



TOPEX/Poseidon MGRD Quality Assessment Report

Cycle 377

08-12-2002 18-12-2002

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SALP-RP-P2-EX-21120-CLS377

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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

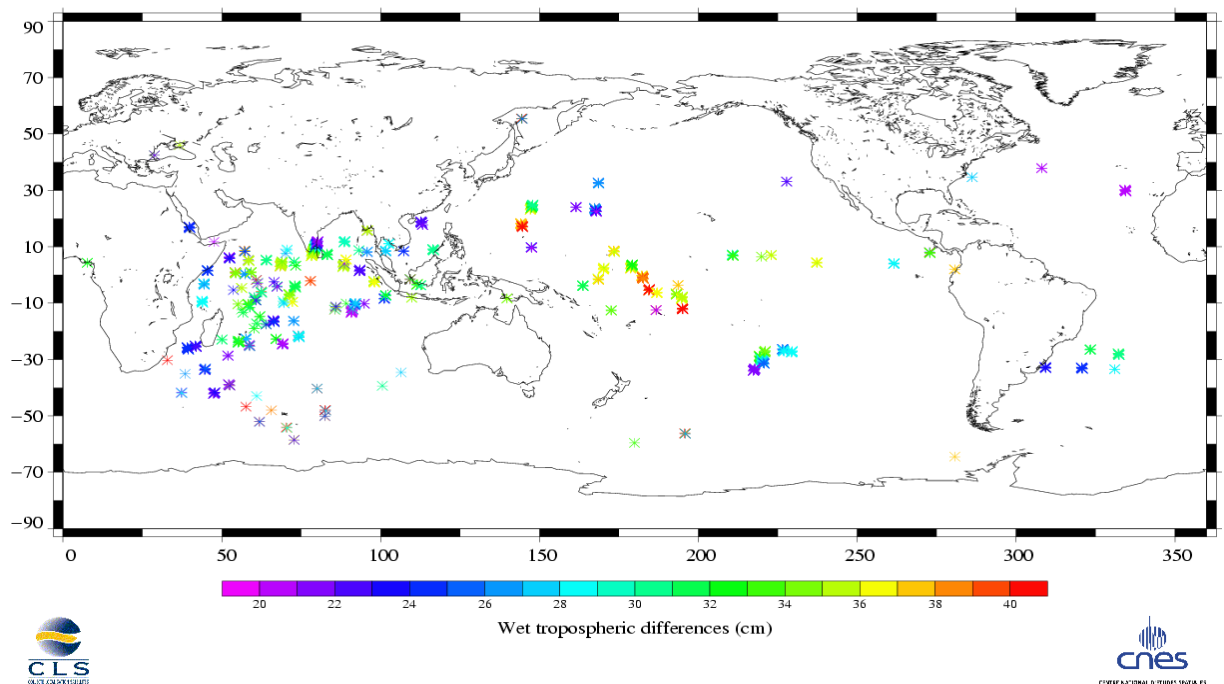
2.1 Cycle quality and performances

Data quality for this cycle appears to be nominal. For this cycle, the crossover standard deviation is 5.93 cm rms, and the standard deviation of Sea Level Anomalies (SLA) relative to a Mean Sea Surface is 9.64 cm.

2.2 Warnings and recommendations

- Missing measurements :
Pass 254 is missing due to an Orbit Maintenance Maneuver #23 (OMM-23). This is the first OMM for Topex/POSEIDON since moving to the new ground track in Summer 2002.
- 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 3.62% of the measurements are removed by the TMR correction criterion.
- Editing measurements (b) :
A new criterion has been added in the editing procedure since 376 (See [Editing](#)). The measurements removed by this criterion for the current cycle are plotted on the following figure.

Edited parameter : Radiometer and ECMWF wet tropospheric differences
T/P Cycle 377 (08/12/2002 / 18/12/2002)



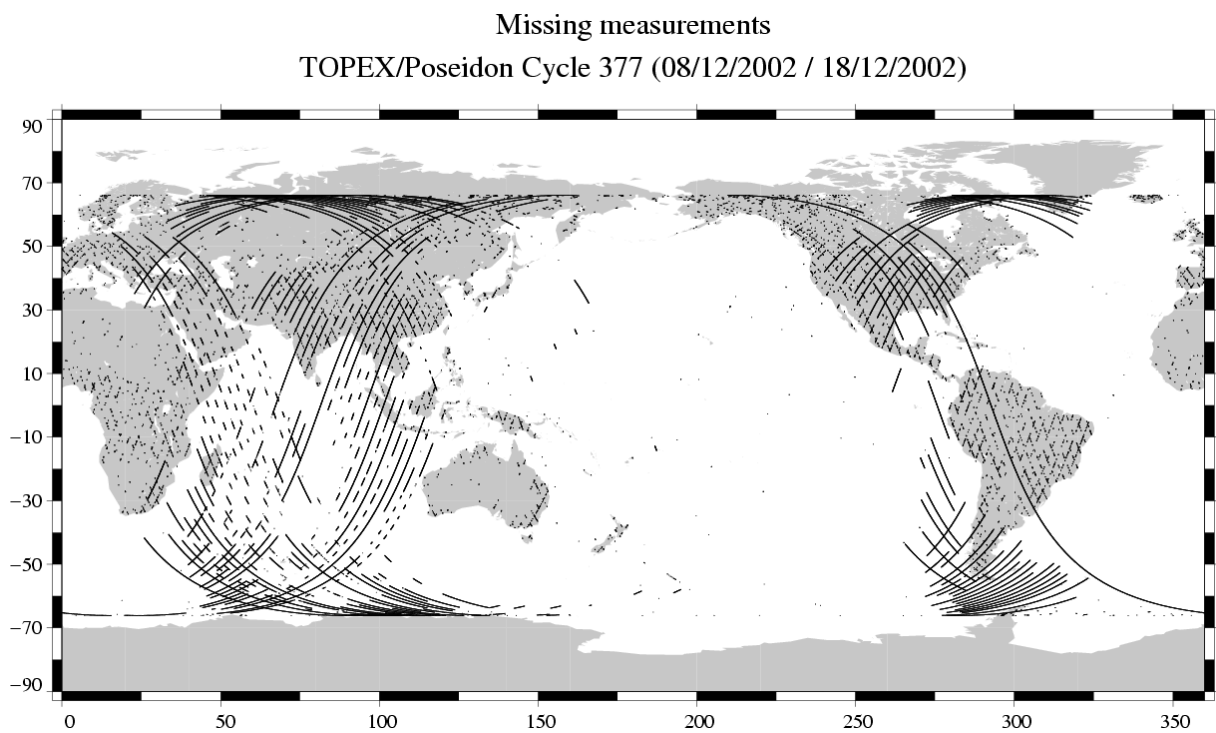
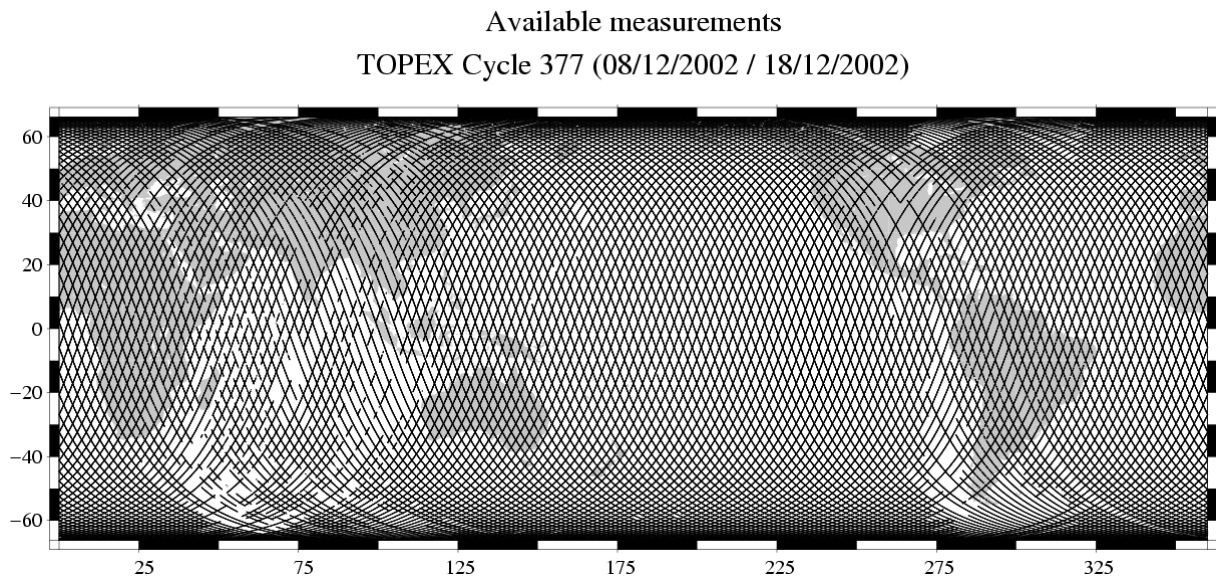
3 CALVAL main results

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

709115 altimeter measurements are present, and 85389 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.



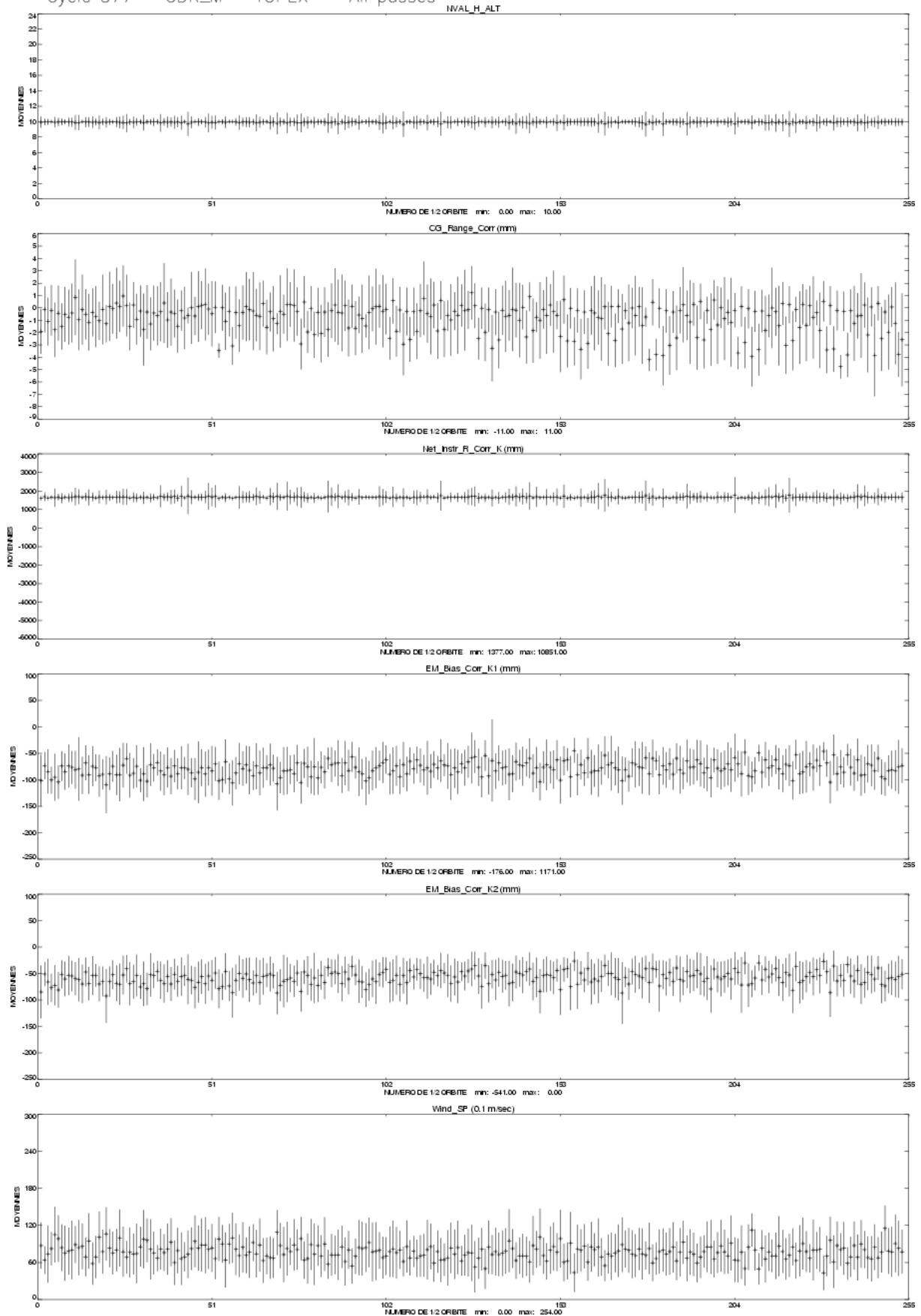
3.2 M-GDR quality flags

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

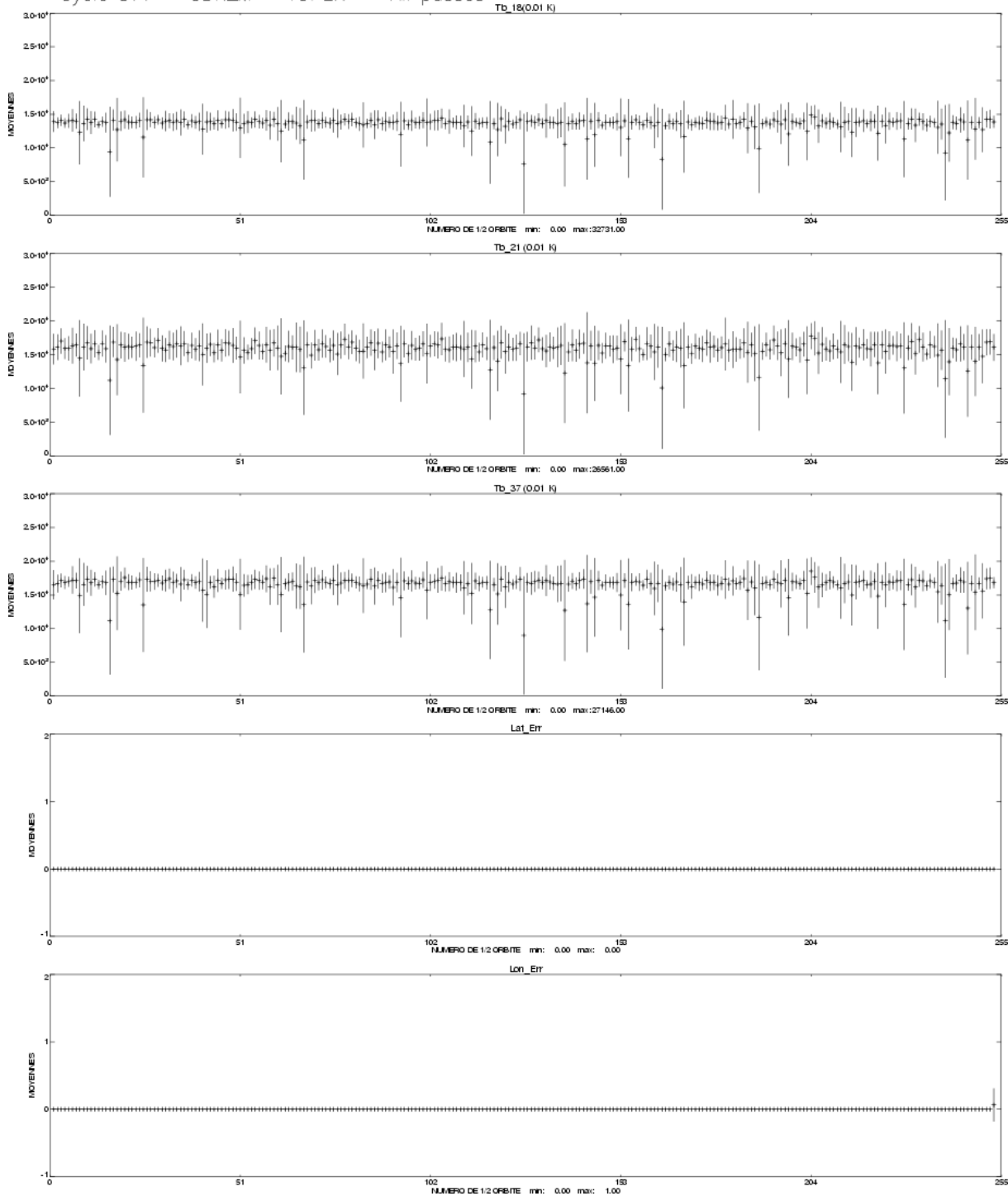
Name	Description	% bad
Geo_Bad_1	altimeter land flag	26.80
Geo_Bad_1	ice flag	6.11
Geo_Bad_1	radiometer land flag	28.37
Alt_Bad_1	conditions 1 altimeter	4.67
Alt_Bad_2	conditions 2 altimeter	4.53
Geo_Bad_2	rain (liquid water in excess)	5.51
Geo_Bad_2	less than 4 points for CSR3.0 tide calculation	0.35
Geo_Bad_2	less than 4 points for FES95.2.1 tide calculation	2.60
TOPEX	TOPEX not valid	0.00
TMR	TMR not valid	0.00
TMR_Bad	Brightness temperatures not valid	5.27
DORIS	DORIS not valid	0.00

3.3 M-GDR parameter plots

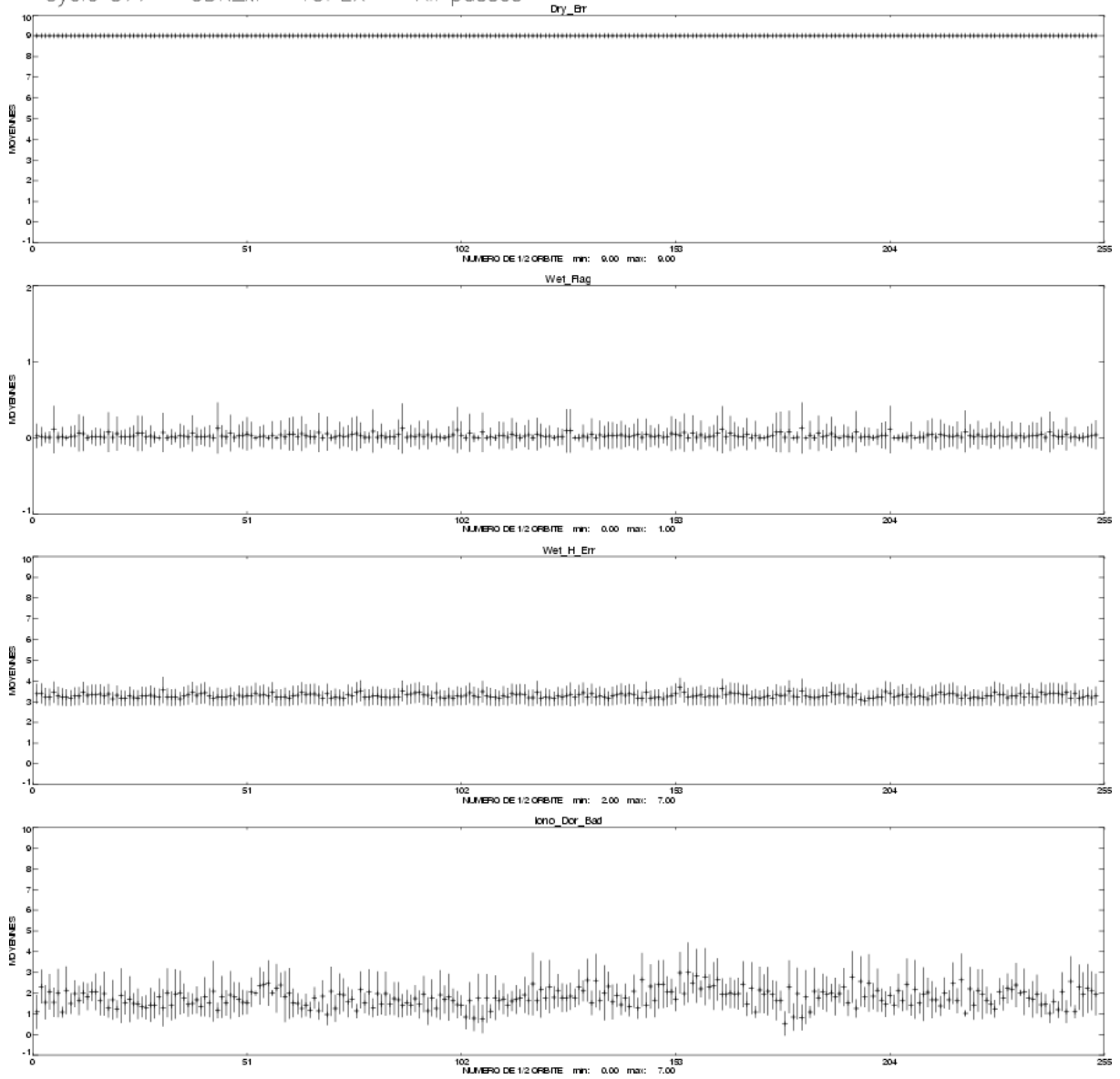
Cycle 377 – GDR_M – TOPEX – All passes –



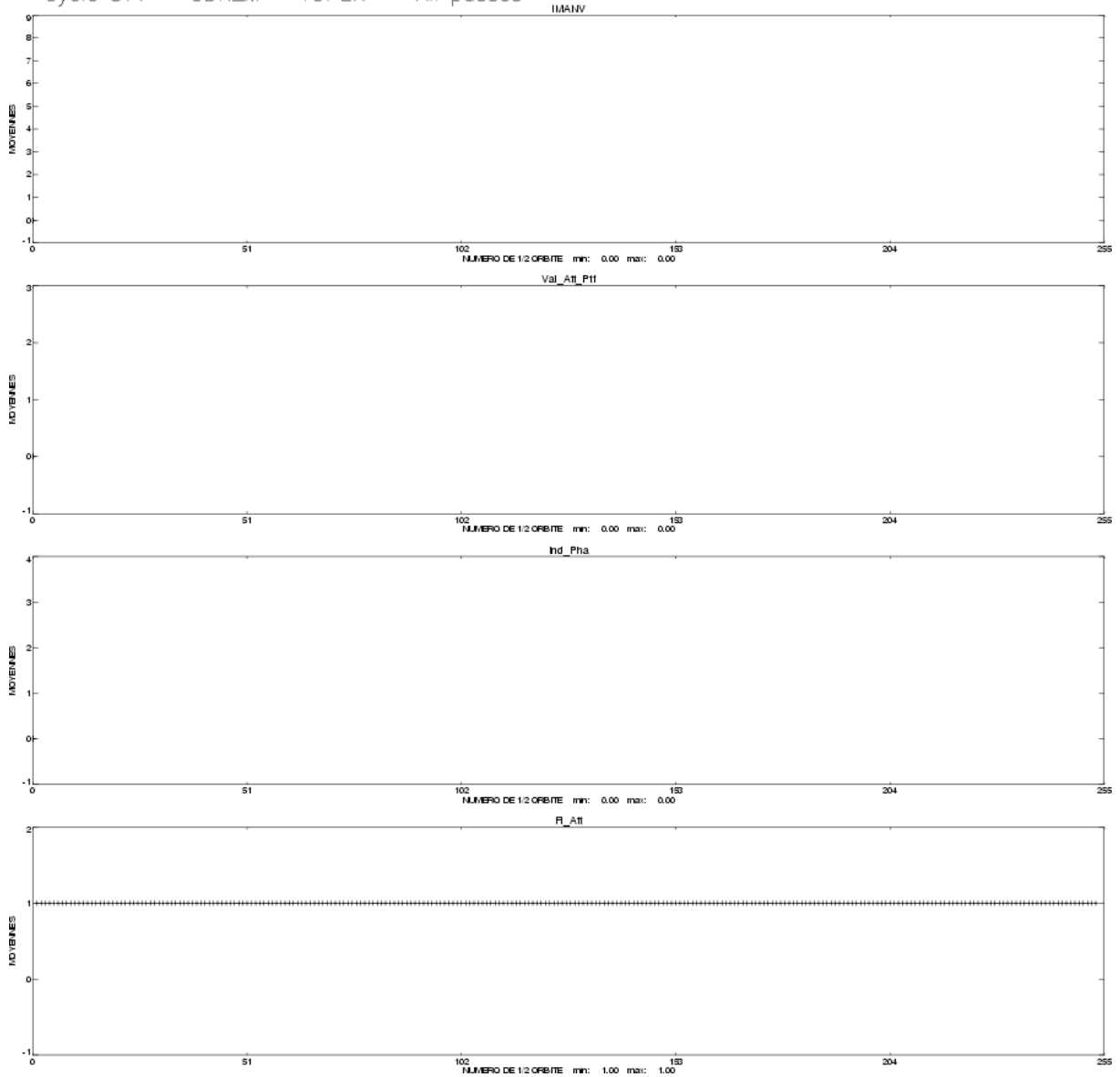
Cycle 377 – GDR_M – TOPEX – All passes –

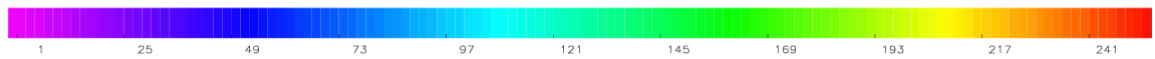
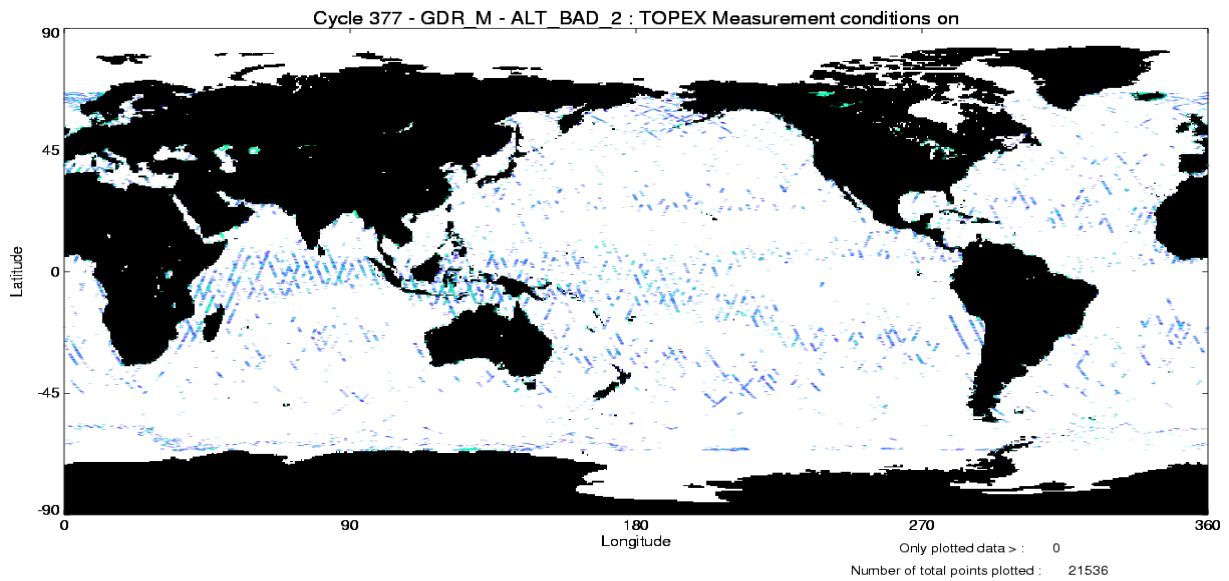
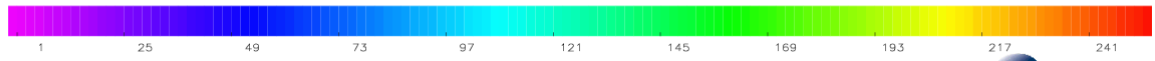
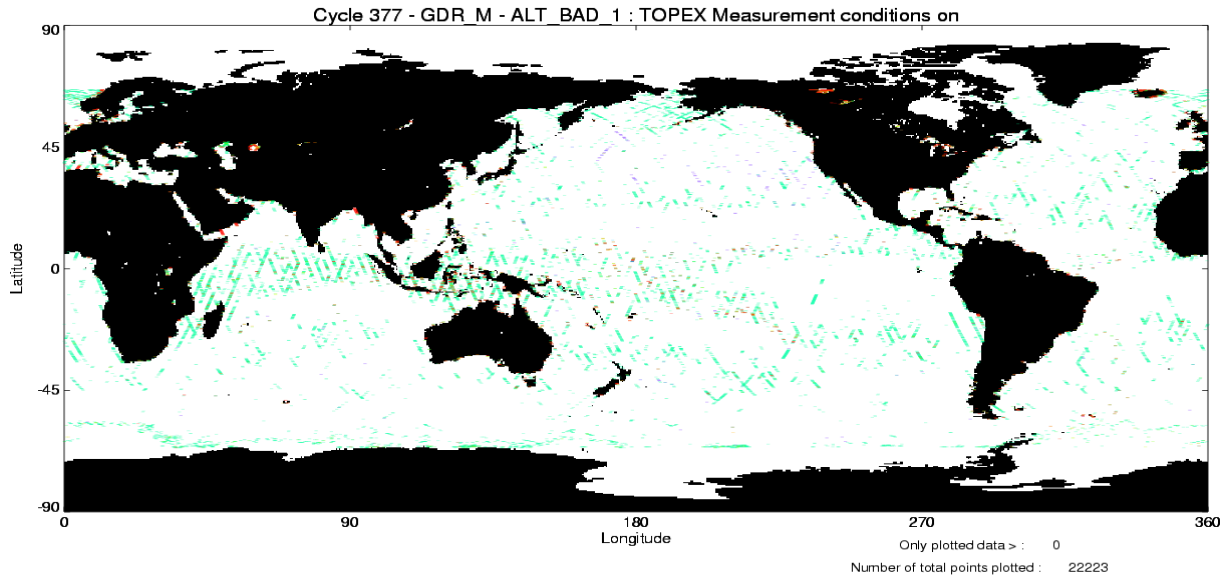


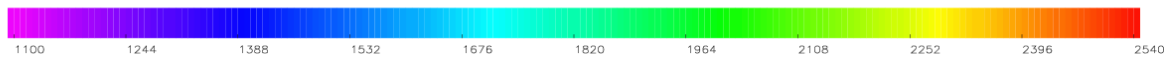
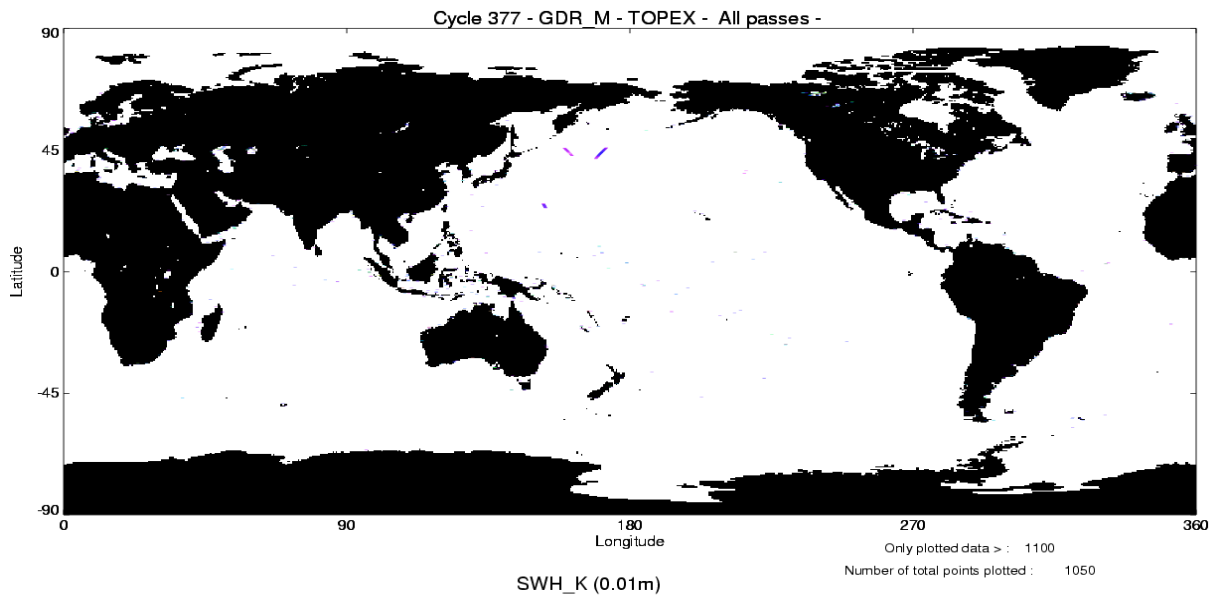
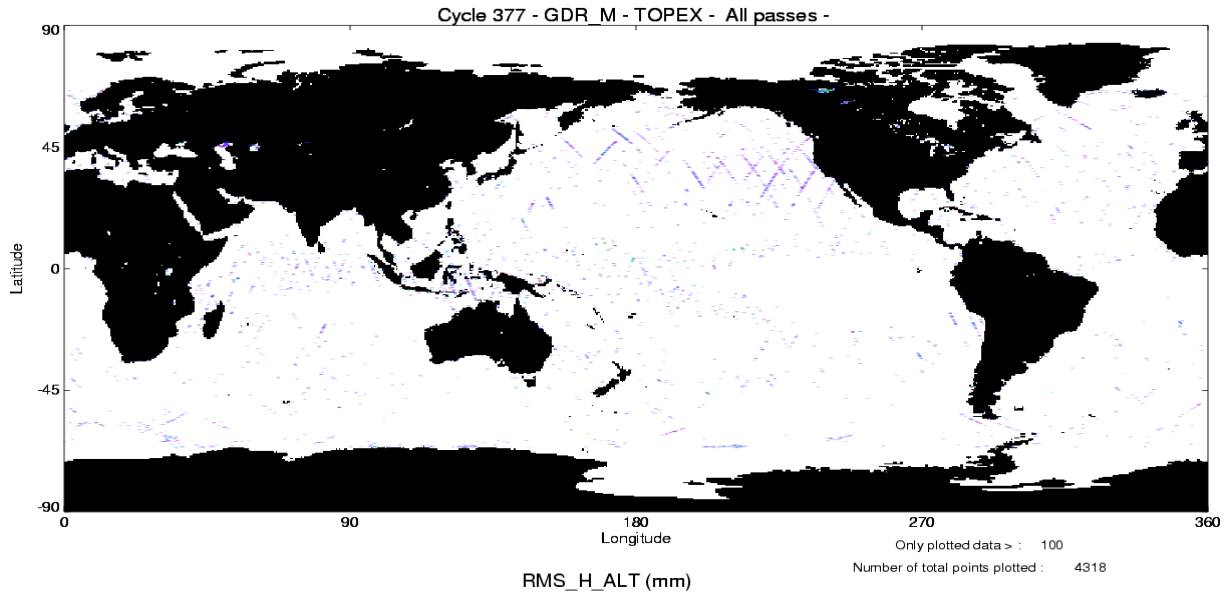
Cycle 377 – GDR_M – TOPEX – All passes –

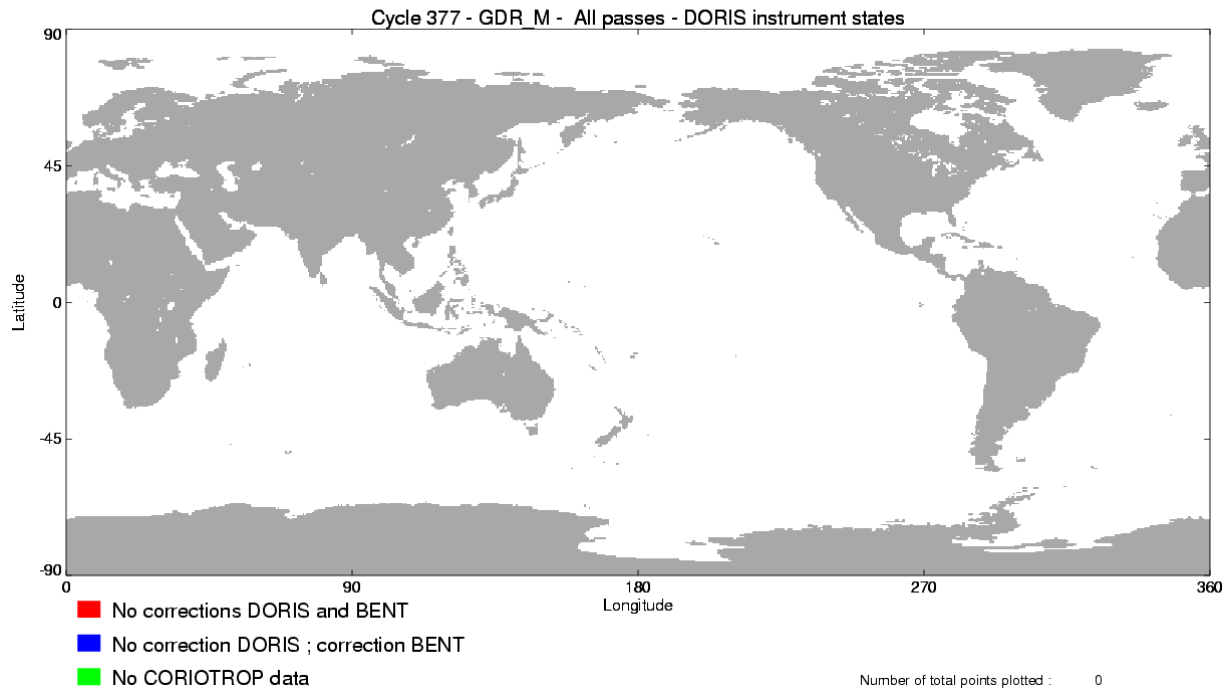


Cycle 377 – GDR_M – TOPEX – All passes –









3.4 Editing

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

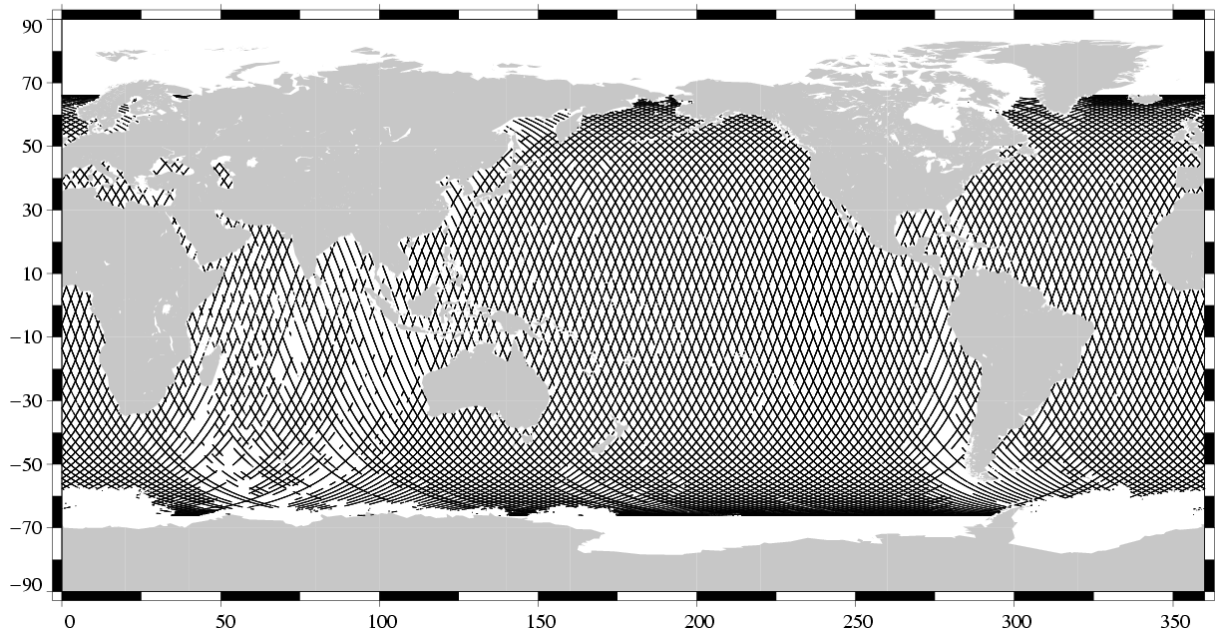
As a comparison, the mean percentage over one year (1997) is also given.

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 TMR and ECMWF wet tropospheric corrections is greater than 20 cm.

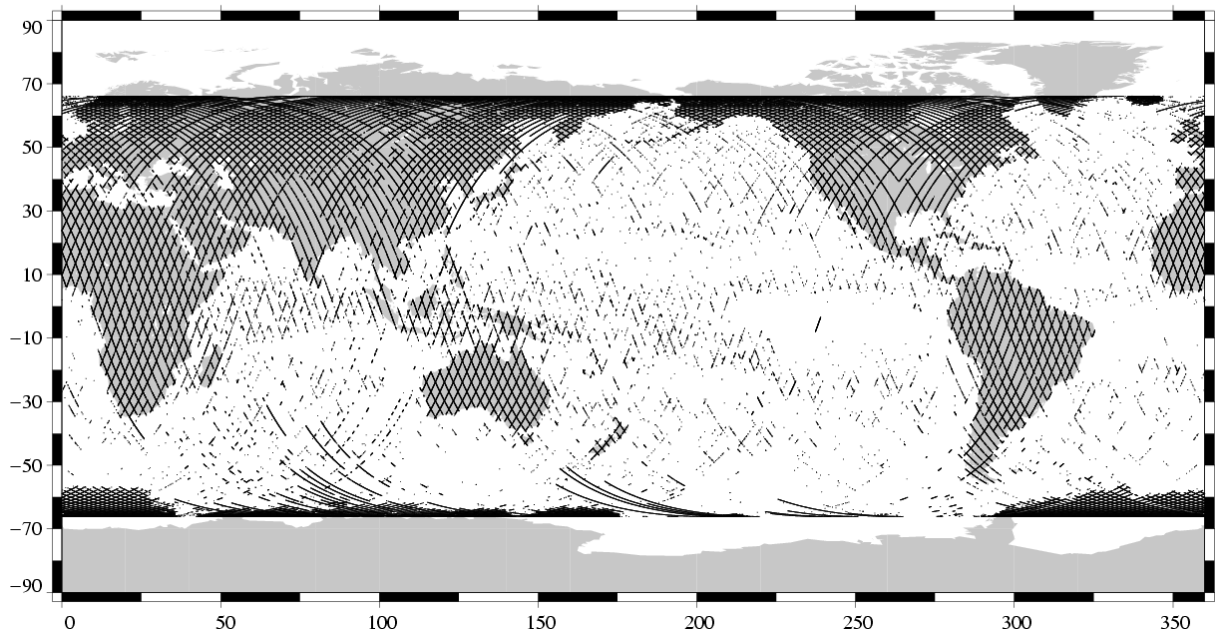
Parameters	Min Thres.	Max Thres.	Unit	Mean % removed in 1997	% removed
Sea surface height	-130.000	100.000	m	1.37	0.88
Number of 20/10Hz valid points Poseidon/TOPEX	5.000	-		1.37	1.18
Std. deviation of range	0.000	0.100	m	1.85	1.97
Off nadir angle from waveform	0.000	0.400	deg	1.36	4.32
Dry tropospheric 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	3.62
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	0.48
Sea state Bias	-0.500	0.000	m	1.39	0.78
Backscatter coefficient	7.000	30.000	dB	1.44	0.73
Ocean tide height	-5.000	5.000	m	0.01	1.10
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	1.13
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.

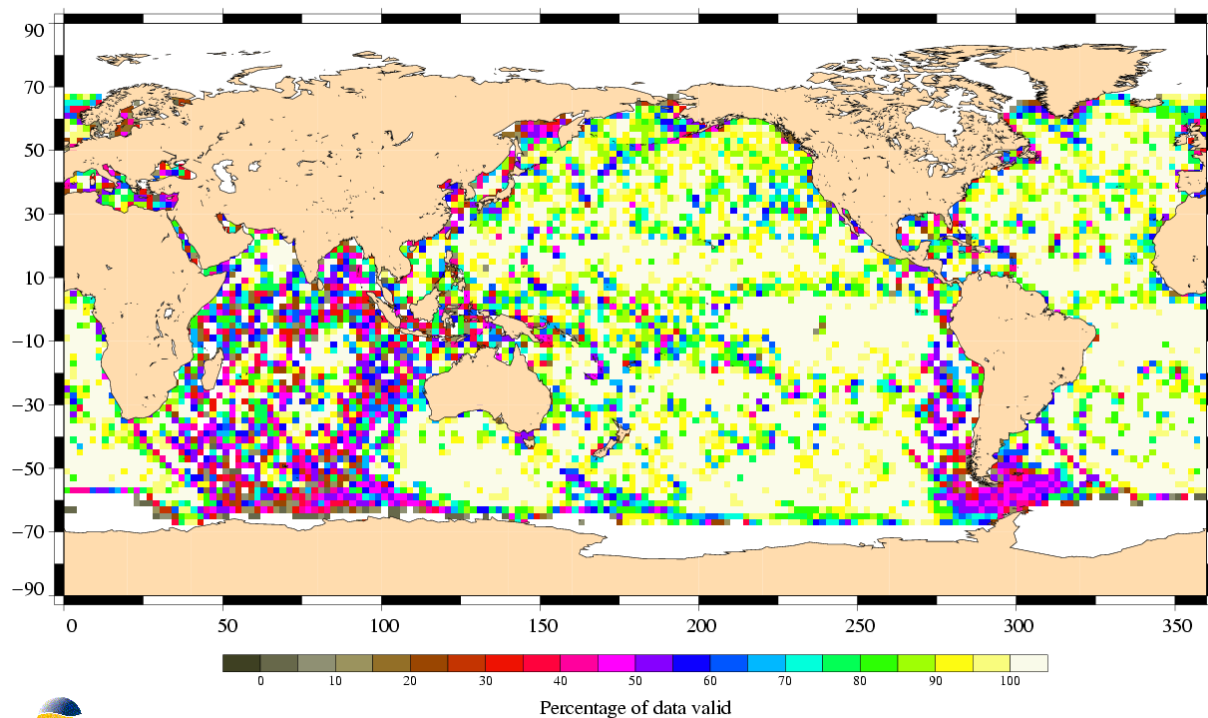
Valid data
TOPEX/Poseidon Cycle 377 (08/12/2002 / 18/12/2002)



Edited measurements
TOPEX Cycle 377 (08/12/2002 / 18/12/2002)

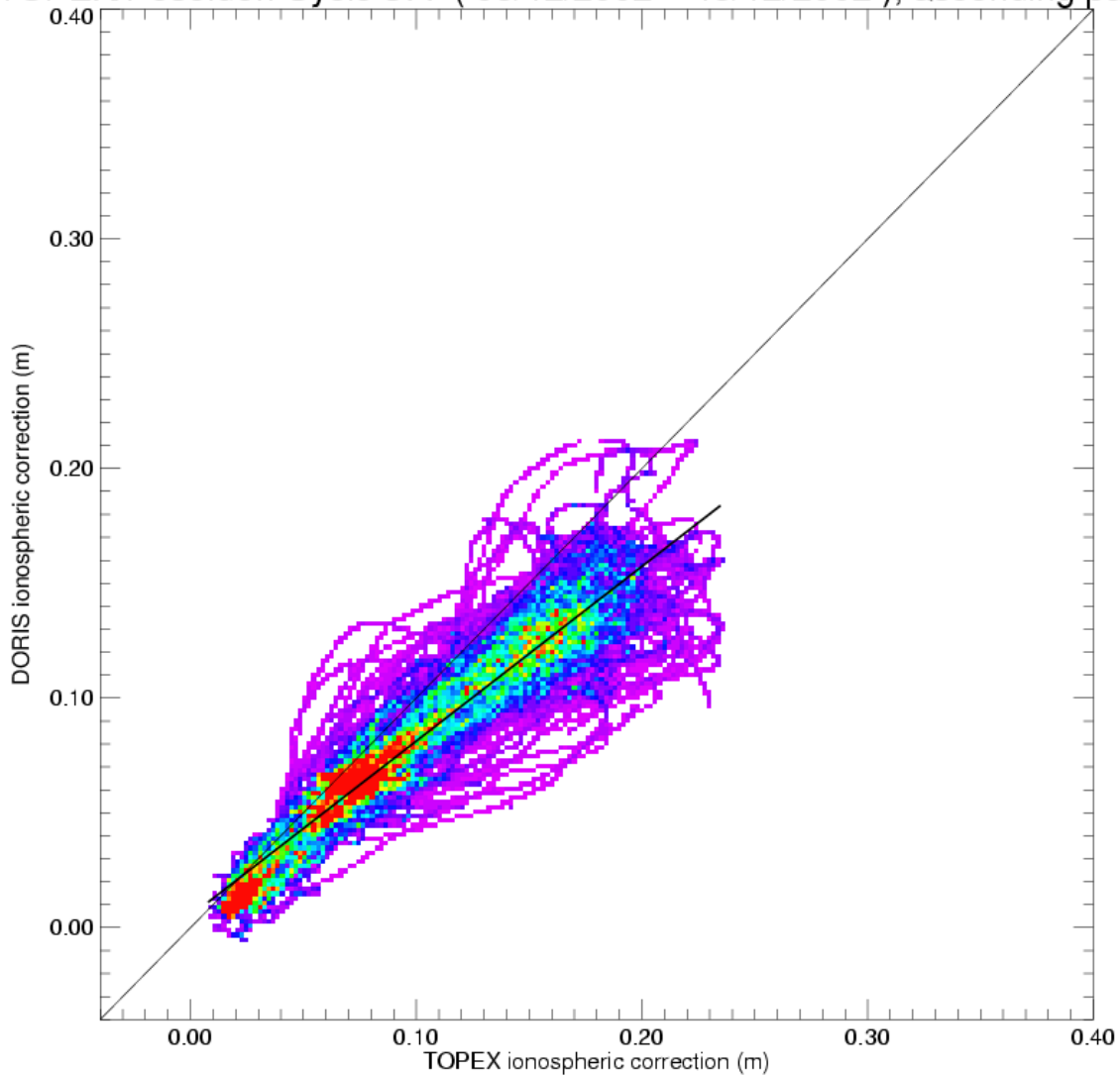


Percentage of valid data relative to the nominal pass
TOPEX/Poseidon Cycle 377 (08/12/2002 / 18/12/2002)

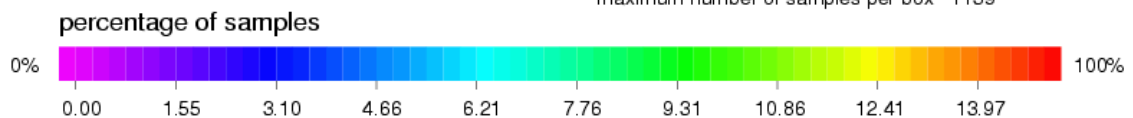


3.5 Ionospheric correction

TOPEX/Poseidon Cycle 377 (08/12/2002 – 18/12/2002), ascending passes



minimum number of samples per box 1
maximum number of samples per box 1139



Statistics Y-X

mean = -0.01830
rms = 0.02643
std = 0.01908

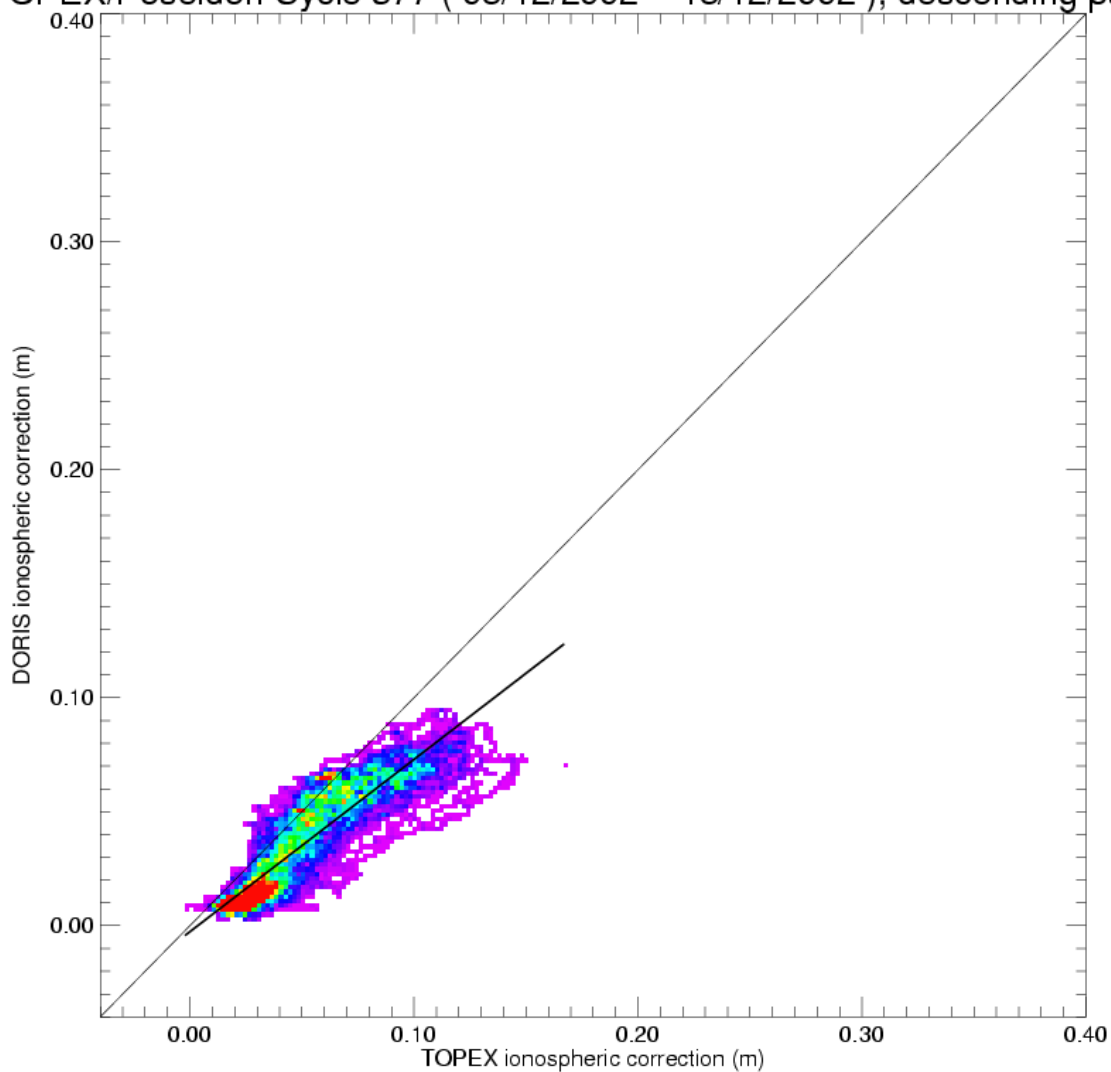
Order 1 fit polynomial

$y = a x + b$
a = 0.76120067
b = 0.00513726

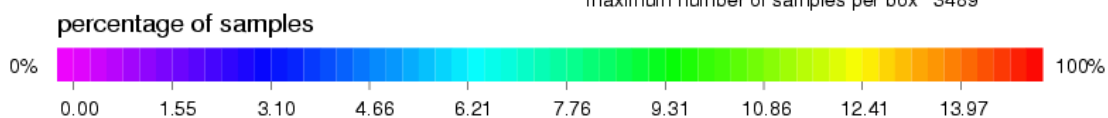
Legend

— Order 1 fit polynomial
— Bisectrix

TOPEX/Poseidon Cycle 377 (08/12/2002 – 18/12/2002), descending passes



minimum number of samples per box 1
 maximum number of samples per box 3489



Statistics Y-X

mean = -0.01471
 rms = 0.01912
 std = 0.01221

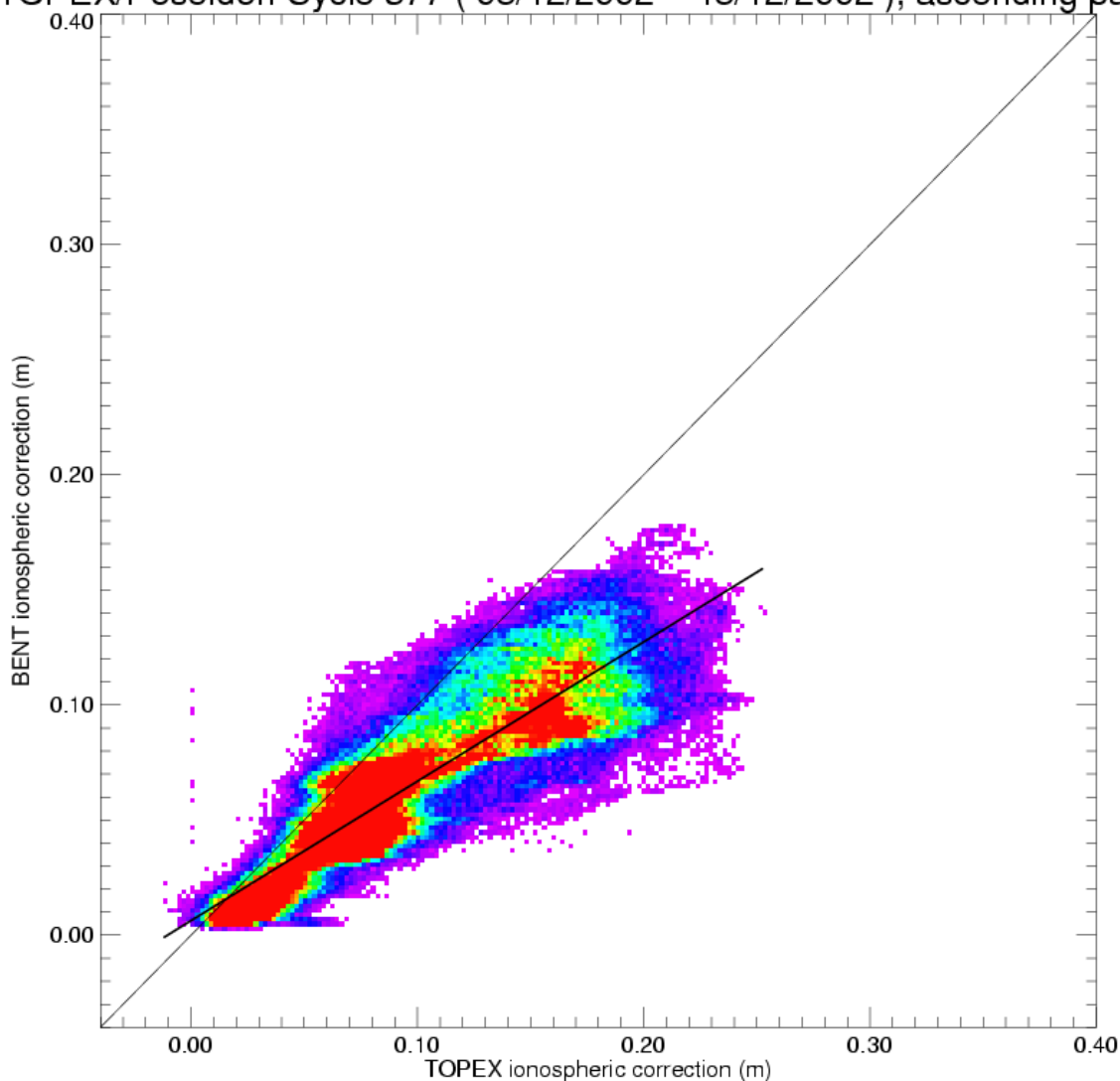
Order 1 fit polynom

$y = a x + b$
 $a = 0.75561154$
 $b = -0.00264552$

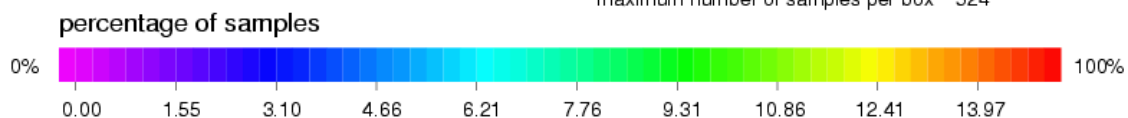
Legend

— Order 1 fit polynom
 — Bisectrix

TOPEX/Poseidon Cycle 377 (08/12/2002 – 18/12/2002), ascending passes



minimum number of samples per box 1
 maximum number of samples per box 524



Statistics Y-X

mean = -0.03259
 rms = 0.04205
 std = 0.02658

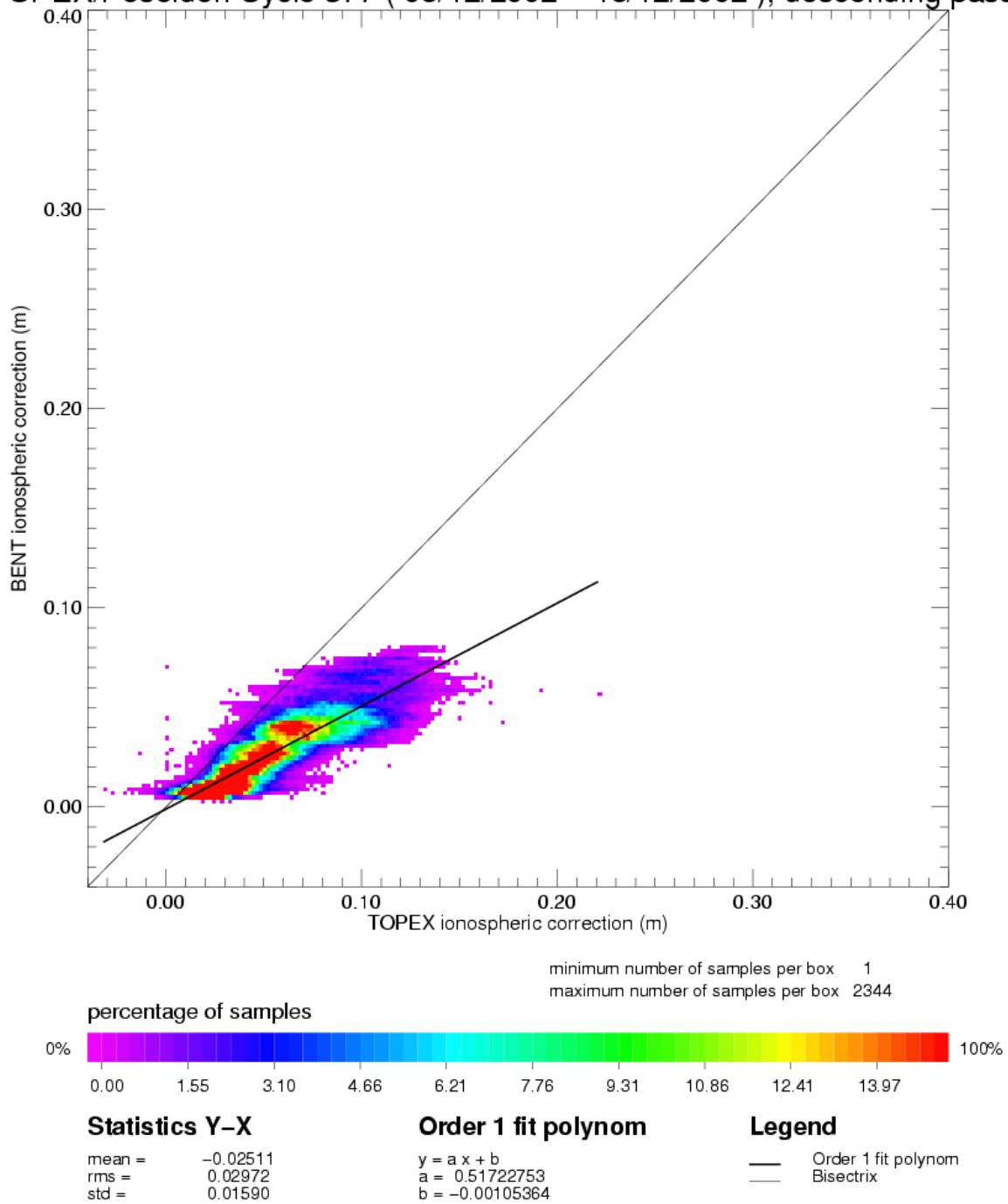
Order 1 fit polynom

$y = a x + b$
 $a = 0.60539180$
 $b = 0.00631959$

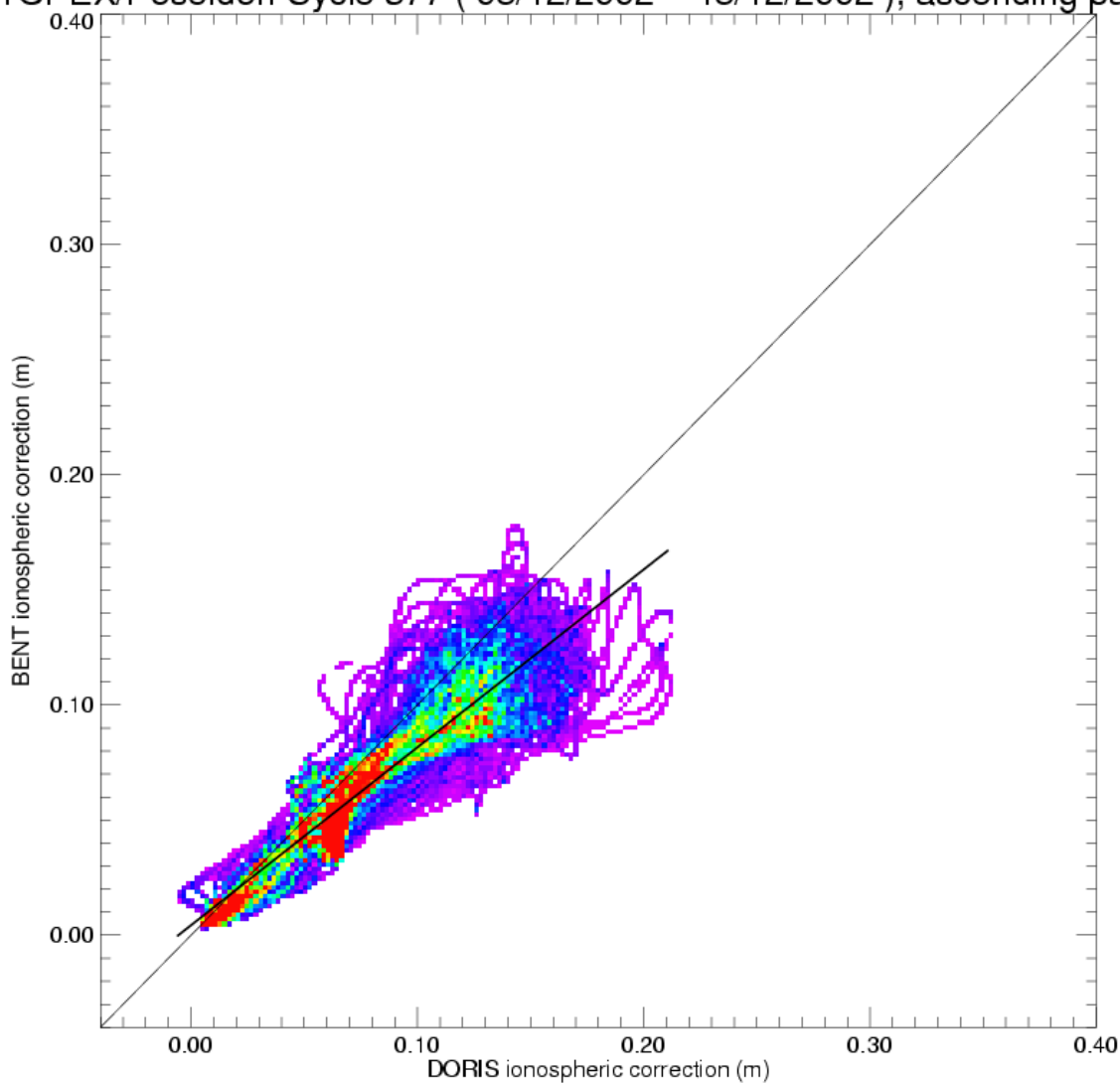
Legend

— Order 1 fit polynom
 — Bisectrix

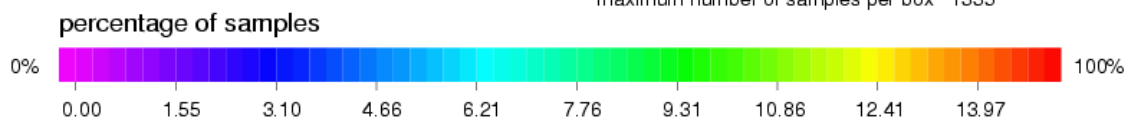
TOPEX/Poseidon Cycle 377 (08/12/2002 – 18/12/2002), descending passes



TOPEX/Poseidon Cycle 377 (08/12/2002 – 18/12/2002), ascending passes



minimum number of samples per box 1
 maximum number of samples per box 1335



Statistics Y-X

mean = -0.01382
 rms = 0.02253
 std = 0.01779

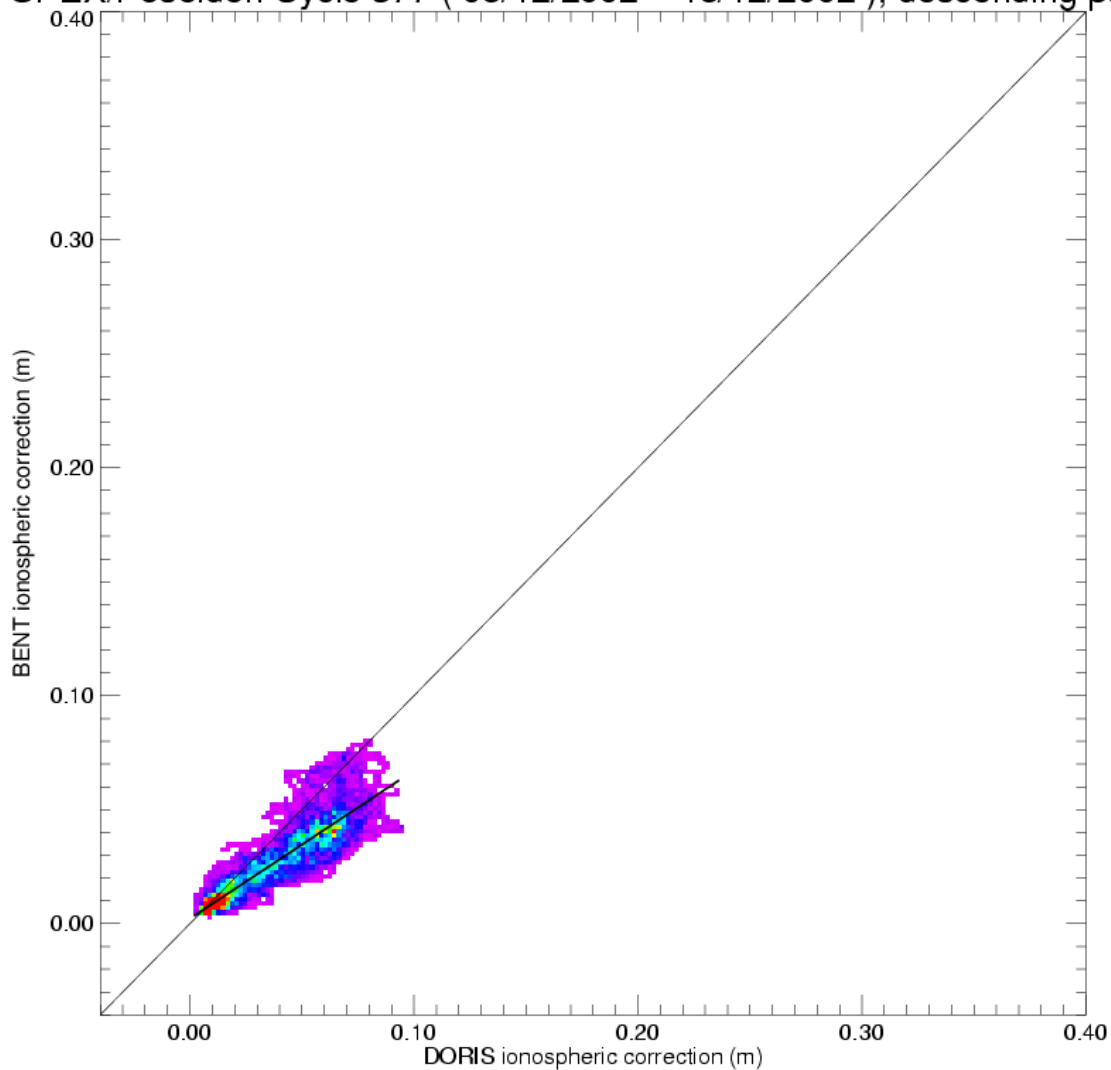
Order 1 fit polynom

$y = a x + b$
 $a = 0.77264559$
 $b = 0.00433235$

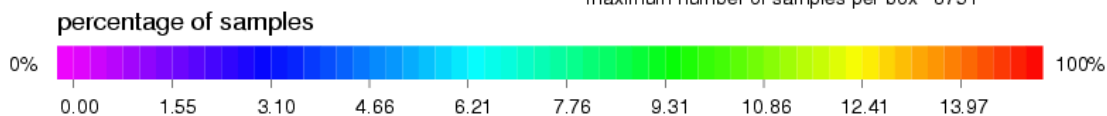
Legend

— Order 1 fit polynom
 — Bisectrix

TOPEX/Poseidon Cycle 377 (08/12/2002 – 18/12/2002), descending passes



minimum number of samples per box 1
 maximum number of samples per box 8751



Statistics Y-X

mean = -0.00993
 rms = 0.01473
 std = 0.01088

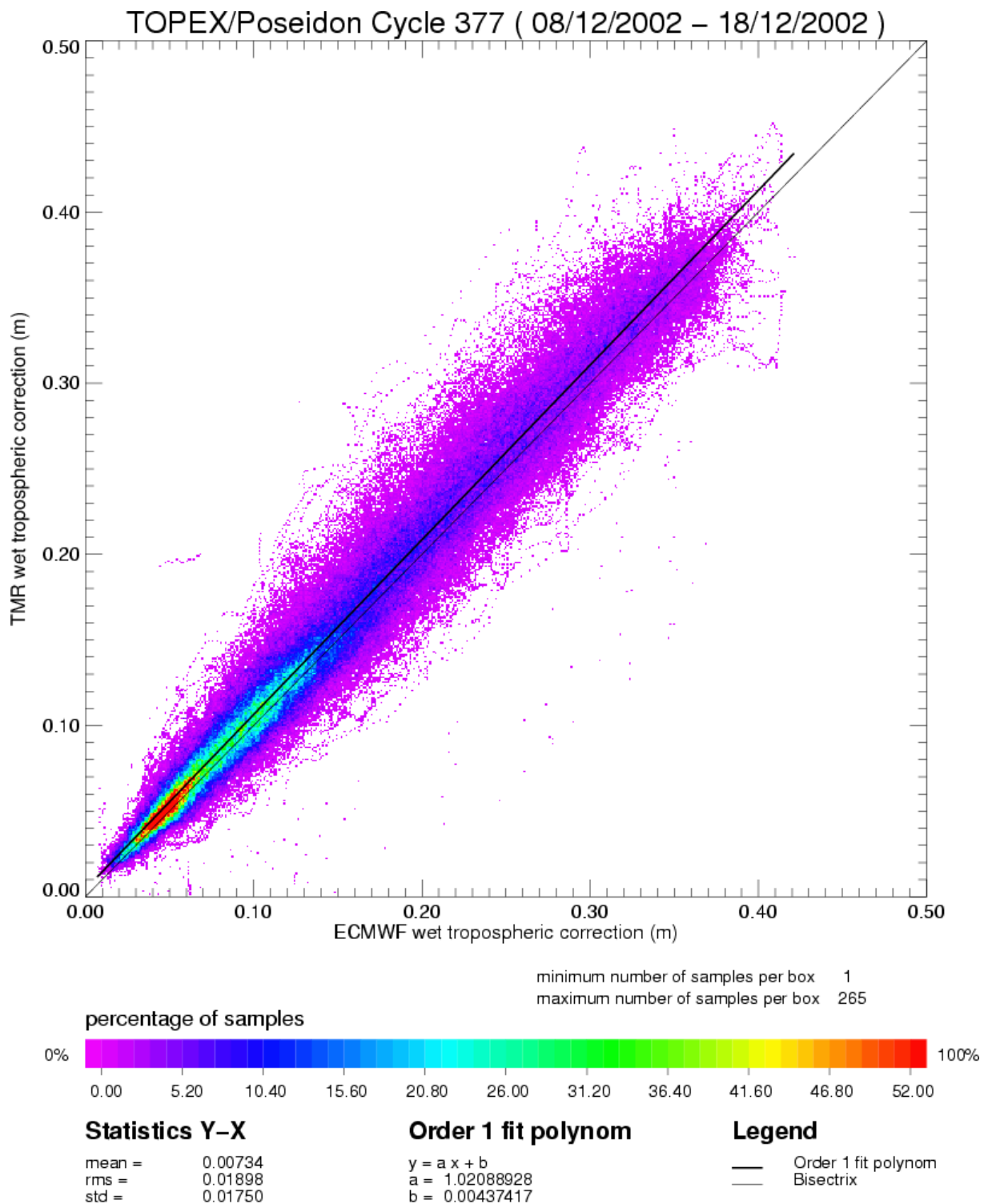
Order 1 fit polynom

$y = a x + b$
 $a = 0.65036875$
 $b = 0.00218711$

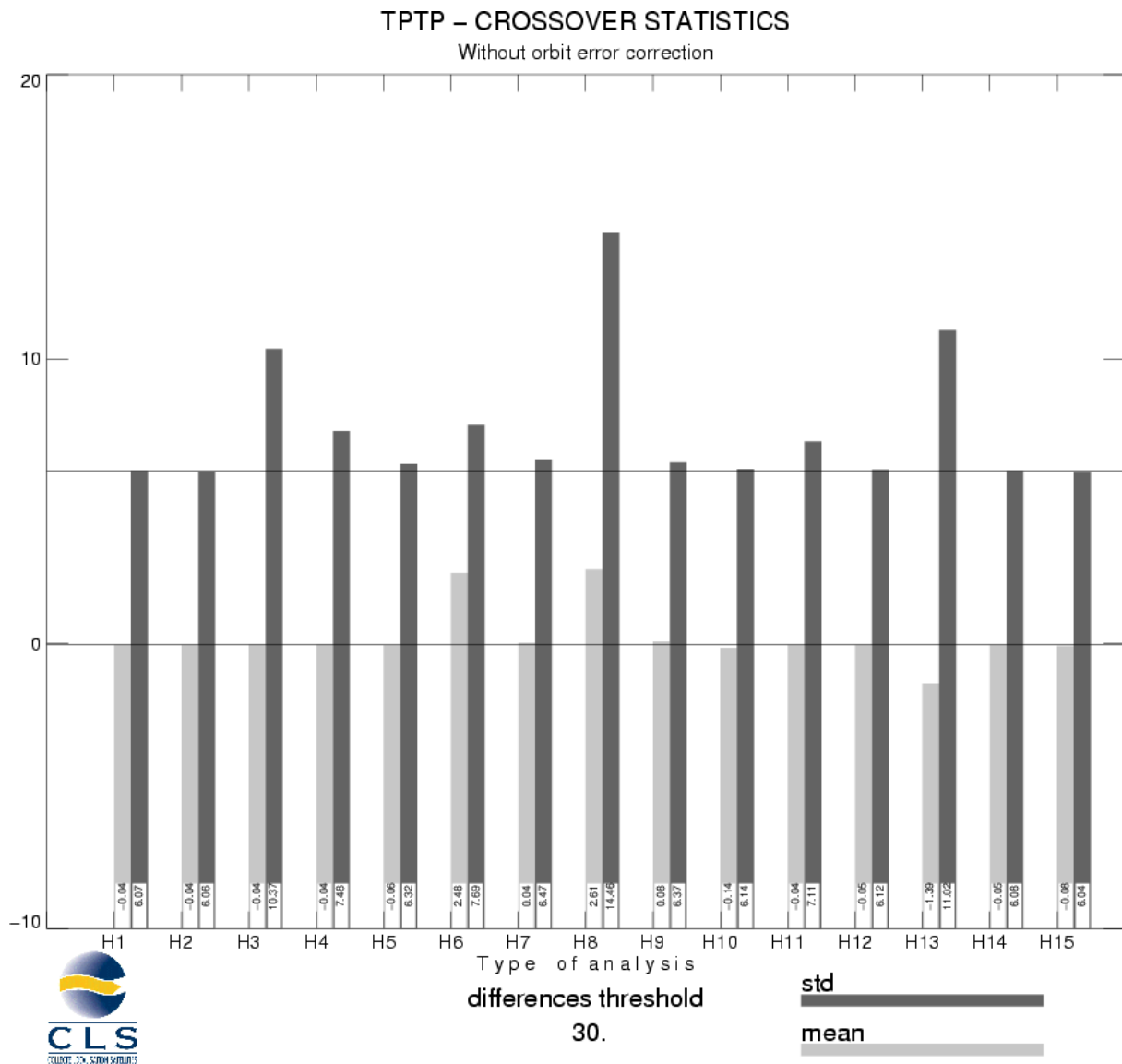
Legend

— 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

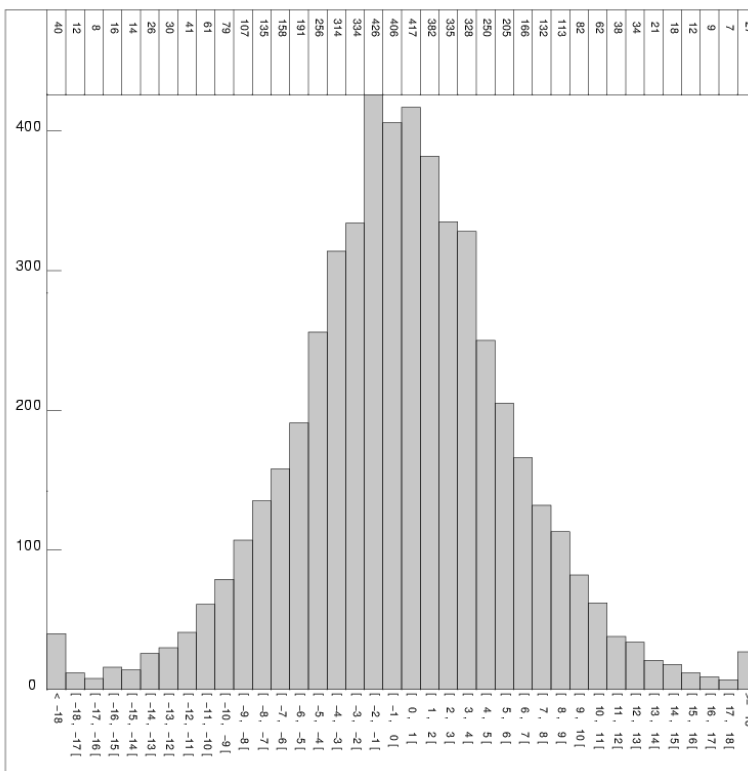
Type de points de croisement: TPTP
 Zone géographique (deg): -90 / 90 , 0 / 360
 Seuil sur les écarts d'analyse 0.00 (moy)
 30.00 (seuil)
 Selection(s) sur les champs :
 CL Arc 1 :=INTERP_SPLN
 CL Arc 2 :=INTERP_SPLN
 Seuil Min +: 0.0000000
 Seuil Max : 0.0000000

Selection(s) sur les écarts :
 Aucune

RESULTATS STATISTIQUES

Valeur minimale : -29.8900
 Valeur maximale : 29.1800
 Différence Max – Min: 59.0700
 Nombre de points lus: 5403
 Nombre de points sélectionnés: 5292
 Moyenne : -0.0447240
 Ecart-type : 6.06989
 Moyenne Quadratique : 6.07006

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TPTP – CROSSOVER STATISTICS

With orbit error correction

SSH = Corrected sea surface height

RAPPEL DES SELECTIONS

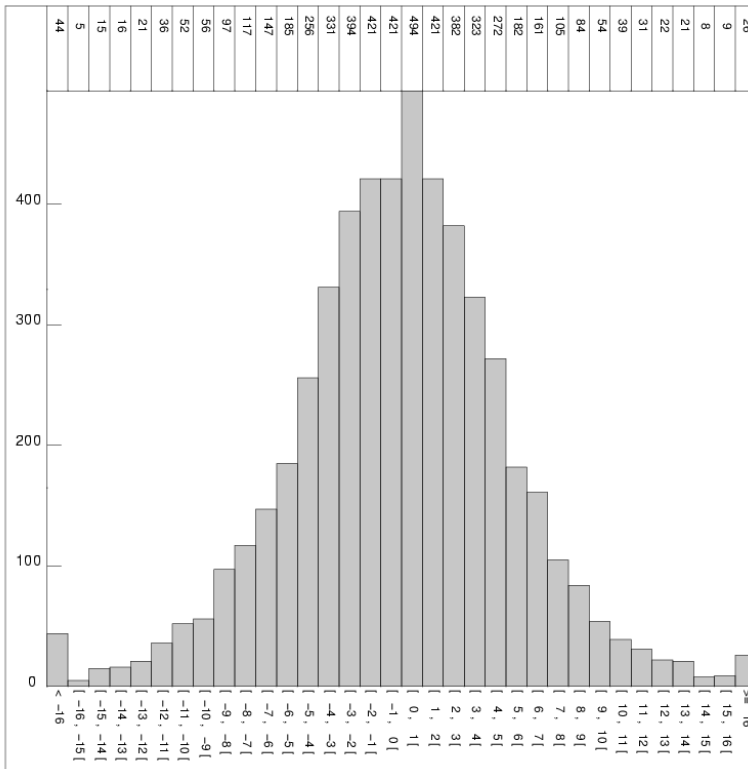
Type de points de croisement: TPTP
 Zone géographique (deg): -90 / 90 , 0 / 360
 Seuil sur les écarts d'analyse 0.00 (moy)
 30.00 (seuil)
 Selection(s) sur les champs :
 CL Arc 1 :=INTERP_SPLN
 CL Arc 2 :=INTERP_SPLN
 Seuil Min +: 0.0000000
 Seuil Max : 0.0000000

Selection(s) sur les écarts :
 Aucune

RESULTATS STATISTIQUES

Valeur minimale : -27.6000
 Valeur maximale : 27.4500
 Différence Max – Min: 55.0500
 Nombre de points lus: 5403
 Nombre de points sélectionnés: 5249
 Moyenne : -0.117586
 Ecart-type : 5.44025
 Moyenne Quadratique : 5.44152

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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

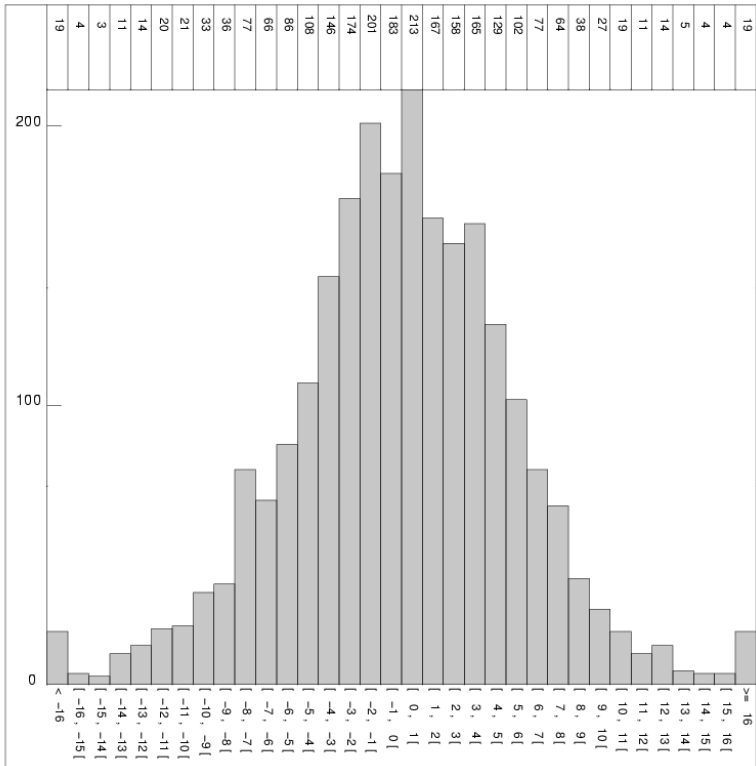
RAPPEL DES SELECTIONS

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 : -22.4100
 Valeur maximale : 34.7700
 Difference Max – Min: 57.1800
 Nombre de points lus: 2636
 Nombre de points selectionnes: 2418
 Moyenne : -0.0314430
 Ecart-type : 5.62120
 Moyenne Quadratique : 5.62128

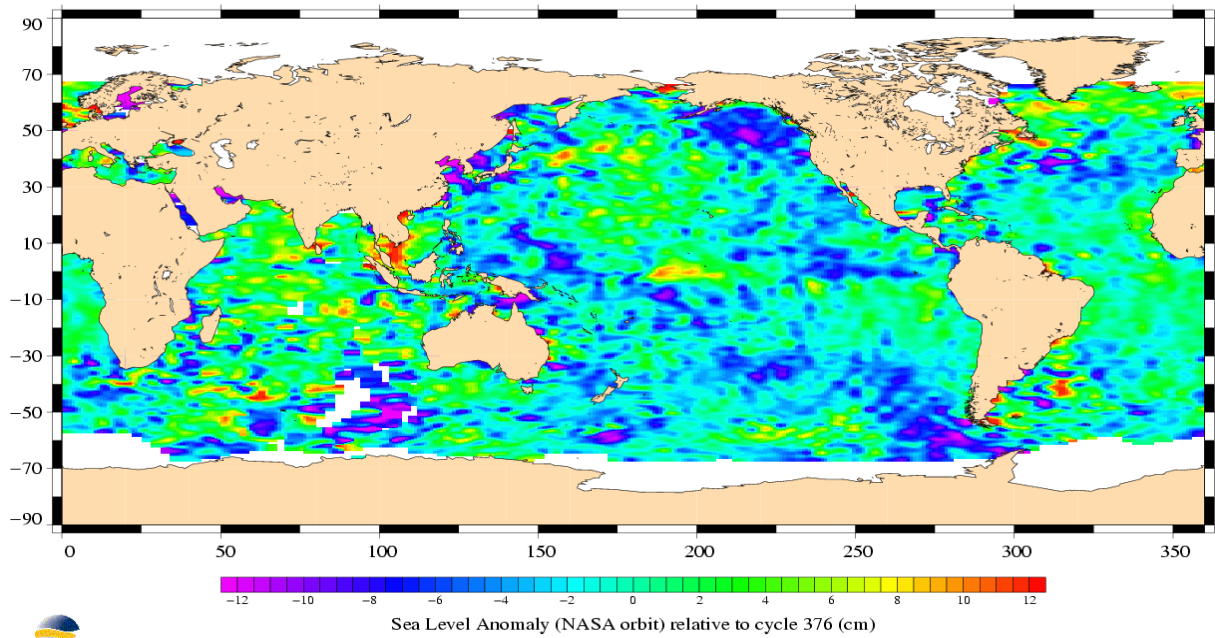
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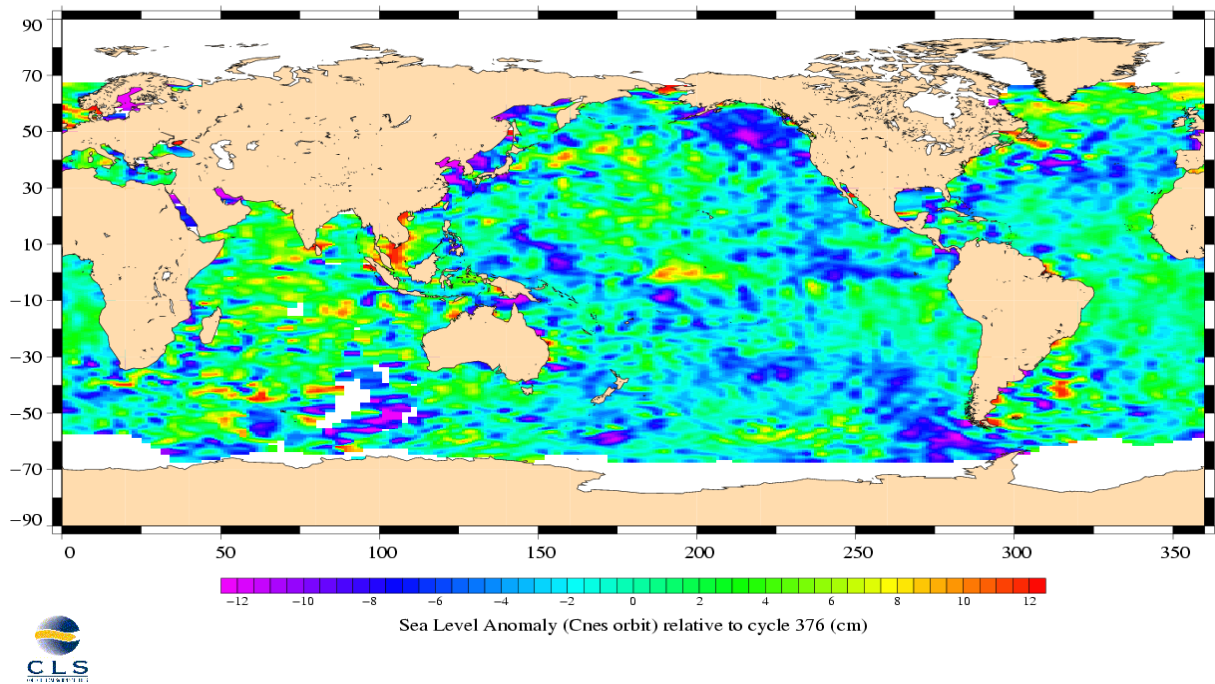
3.8 SSH variability

3.8.1 Sea Level Anomaly

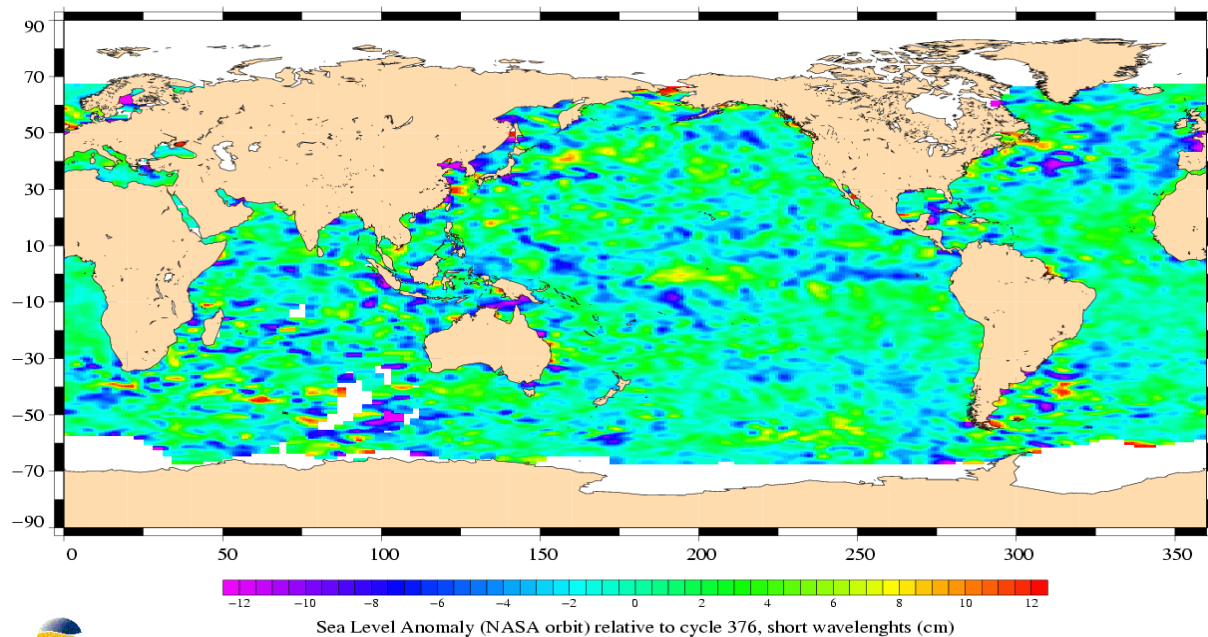
TOPEX/Poseidon, cycle 377
Period : 08/12/2002 – 18/12/2002



TOPEX/Poseidon, cycle 377
Period : 08/12/2002 – 18/12/2002



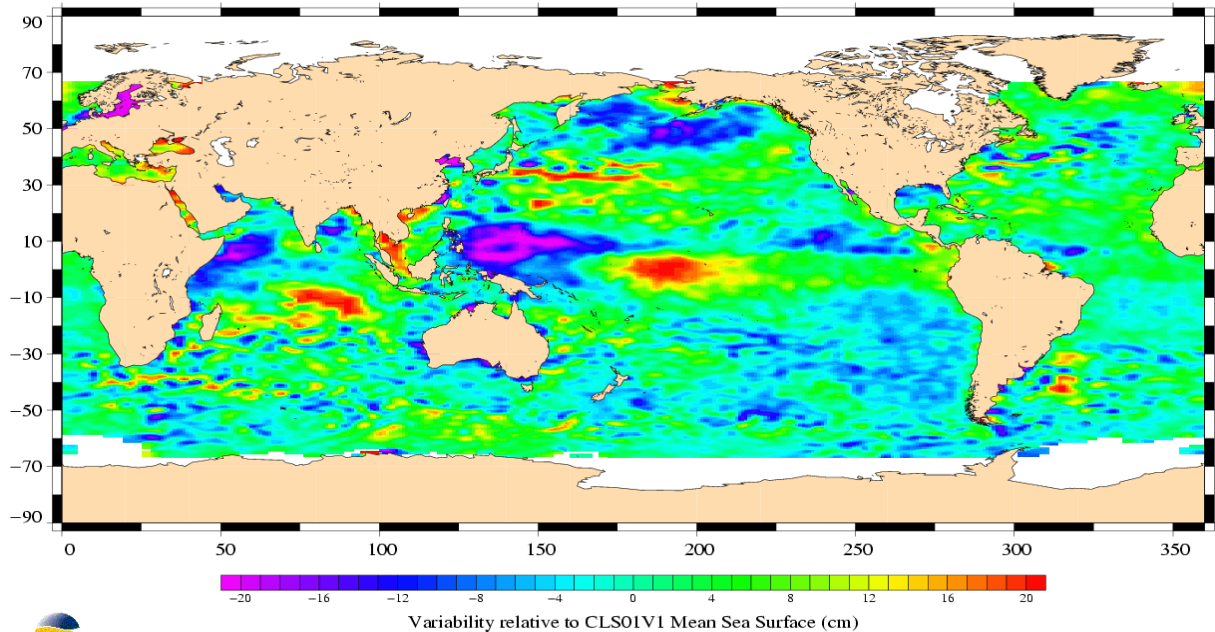
TOPEX/Poseidon, cycle 377
Period : 08/12/2002 – 18/12/2002



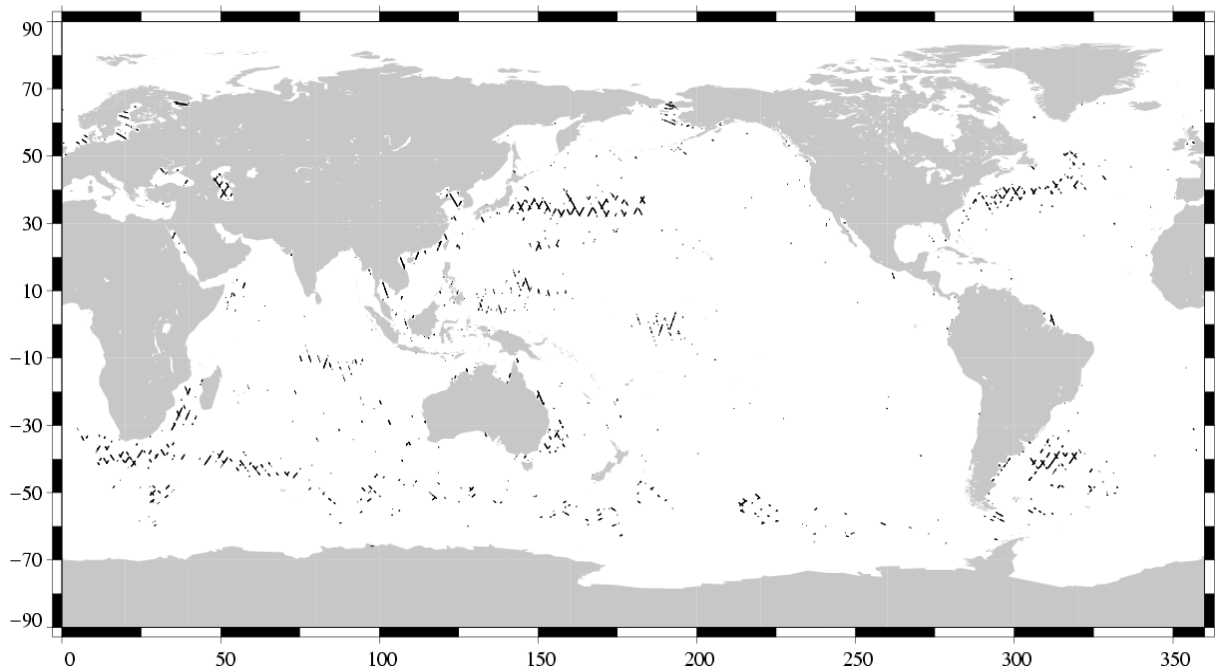
3.8.2 Comparison to a precise Mean Sea Surface

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 377
Period : 08/12/2002 – 18/12/2002

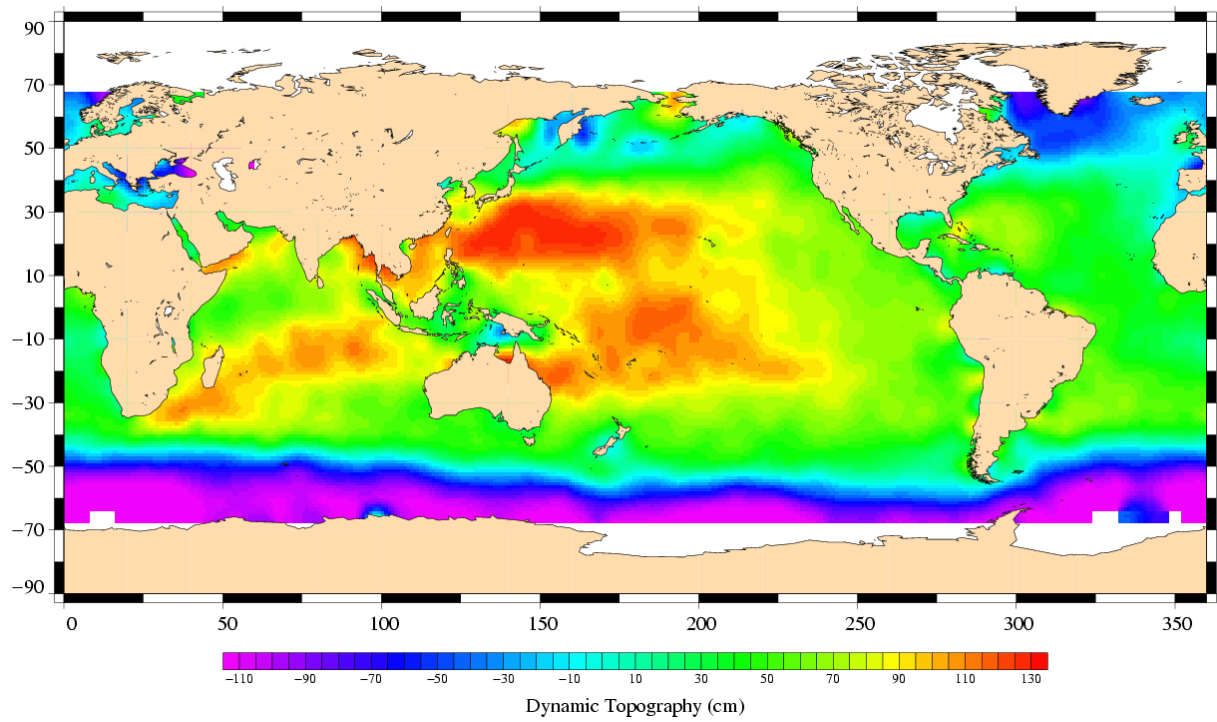


(SSH – MSS) differences greater than 0.3 m
TOPEX/Poseidon Cycle 377 (08/12/2002 / 18/12/2002)



3.9 Dynamic topography

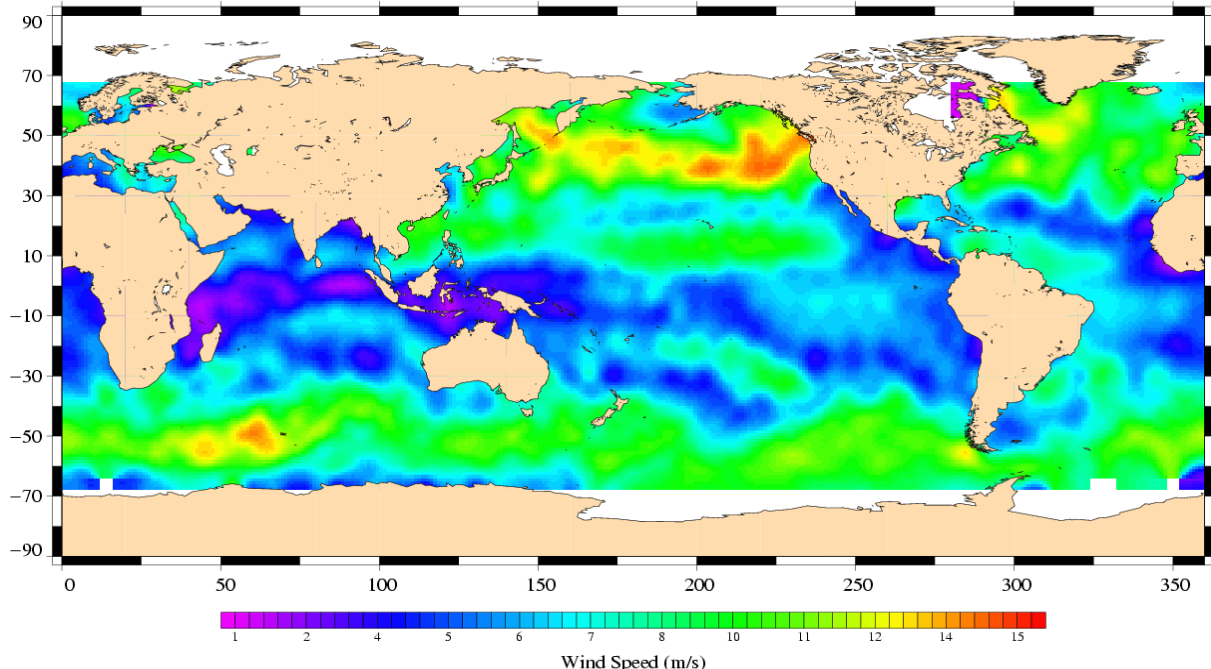
TOPEX/Poseidon, cycle 377
Period : 08/12/2002 – 18/12/2002



3.10 Wind and wave maps

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

TOPEX/Poseidon, cycle 377
Period : 08/12/2002 – 18/12/2002



TOPEX/Poseidon, cycle 377
Period : 08/12/2002 – 18/12/2002

