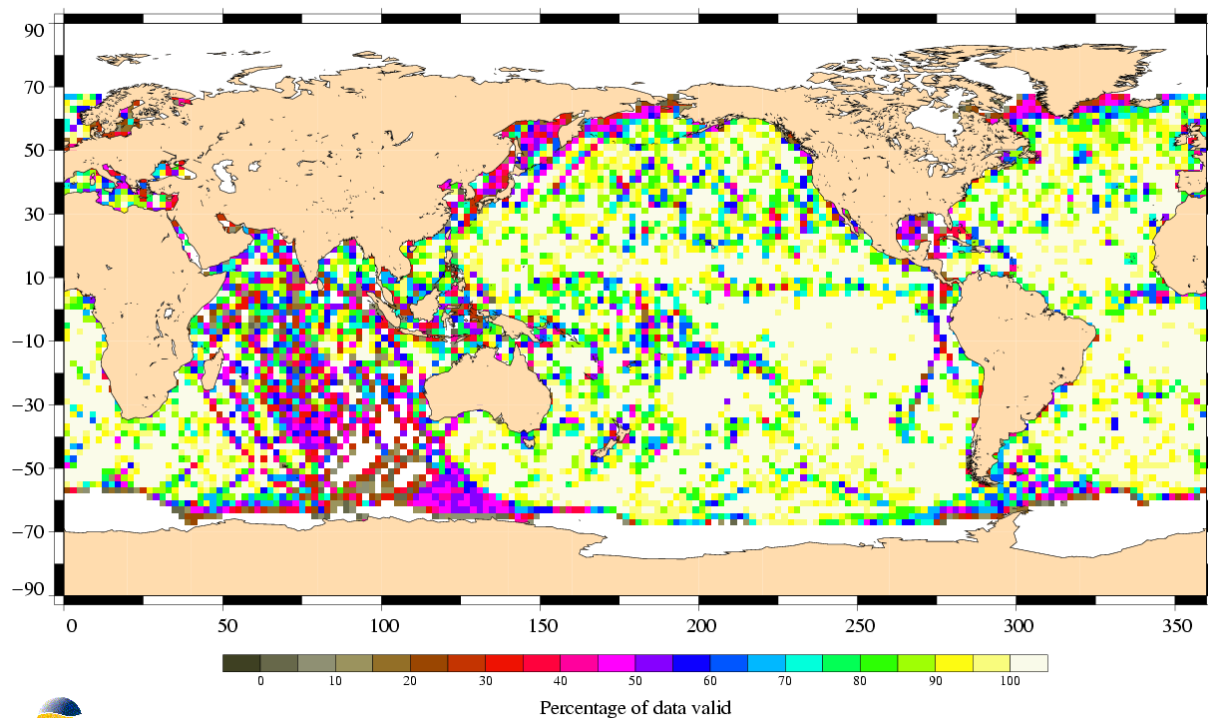
Valid data
TOPEX/Poseidon Cycle 376 (28/11/2002 / 08/12/2002)



Edited measurements
TOPEX Cycle 376 (28/11/2002 / 08/12/2002)

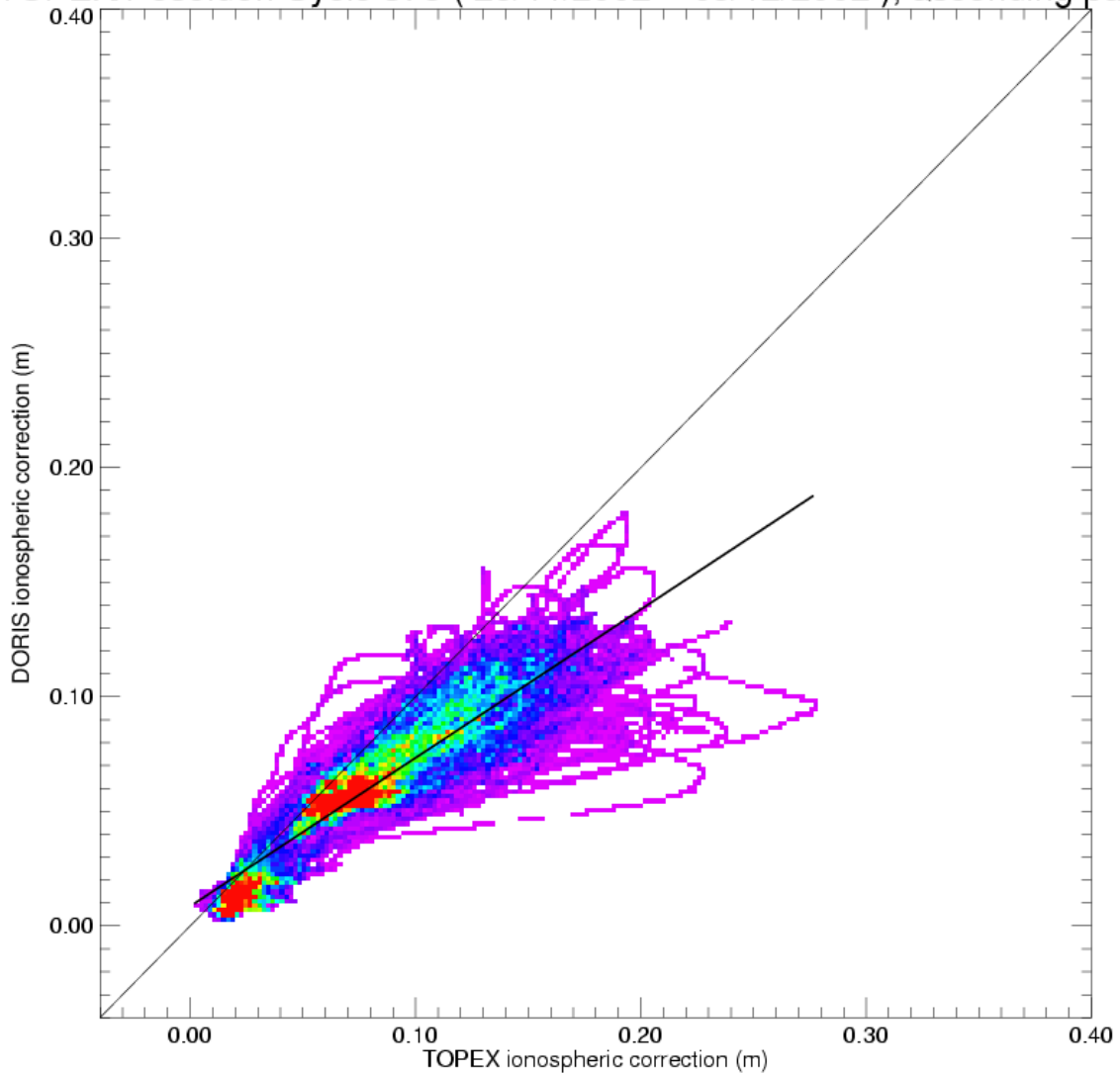


Percentage of valid data relative to the nominal pass
TOPEX/Poseidon Cycle 376 (28/11/2002 / 08/12/2002)

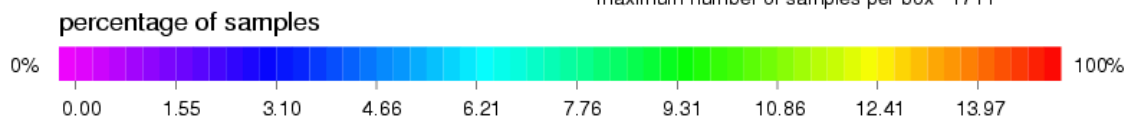


3.5 Ionospheric correction

TOPEX/Poseidon Cycle 376 (28/11/2002 – 08/12/2002), ascending passes



minimum number of samples per box 1
maximum number of samples per box 1711



Statistics Y-X

mean = -0.02083
rms = 0.02932
std = 0.02063

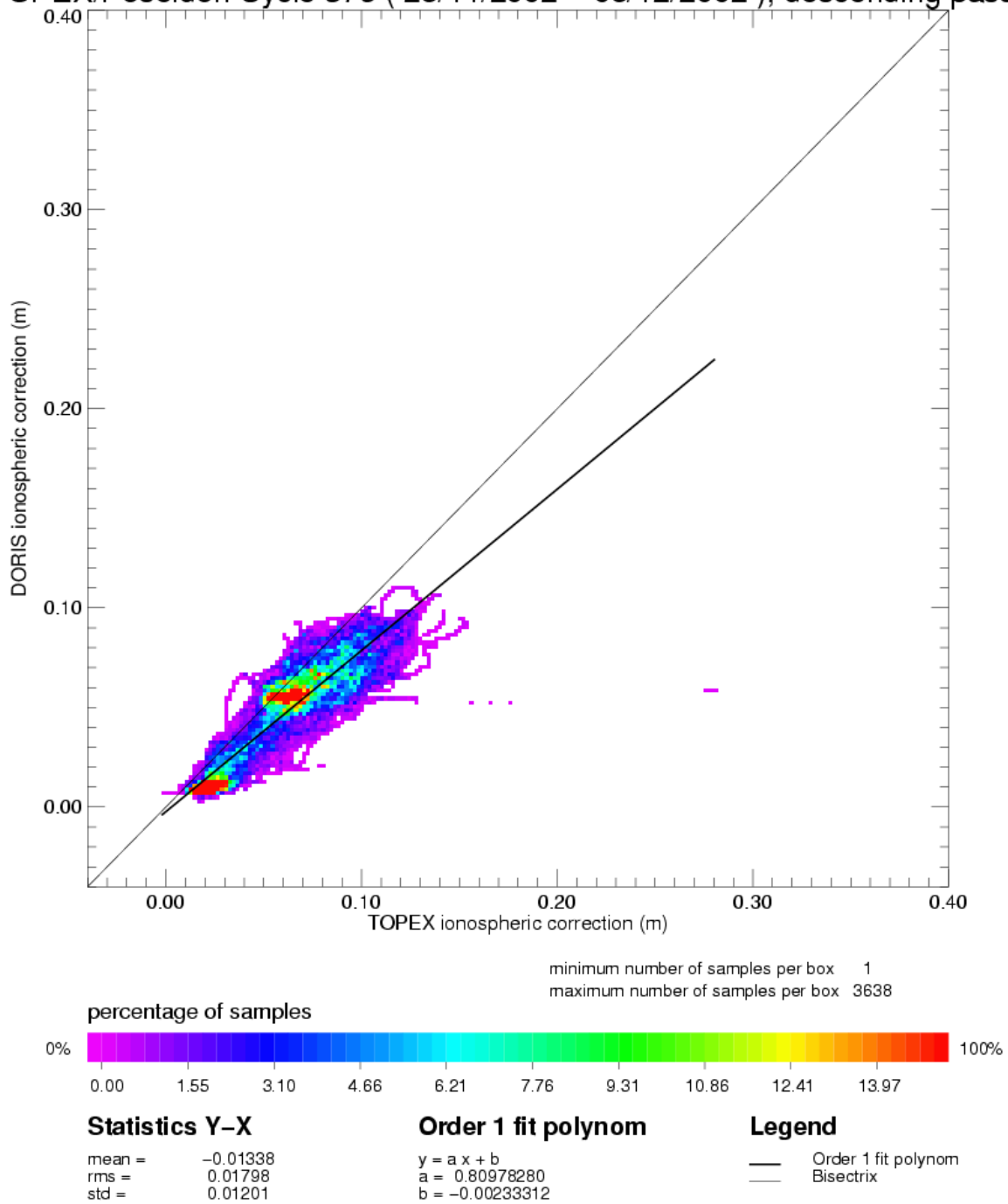
Order 1 fit polynomial

$y = a x + b$
a = 0.64787287
b = 0.00855723

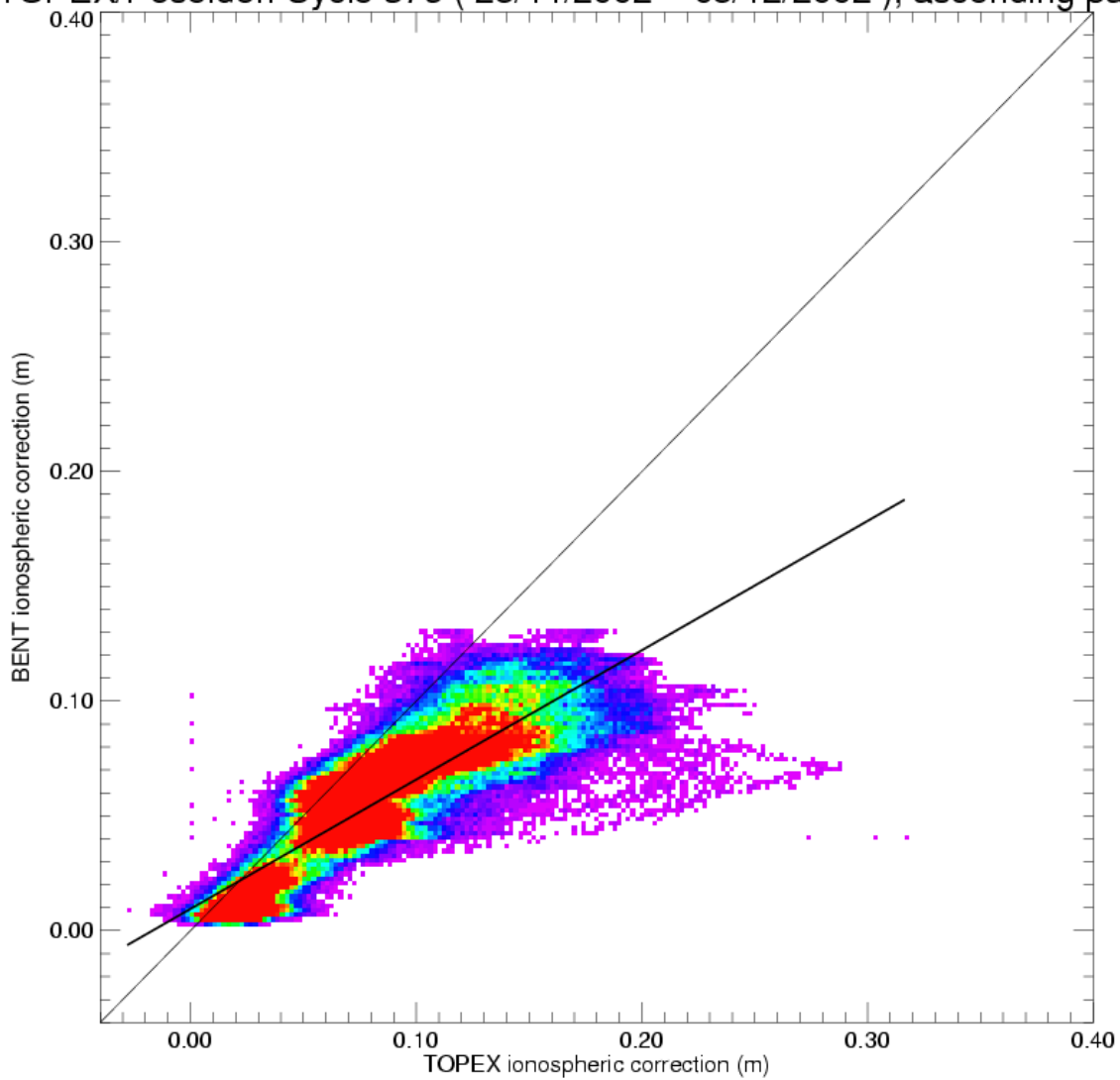
Legend

— Order 1 fit polynomial
— Bisectrix

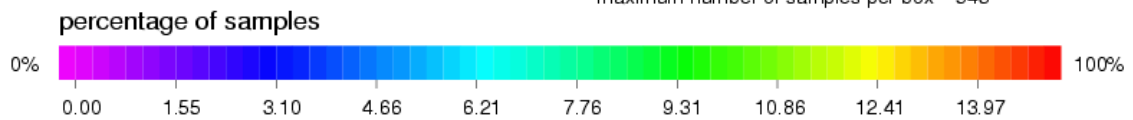
TOPEX/Poseidon Cycle 376 (28/11/2002 – 08/12/2002), descending passes



TOPEX/Poseidon Cycle 376 (28/11/2002 – 08/12/2002), ascending passes



minimum number of samples per box 1
 maximum number of samples per box 543



Statistics Y-X

mean = -0.02715
 rms = 0.03632
 std = 0.02413

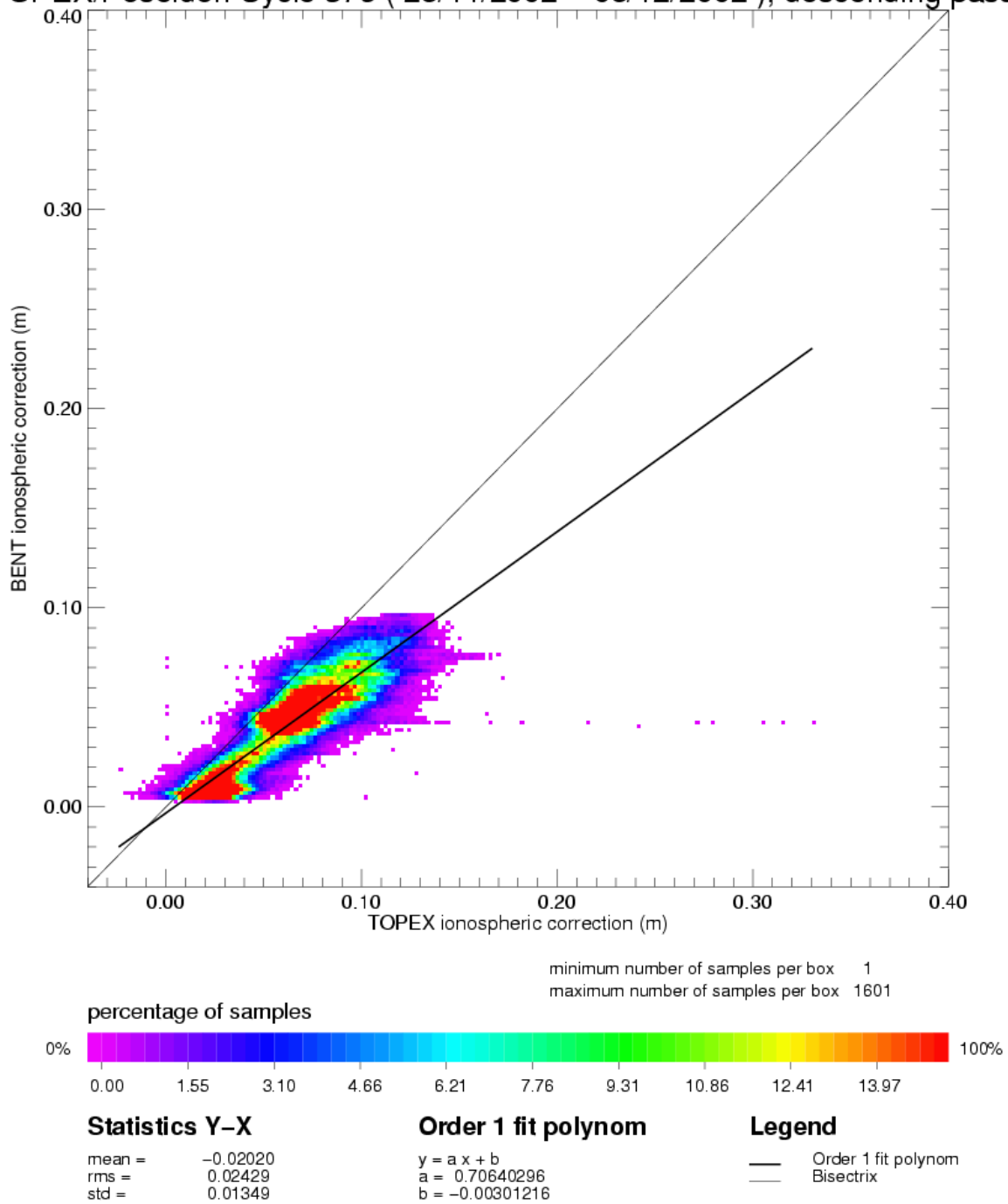
Order 1 fit polynom

$y = a x + b$
 $a = 0.56331176$
 $b = 0.00949107$

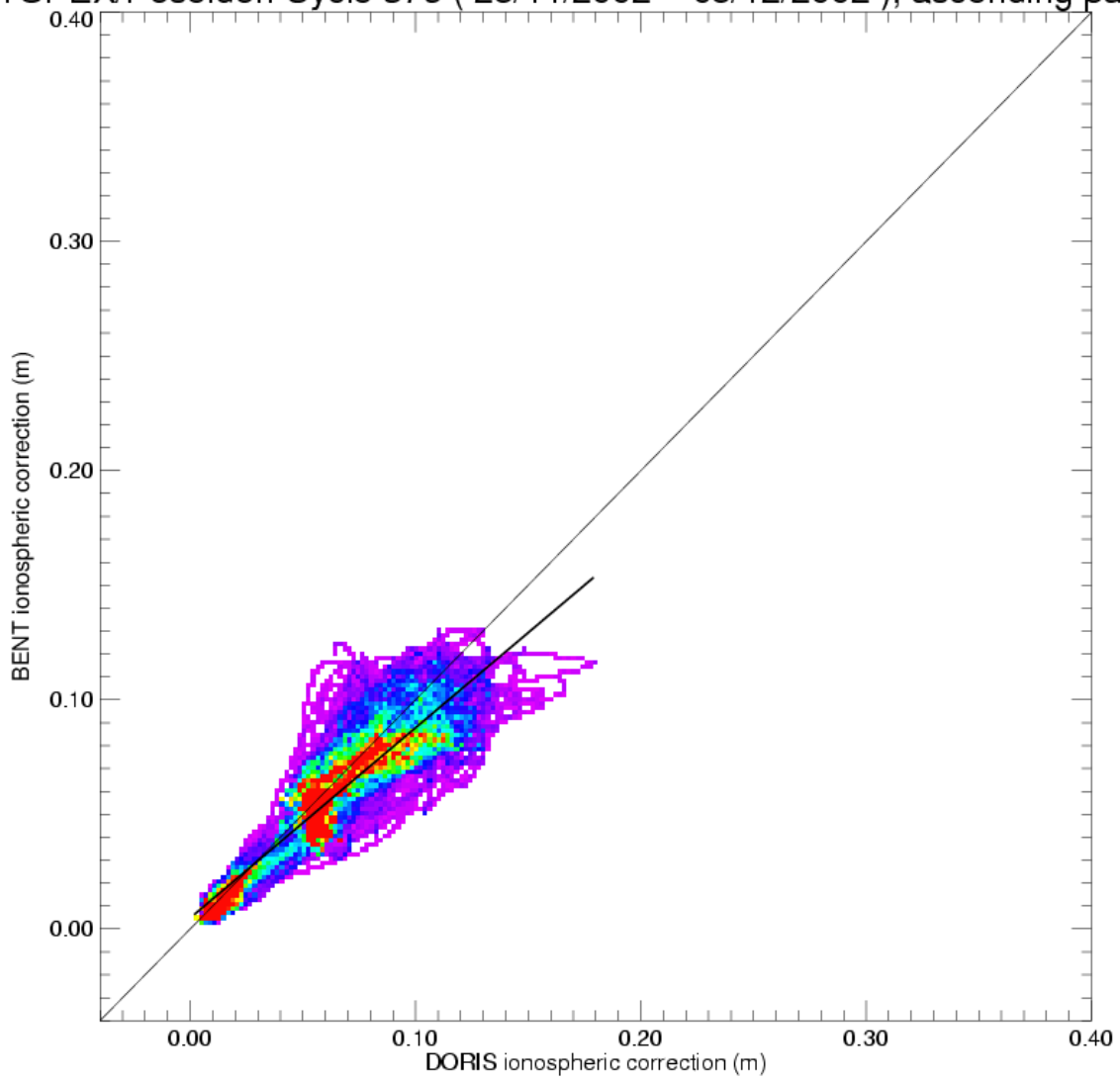
Legend

— Order 1 fit polynom
 - - - Bisectrix

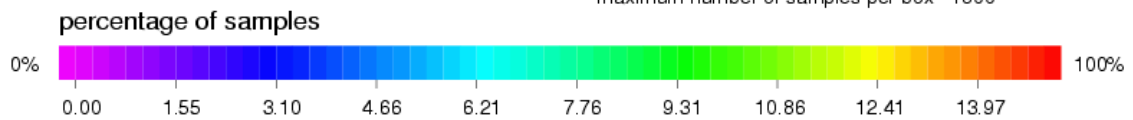
TOPEX/Poseidon Cycle 376 (28/11/2002 – 08/12/2002), descending passes



TOPEX/Poseidon Cycle 376 (28/11/2002 – 08/12/2002), ascending passes



minimum number of samples per box 1
 maximum number of samples per box 1800



Statistics Y-X

mean = -0.00586
 rms = 0.01448
 std = 0.01325

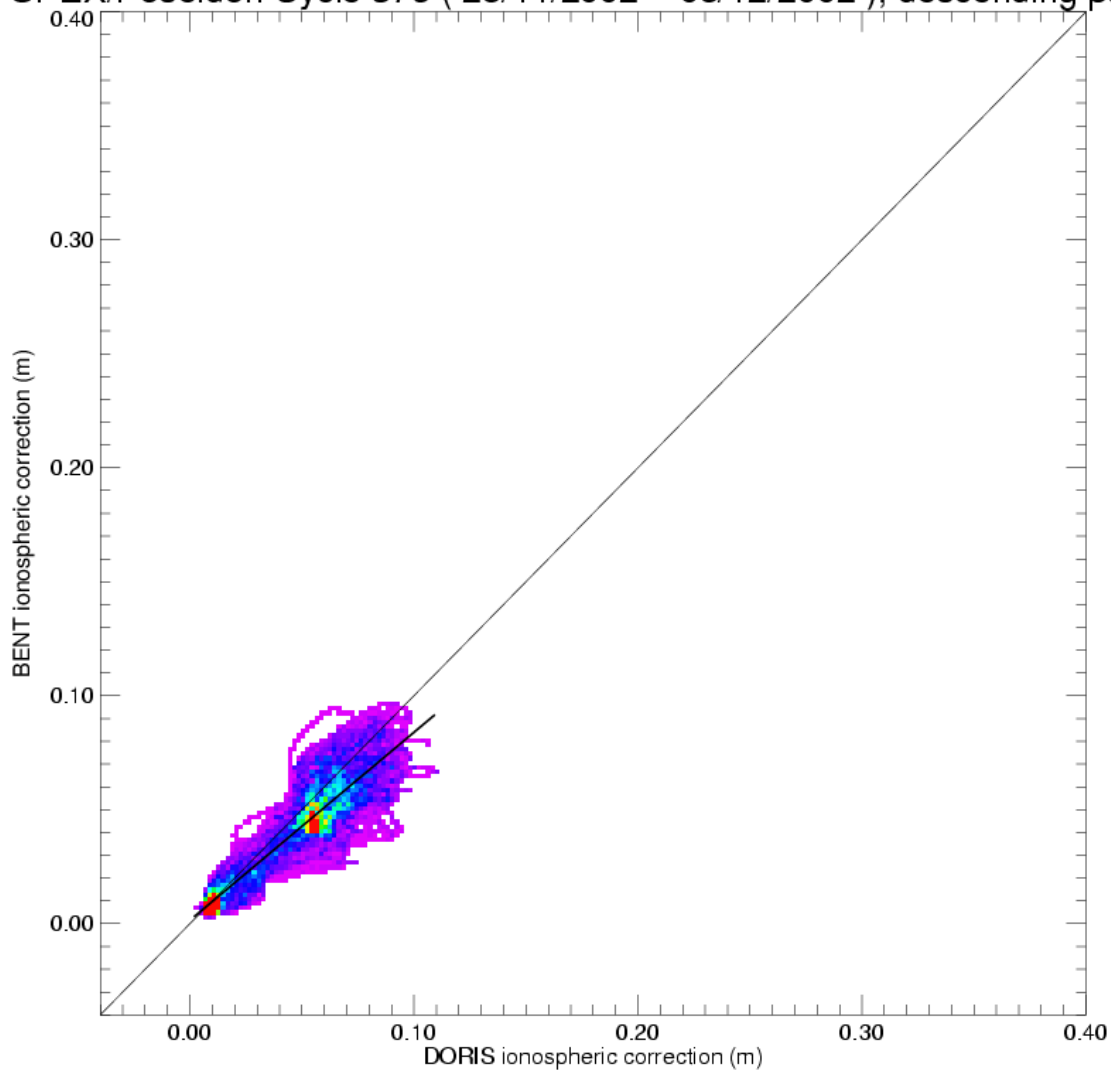
Order 1 fit polynom

$y = a x + b$
 $a = 0.83002204$
 $b = 0.00478754$

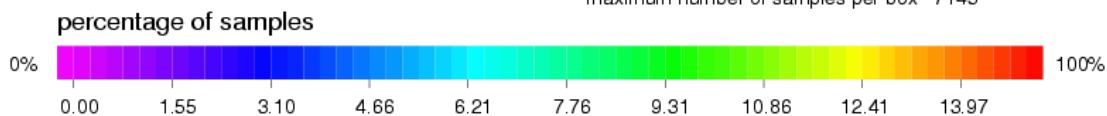
Legend

— Order 1 fit polynom
 — Bisectrix

TOPEX/Poseidon Cycle 376 (28/11/2002 – 08/12/2002), descending passes



minimum number of samples per box 1
 maximum number of samples per box 7145



Statistics Y-X

mean = -0.00635
 rms = 0.01241
 std = 0.01065

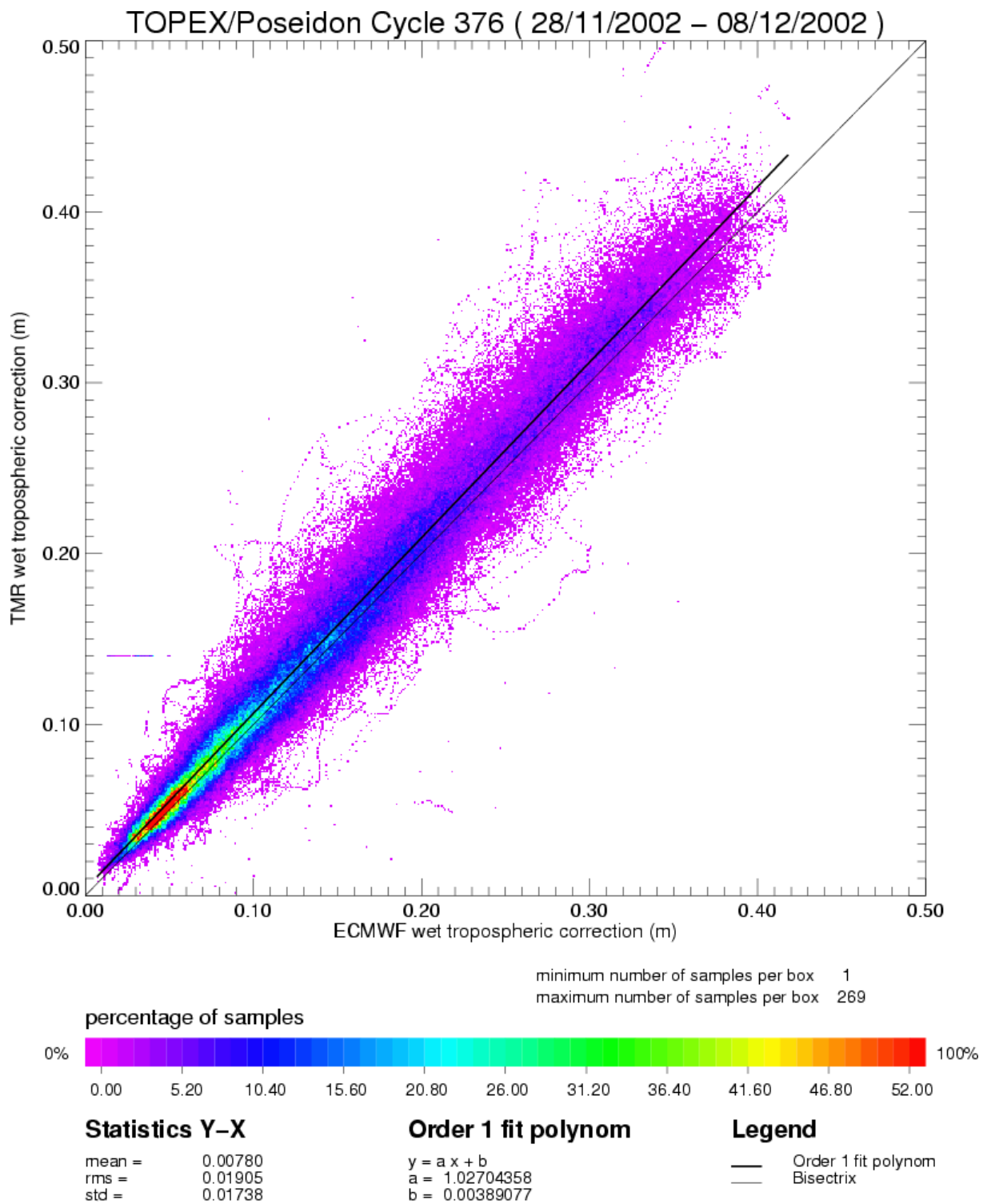
Order 1 fit polynom

$y = a x + b$
 $a = 0.82464272$
 $b = 0.00148342$

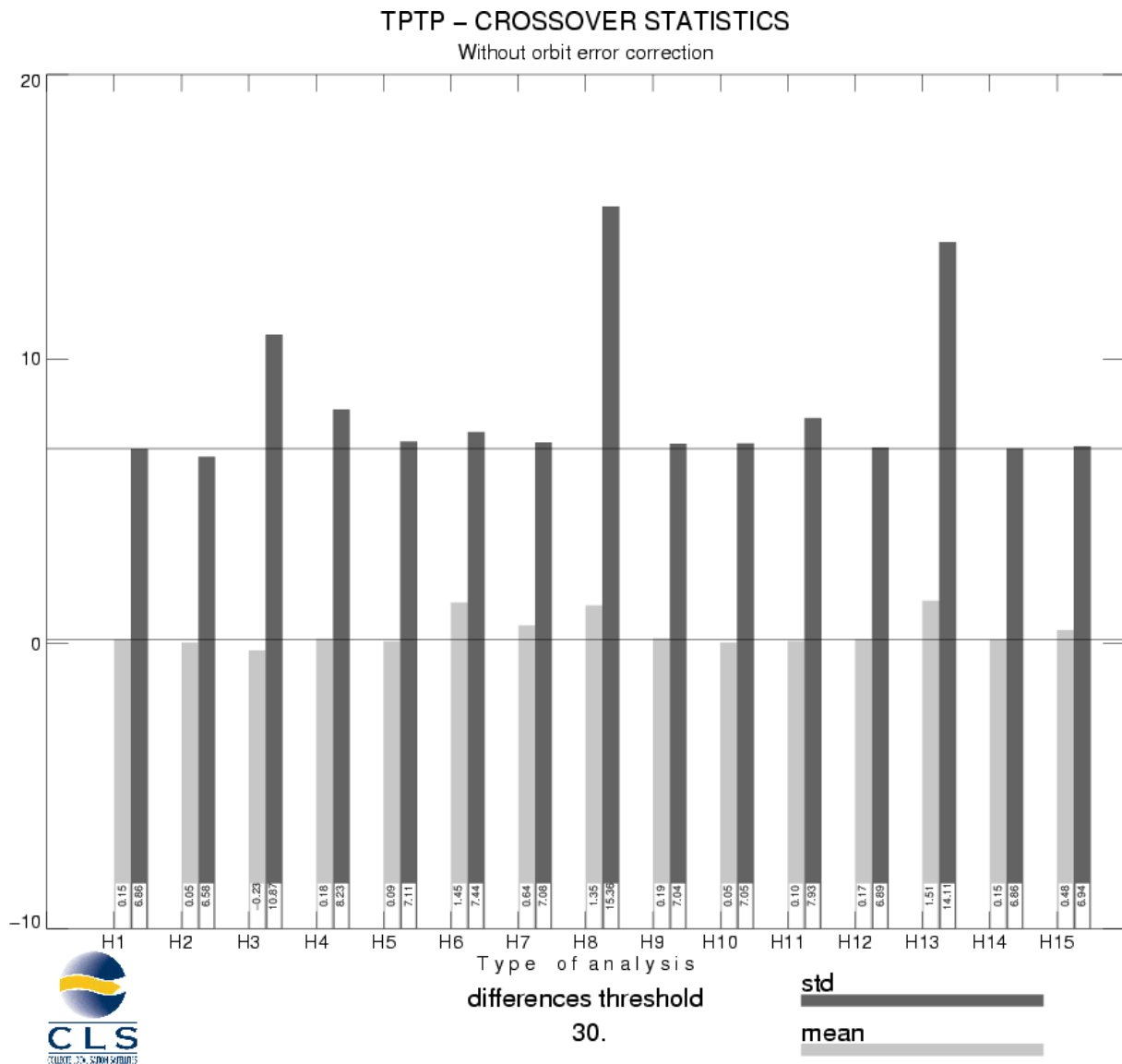
Legend

— 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

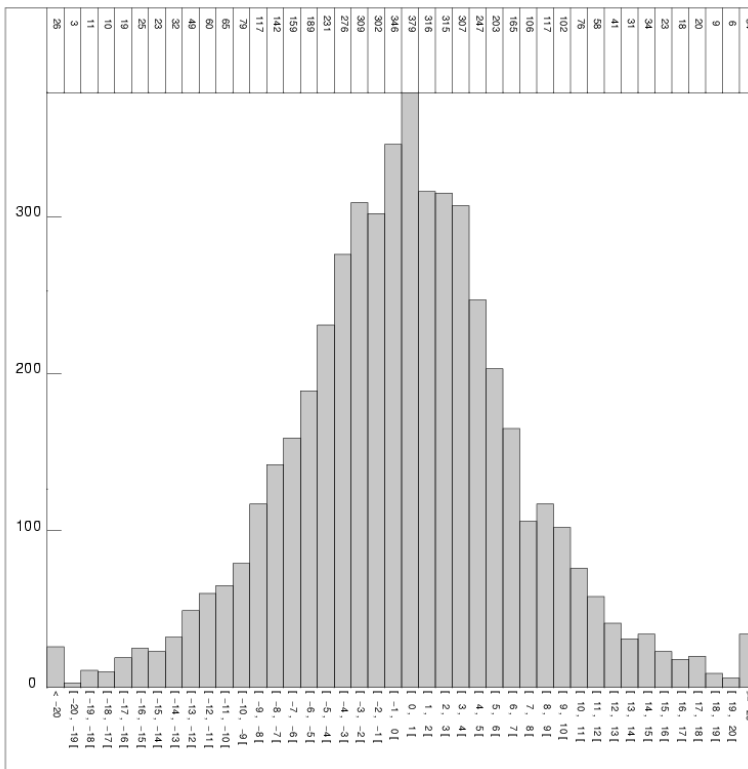
Type de points de croisement: TPTP
 Zone géographique (deg): -90 / 90 , 0 / 360
 Seuil sur les écarts d'analyse 0.00 (moy)
 30.00 (seuil)
 Selection(s) sur les champs :
 CL Arc 1 :=INTERP_SPLN
 CL Arc 2 :=INTERP_SPLN
 Seuil Min +: 0.0000000
 Seuil Max : 0.0000000

Selection(s) sur les écarts :
 Aucune

RESULTATS STATISTIQUES

Valeur minimale : -28.4900
 Valeur maximale : 29.6100
 Différence Max – Min: 58.1000
 Nombre de points lus: 5192
 Nombre de points sélectionnés: 5081
 Moyenne : 0.154511
 Ecart-type : 6.85690
 Moyenne Quadratique : 6.85864

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TPTP – CROSSOVER STATISTICS

With orbit error correction

SSH = Corrected sea surface height

RAPPEL DES SELECTIONS

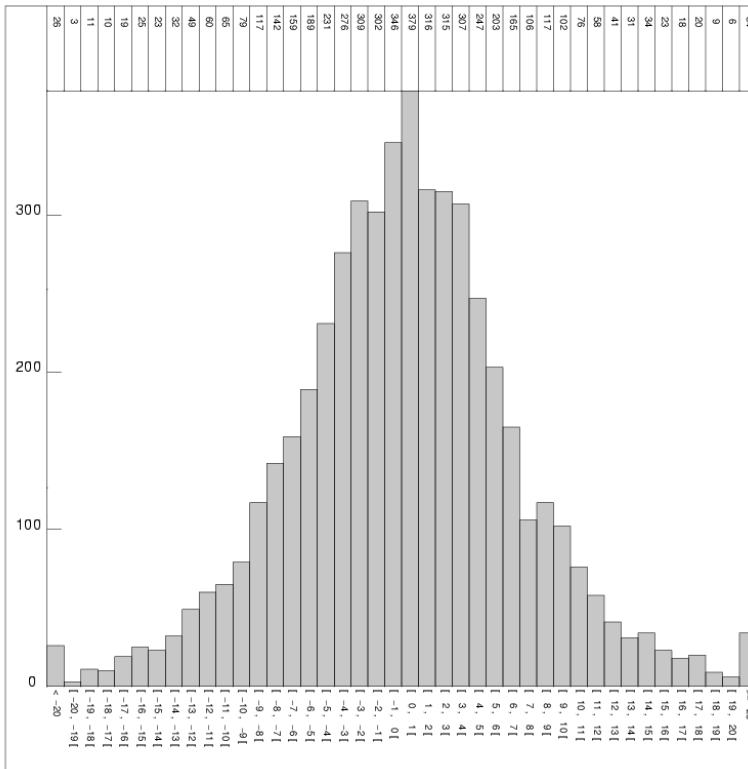
Type de points de croisement: TPTP
 Zone géographique (deg): -90 / 90 , 0 / 360
 Seuil sur les écarts d'analyse 0.00 (moy)
 30.00 (seuil)
 Selection(s) sur les champs :
 CL Arc 1 :=INTERP_SPLN
 CL Arc 2 :=INTERP_SPLN
 Seuil Min +: 0.0000000
 Seuil Max : 0.0000000

Selection(s) sur les écarts :
 Aucune

RESULTATS STATISTIQUES

Valeur minimale : -28.4900
 Valeur maximale : 29.6100
 Différence Max – Min: 58.1000
 Nombre de points lus: 5192
 Nombre de points sélectionnés: 5081
 Moyenne : 0.154511
 Ecart-type : 6.85690
 Moyenne Quadratique : 6.85864

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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

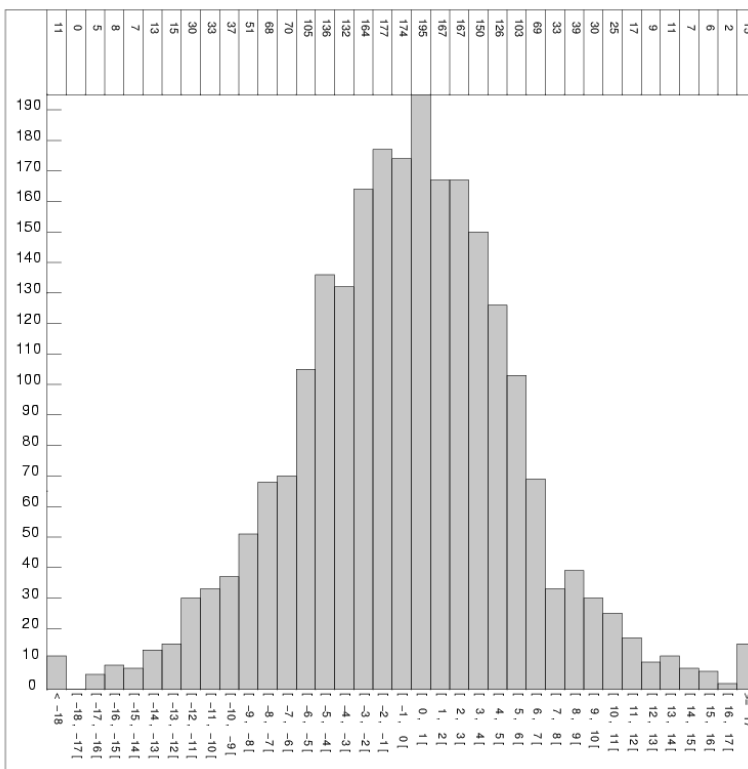
RAPPEL DES SELECTIONS

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 : -33.1800
 Valeur maximale : 64.9900
 Différence Max – Min: 98.1700
 Nombre de points lus: 2638
 Nombre de points selectionnes: 2407
 Moyenne : -0.302385
 Ecart-type : 6.07868
 Moyenne Quadratique : 6.08619

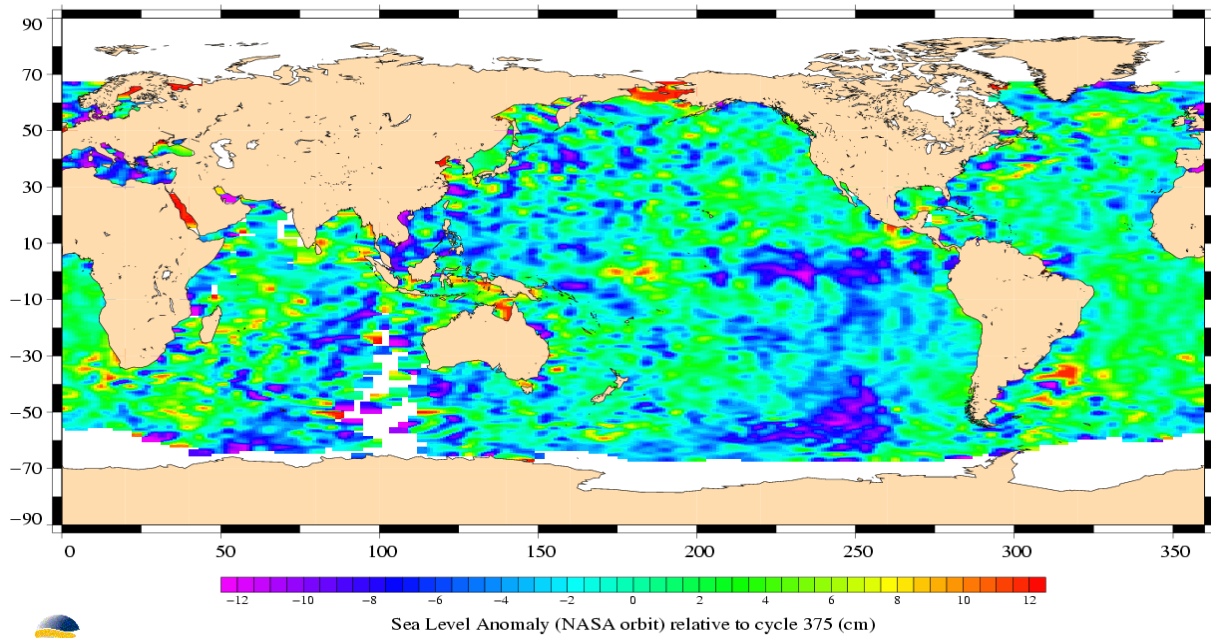
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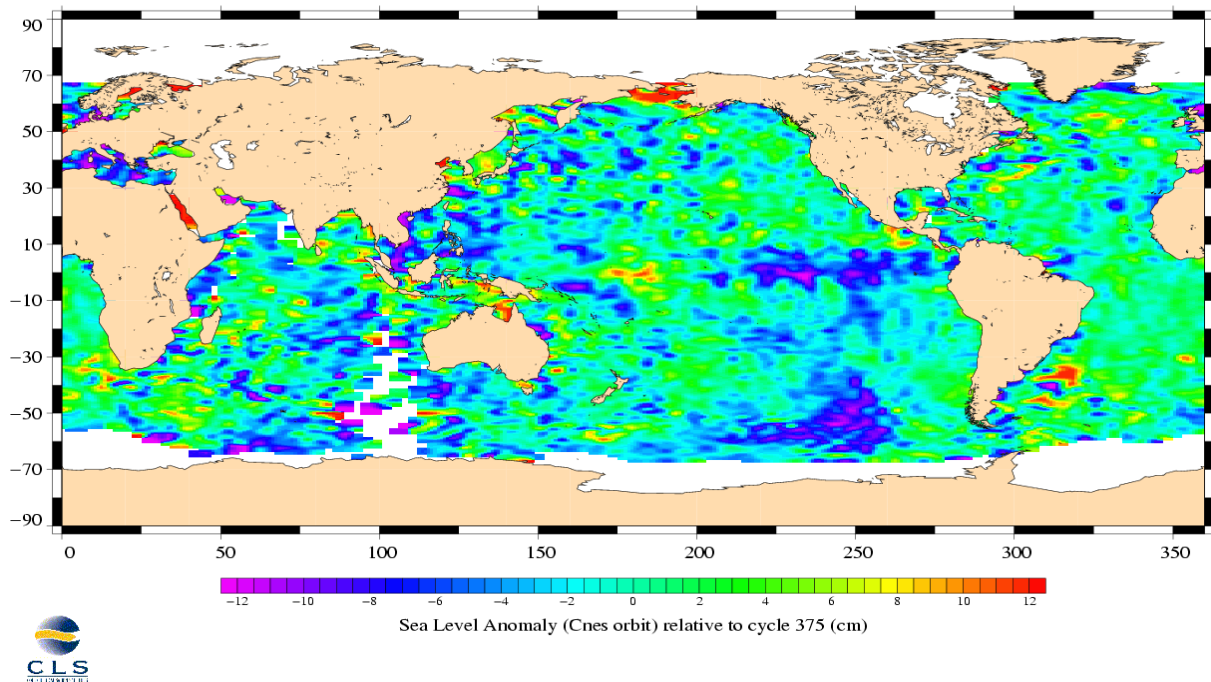
3.8 SSH variability

3.8.1 Sea Level Anomaly

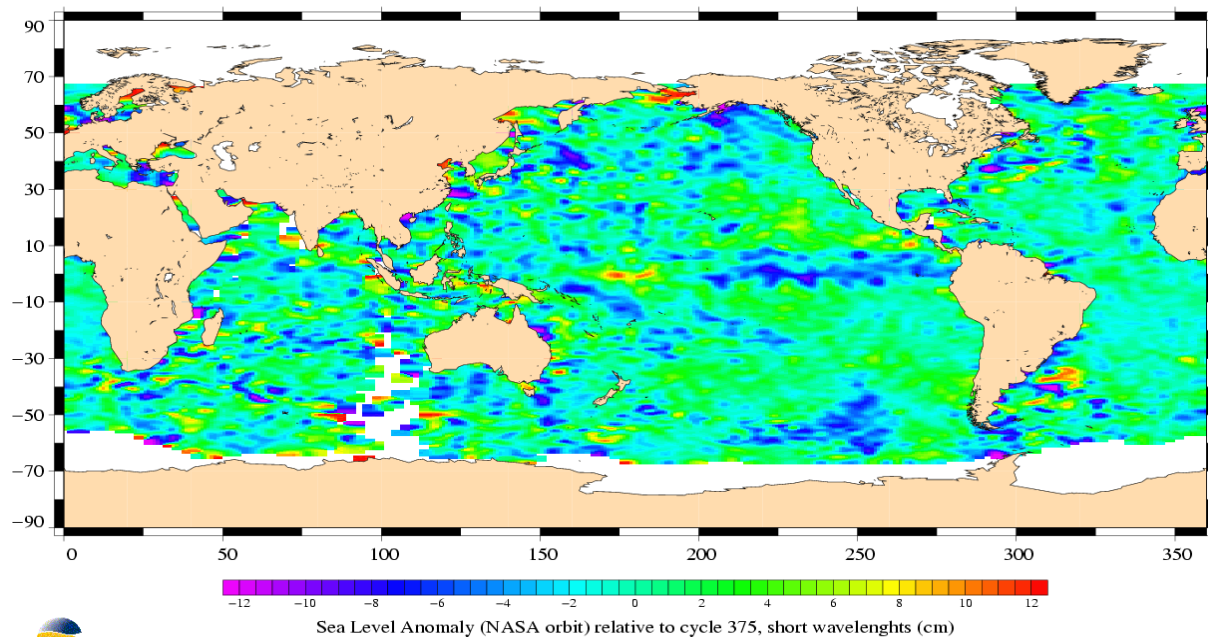
TOPEX/Poseidon, cycle 376
Period : 28/11/2002 – 08/12/2002



TOPEX/Poseidon, cycle 376
Period : 28/11/2002 – 08/12/2002



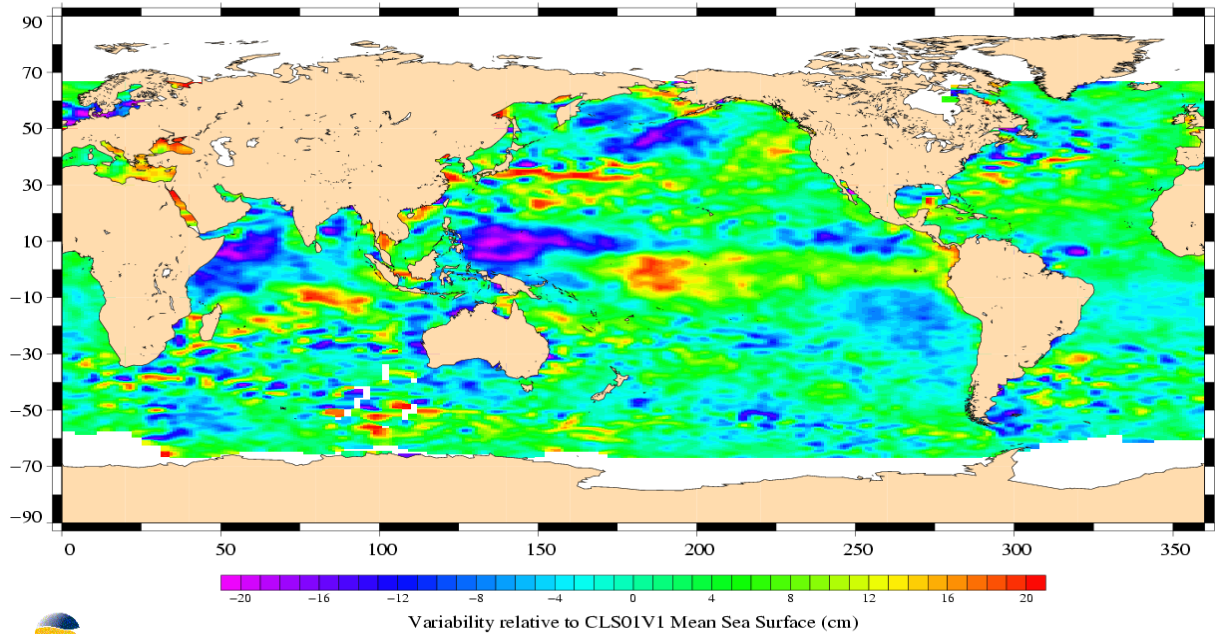
TOPEX/Poseidon, cycle 376
Period : 28/11/2002 – 08/12/2002



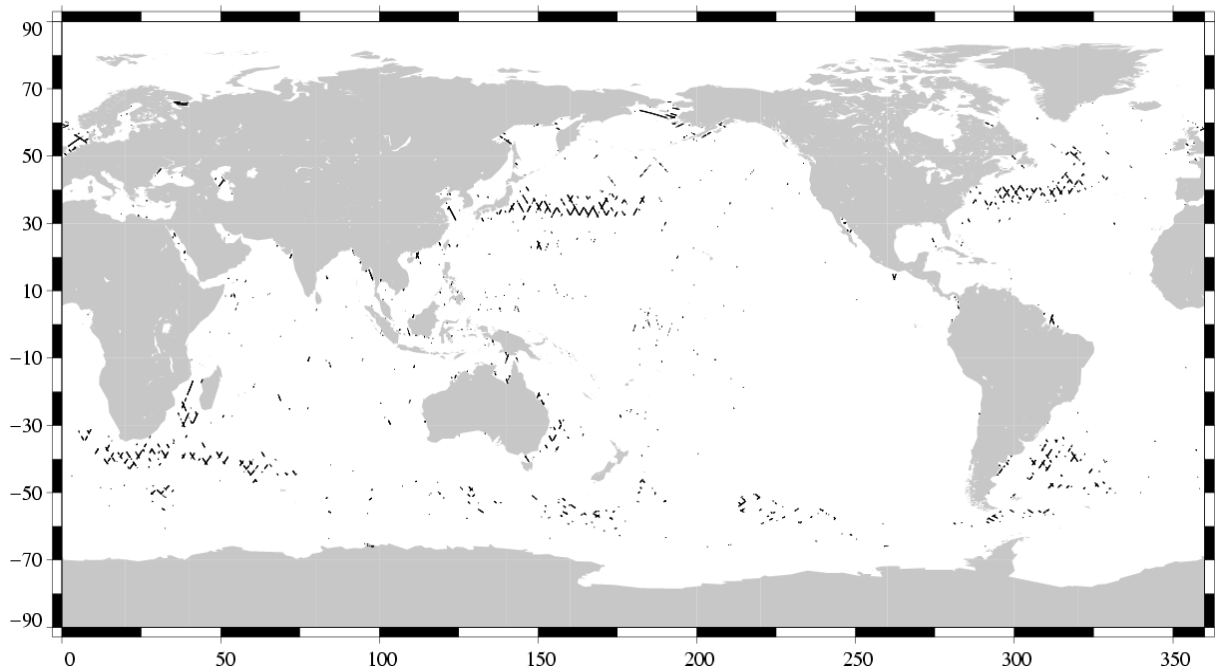
3.8.2 Comparison to a precise Mean Sea Surface

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 376
Period : 28/11/2002 – 08/12/2002

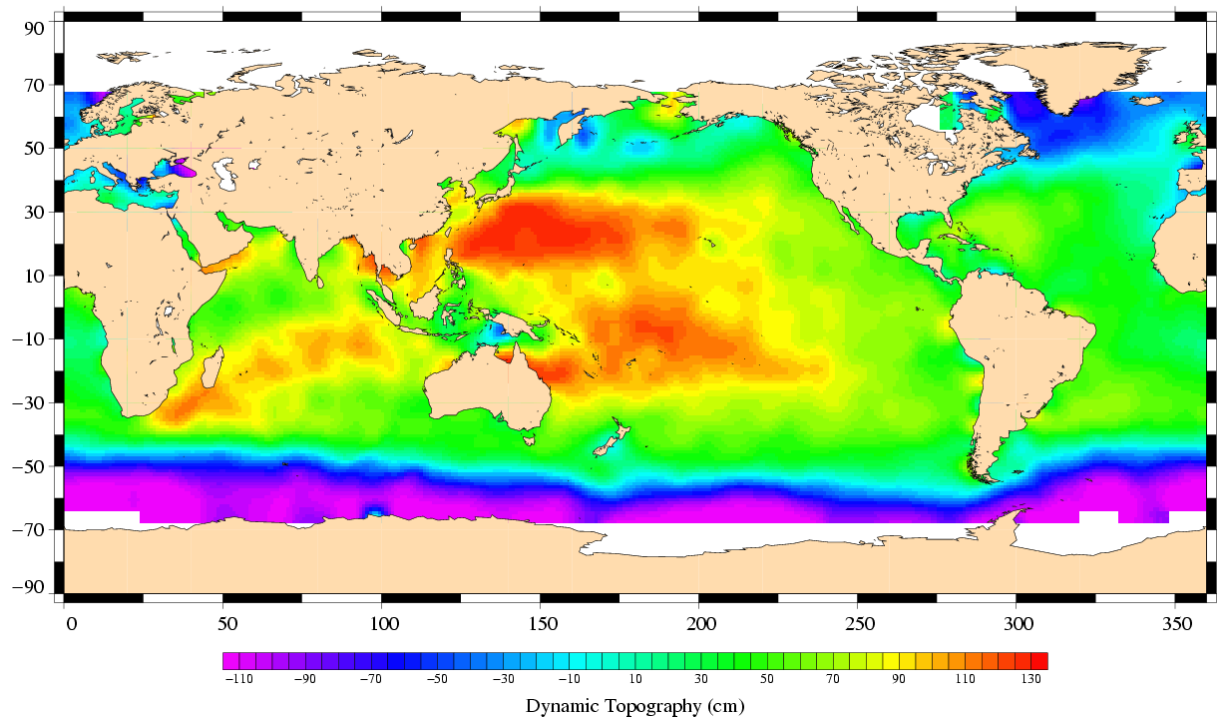


(SSH – MSS) differences greater than 0.3 m
TOPEX/Poseidon Cycle 376 (28/11/2002 / 08/12/2002)



3.9 Dynamic topography

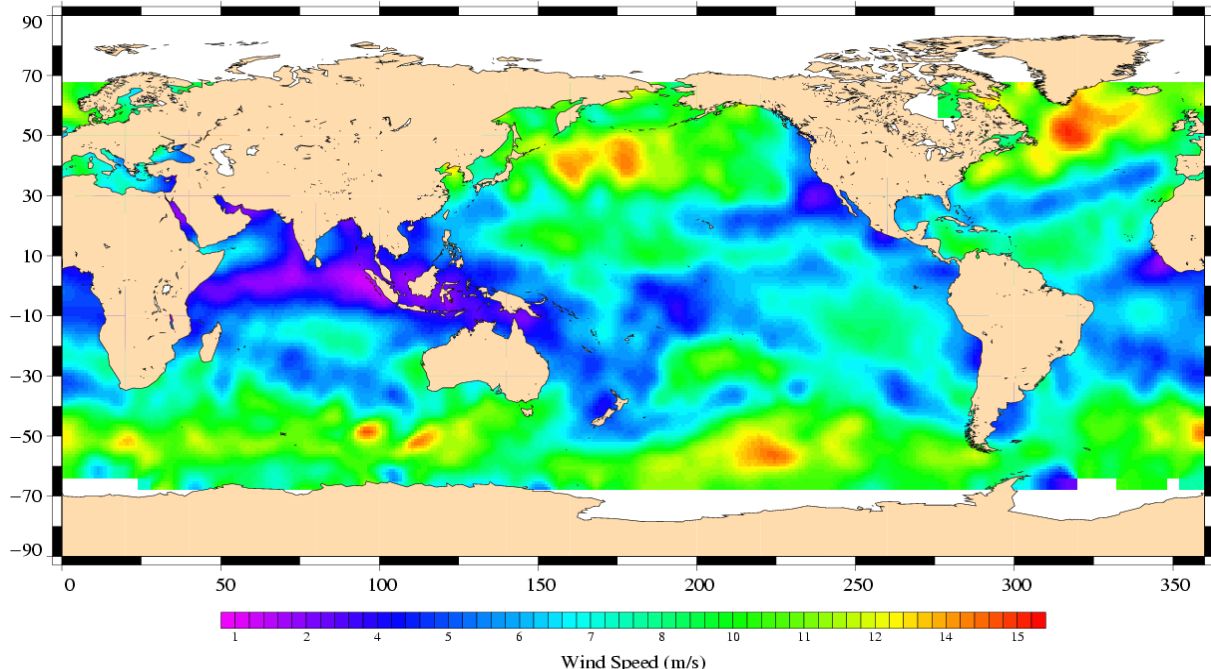
TOPEX/Poseidon, cycle 376
Period : 28/11/2002 – 08/12/2002



3.10 Wind and wave maps

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

TOPEX/Poseidon, cycle 376
Period : 28/11/2002 – 08/12/2002



TOPEX/Poseidon, cycle 376
Period : 28/11/2002 – 08/12/2002

