TOPEX/Poseidon MGDR
Quality Assessment Report

Cycle 368

10-09-2002 20-09-2002

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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 6.71 cm rms, and the standard deviation of Sea Level Anomalies (SLA) relative to a Mean Sea Surface is 10.07 cm.

2.2 Warnings and recommendations

- Starting on August 15, a six-maneuver sequence was be conducted over a period of about 30 days to move T/P to the new Tandem Mission orbit on the new ground track at one half the TOPEX/Jason track spacing to the West of Jason :
  - Cycle 365 - pass 110 was the last regular TOPEX pass
  - Cycle 368 - pass 172 and later are on the final fixed tandem mission ground track

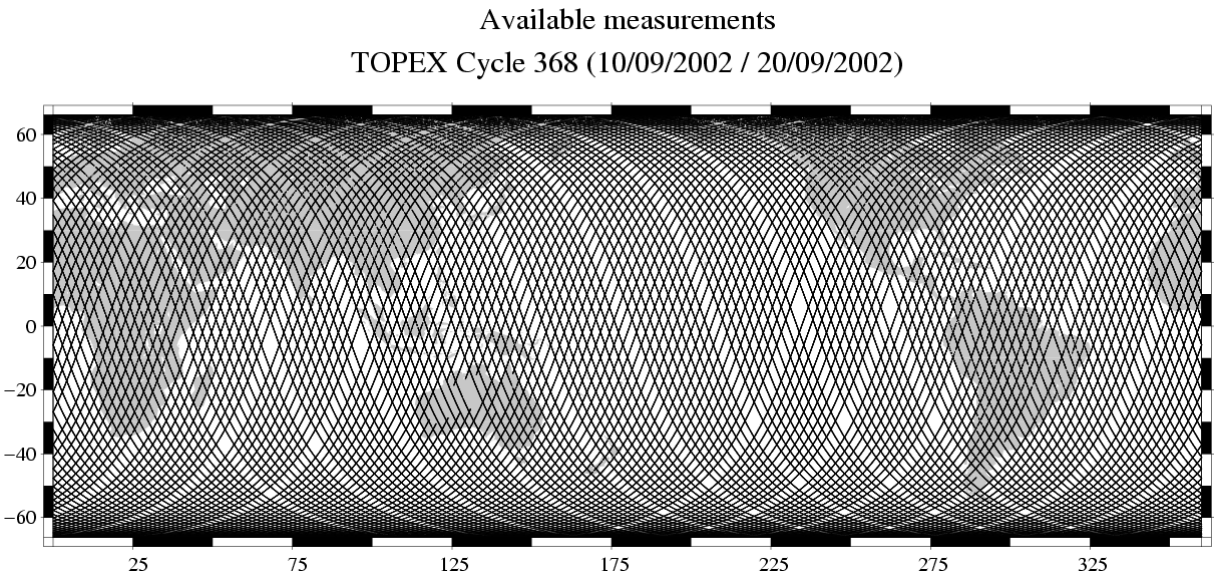
  No nominal track is available during this period. Thus the maps of the missing 1Hz measurements and the sea level anomaly are not present in this report.
- TOPEX/Poseidon Tandem Mission Orbit Maneuvers : The second set of TOTM retrograde maneuvrers to move TOPEX/Poseidon to a new orbit (approximately 160 km west) were executed during this cycle on 10, 13 and 16 September.
- Missing measurements : passes 1 to 18 are missing due to NASA POE interpolation failure.
- The Alt_bad_1 and Alt_bad_2 quality flag is set on passes 94 and 170. These measurements have been removed in the editing procedure due to bad altimeter measurement.
- Due to maneuvers in this cycle there are some significant differences between CNES and NASA ephemeris on passes 19,20,21,22,94 and 170.

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

701717 altimeter measurements are present. It is not possible to compute the missing 1Hz measurements map through cycles 365-368 because the satellite is not on a repeat cycle orbit. The following map shows all the available measurements for cycle 368s.

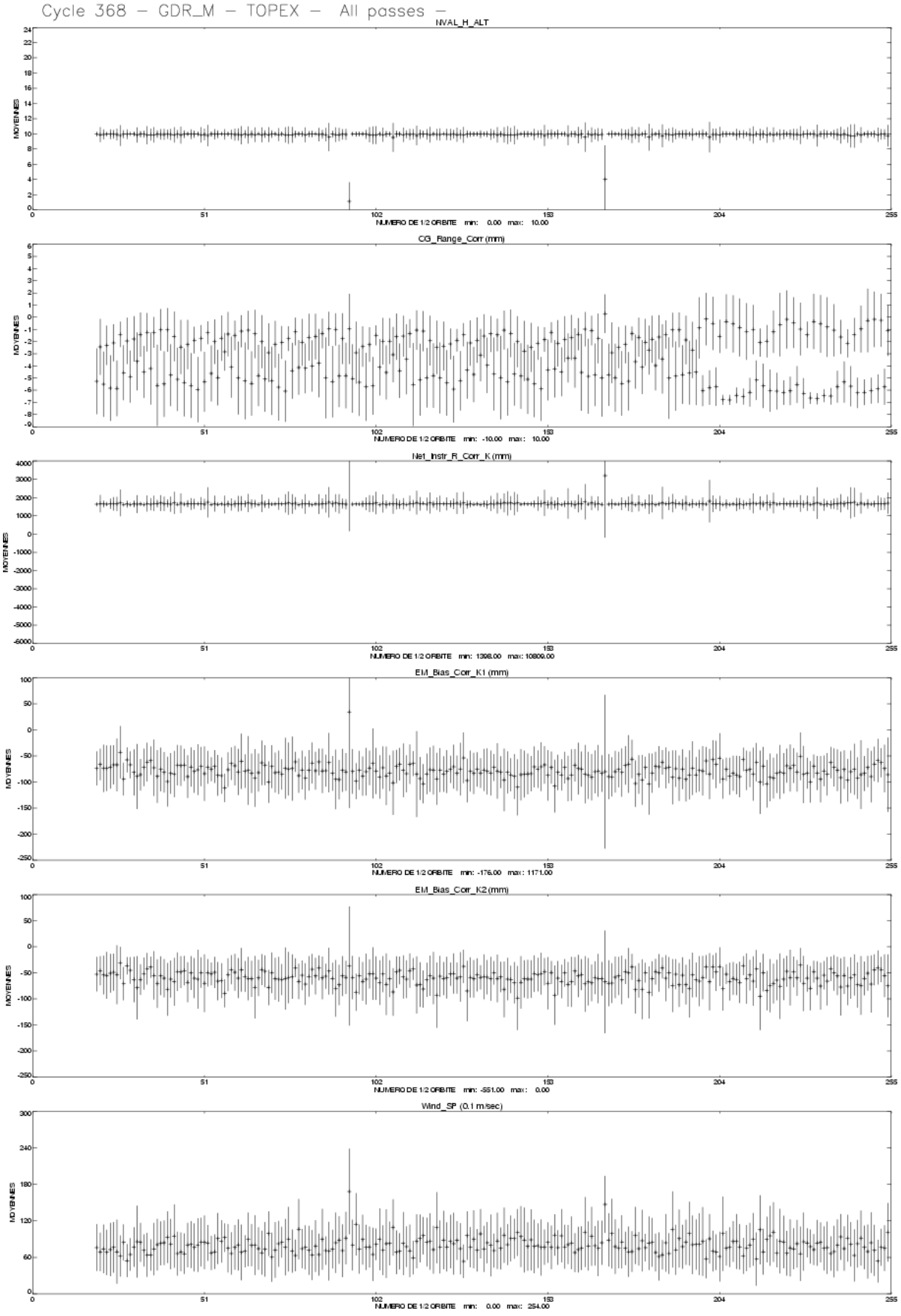


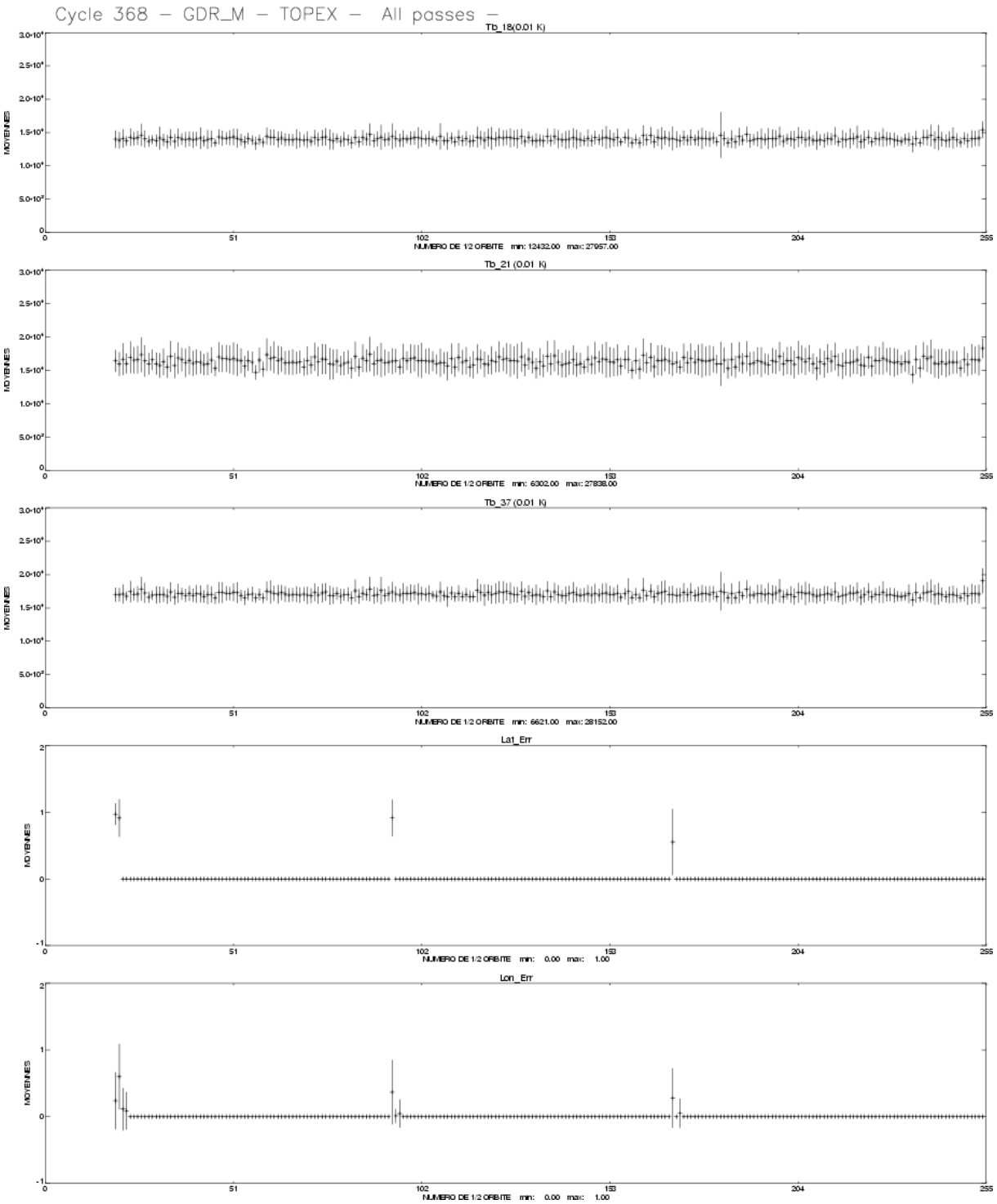
3.2 M-GDR quality flags

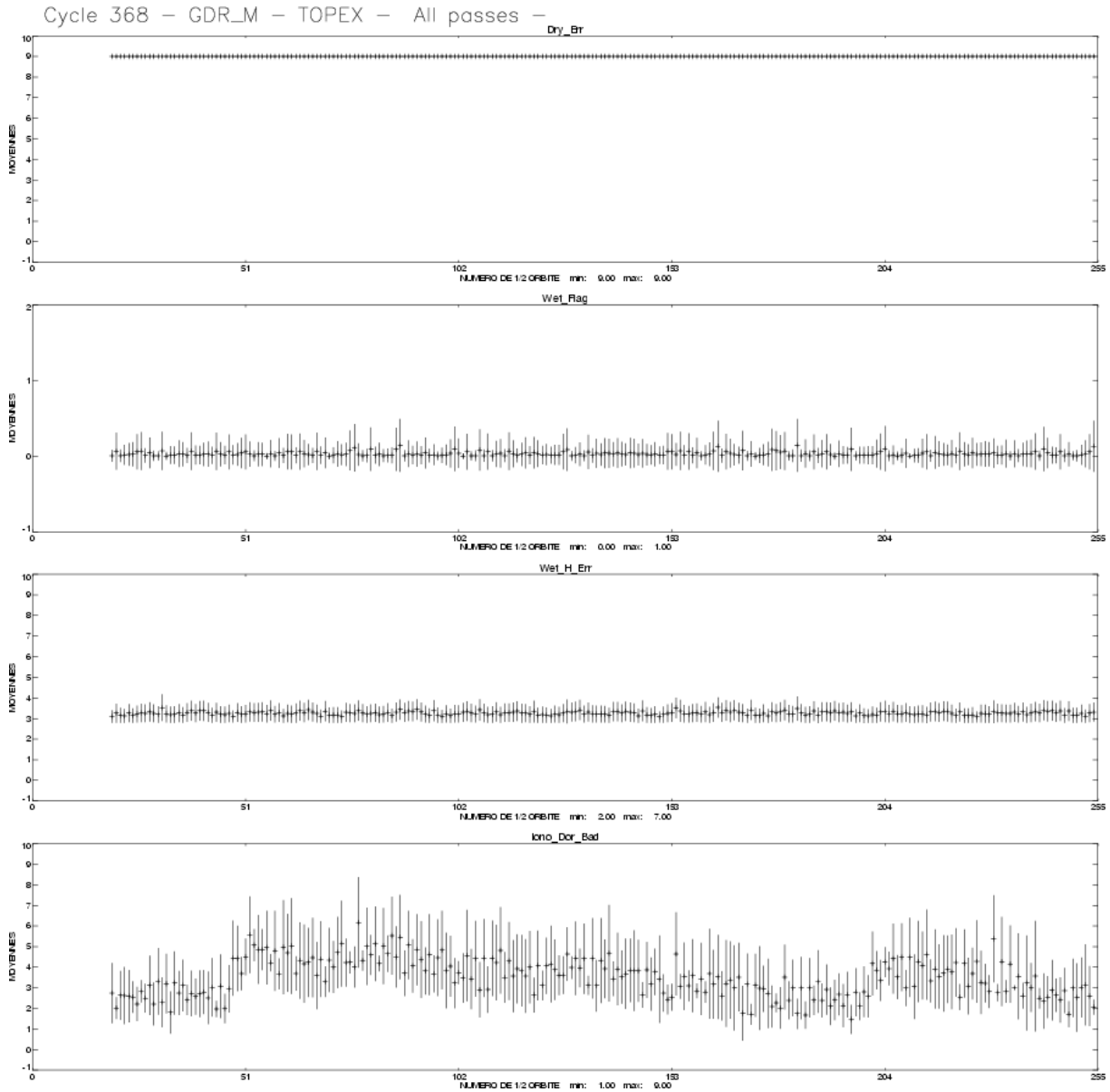
The following table indicates the percentage of measurements for which those flags are set.

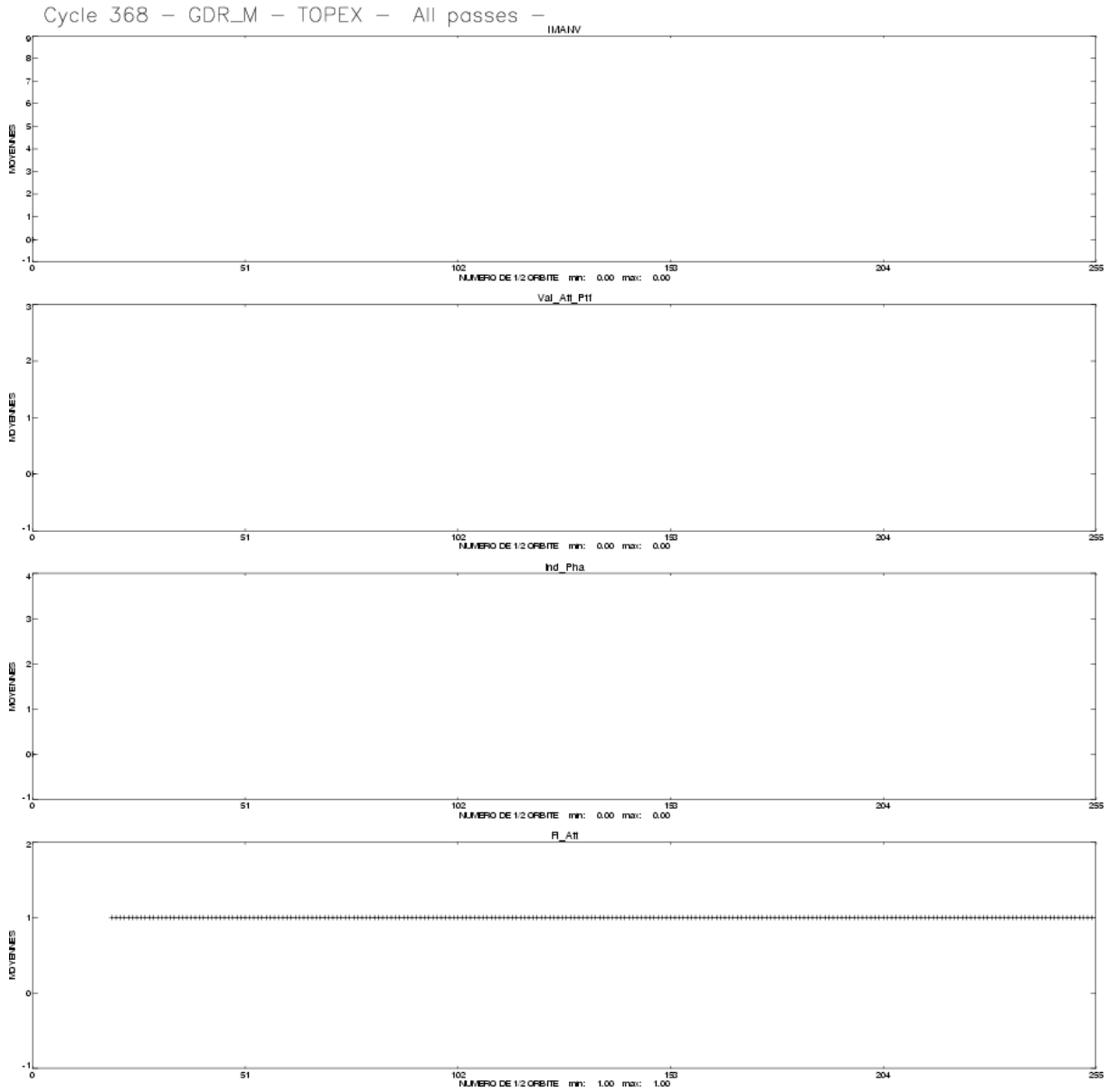
Name	Descrition	% bad
Geo_Bad_1	altimeter land flag	26.11
Geo_Bad_1	ice flag	8.92
Geo_Bad_1	radiometer land flag	27.80
Alt_Bad_1	conditions 1 altimeter	5.38
Alt_Bad_2	conditions 2 altimeter	5.24
Geo_Bad_2	rain (liquid water in excess)	3.27
Geo_Bad_2	less than 4 points for CSR3.0 tide calculation	0.46
Geo_Bad_2	less than 4 points for FES95.2.1 tide calculation	3.18
TOPEX	TOPEX not valid	0.00
TMR	TMR not valid	0.00
TMR_Bad	Brightness temperatures not valid	0.01
DORIS	DORIS not valid	0.00

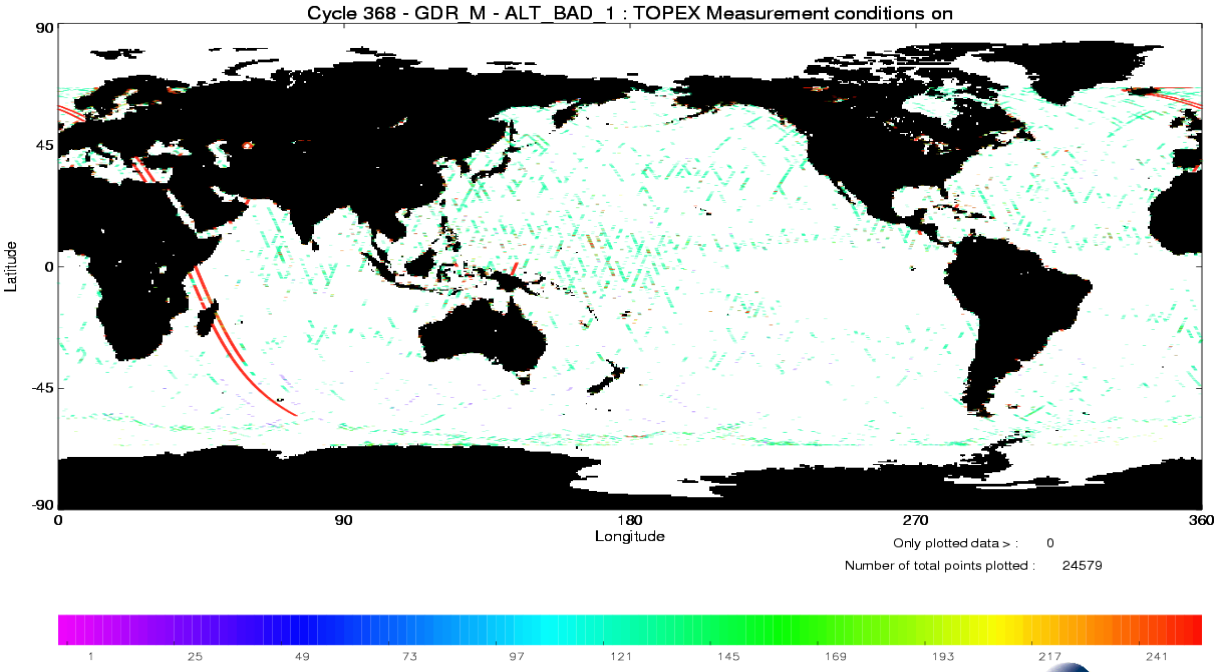
3.3 M-GDR parameter plots

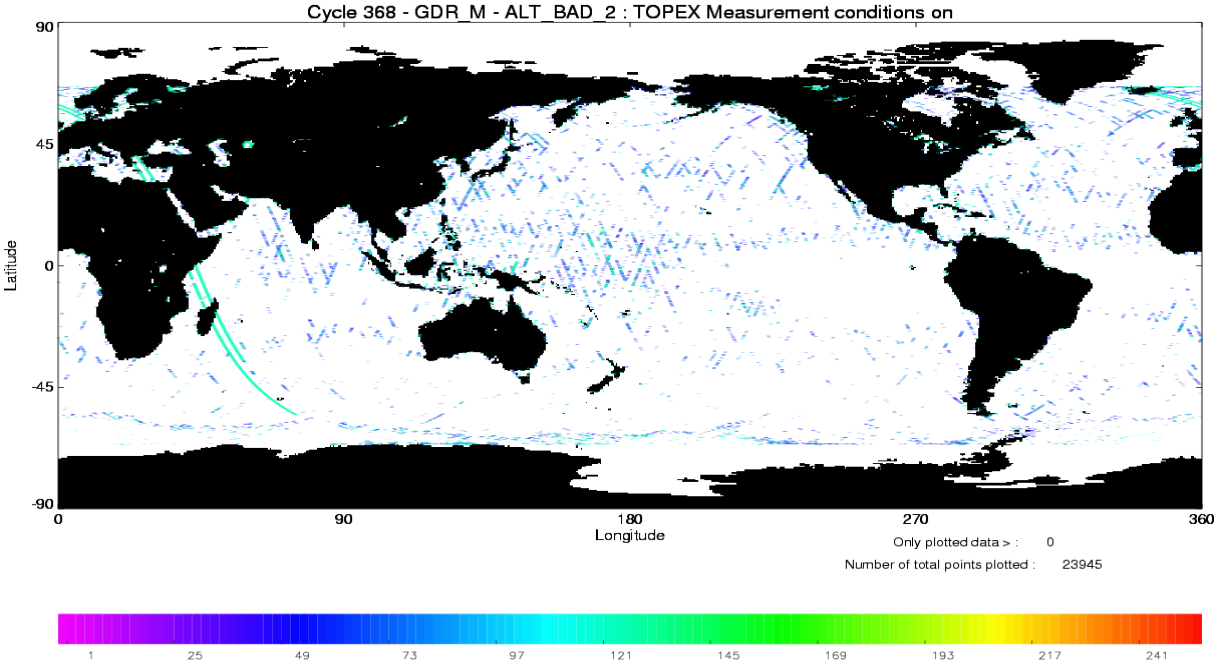


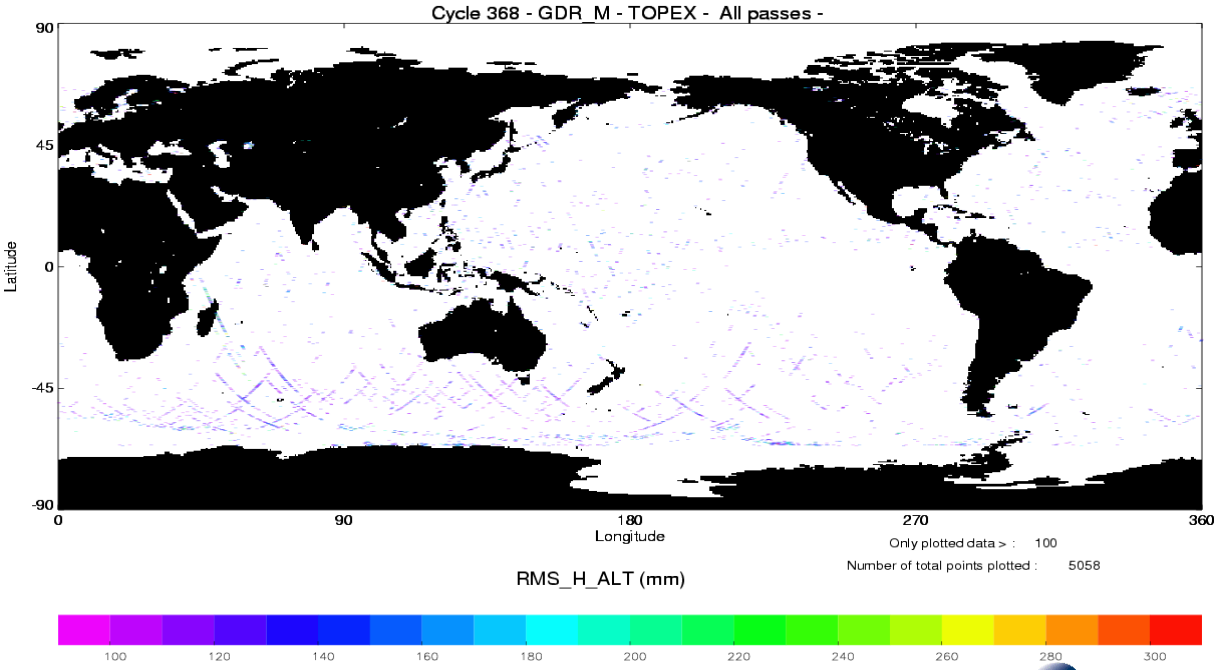

Cycle 368 – GDR_M – TOPEX – All passes –
Tb_18(0.01 K)
MOYENNES
NUMERO DE 1/2 ORBITE min: 12432.00 max: 27957.00
Tb_21 (0.01 K)
MOYENNES
NUMERO DE 1/2 ORBITE min: 6302.00 max: 27838.00
Tb_37 (0.01 K)
MOYENNES
NUMERO DE 1/2 ORBITE min: 6621.00 max: 28152.00
Lat_Err
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 1.00
Lon_Err
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 1.00

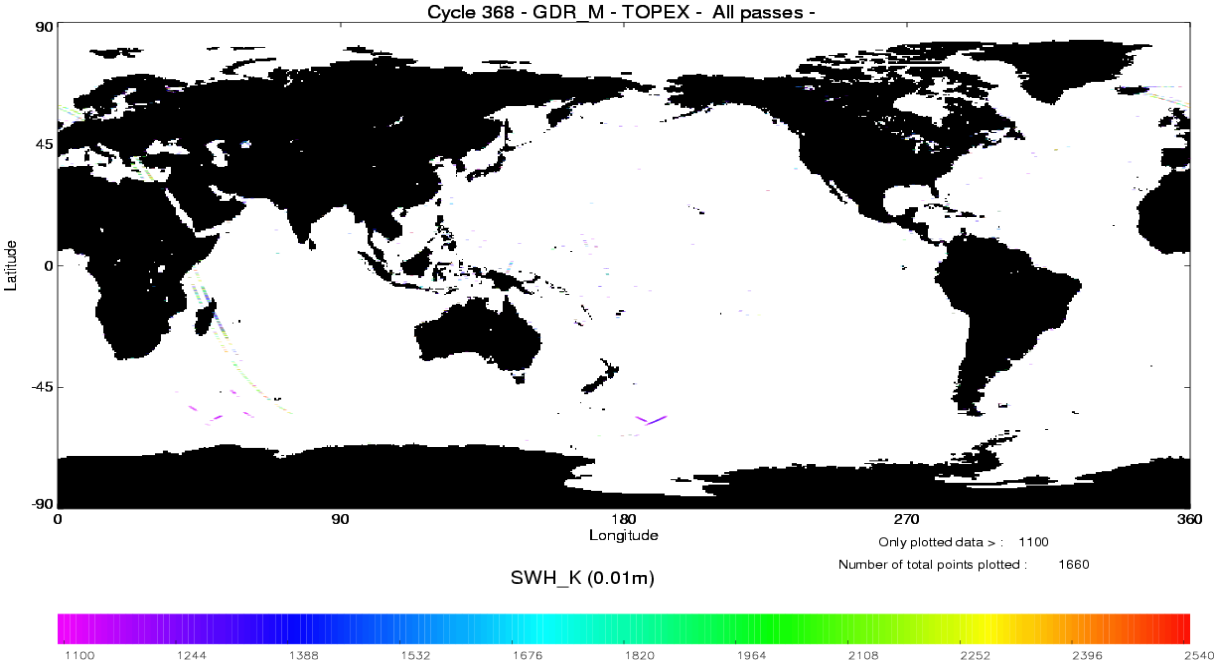

Cycle 368 – GDR_M – TOPEX – All passes –
Dry_Err
MOYENNES
NUMERO DE 1/2 ORBITE min: 9.00 max: 9.00
Wet_Flag
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 1.00
Wet_H_Err
MOYENNES
NUMERO DE 1/2 ORBITE min: 2.00 max: 7.00
Iono_Dor_Bad
MOYENNES
NUMERO DE 1/2 ORBITE min: 1.00 max: 9.00

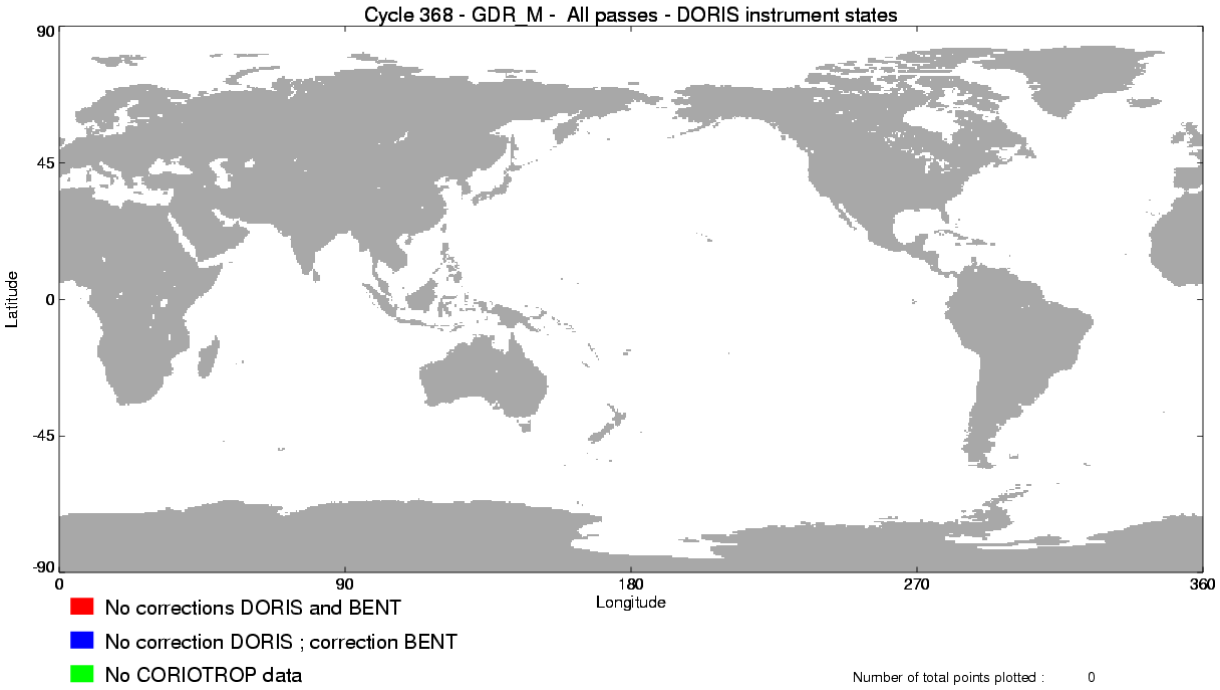

Cycle 368 – GDR_M – TOPEX – All passes –
IMANV
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Val_Att_P1f
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Ind_Pha
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Fl_Att
MOYENNES
NUMERO DE 1/2 ORBITE min: 1.00 max: 1.00


Cycle 368 - GDR_M - ALT_BAD_1 : TOPEX Measurement conditions on
Latitude
Longitude
90
45
0
-45
-90
0
90
180
270
360
Only plotted data > : 0
Number of total points plotted : 24579
1
25
49
73
97
121
145
169
193
217
241


Cycle 368 - GDR_M - ALT_BAD_2 : TOPEX Measurement conditions on
Latitude
Longitude
90
45
0
-45
-90
0
90
180
270
360
Only plotted data > : 0
Number of total points plotted : 23945
1
25
49
73
97
121
145
169
193
217
241


Cycle 368 - GDR_M - TOPEX - All passes -
90
45
0
-45
-90
Latitude
0
90
180
270
360
Longitude
Only plotted data > : 100
Number of total points plotted : 5058
RMS_H_ALT (mm)
100
120
140
160
180
200
220
240
260
280
300


Cycle 368 - GDR_M - TOPEX - All passes -
90
45
0
-45
-90
Latitude
0
90
180
270
360
Longitude
Only plotted data > : 1100
Number of total points plotted : 1660
SWH_K (0.01m)
1100
1244
1388
1532
1676
1820
1964
2108
2252
2396
2540


Cycle 368 - GDR_M - All passes - DORIS instrument states
90
45
0
-45
-90
Latitude
0
90
180
270
360
Longitude
No corrections DORIS and BENT
No correction DORIS ; correction BENT
No CORIOTROP data
Number of total points plotted : 0

3.4 Editing

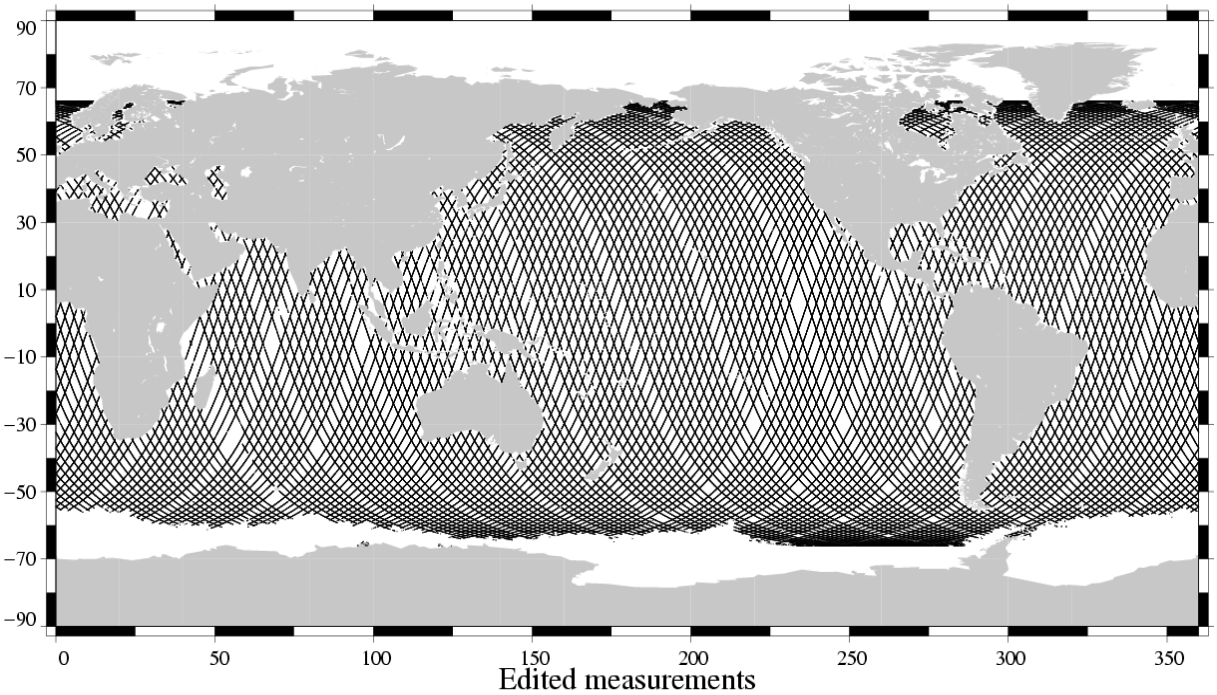
The following table gives for each tested parameter, minimum and maximum thresholds, the number and the percentage of points removed.
As a comparison, the mean percentage over one year (1997) is also given.

Parameters	Min Thres.	Max Thres.	Unit	Mean % removed in 1997	% removed
Sea surface height	-130.000	100.000	m	1.37	0.43
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	1.68
Off nadir angle from waveform	0.000	0.400	deg	1.36	3.87
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	0.39
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	0.27
Sea state Bias	-0.500	0.000	m	1.39	0.75
Backscatter coefficient	7.000	30.000	dB	1.44	0.77
Ocean tide height	-5.000	5.000	m	0.01	0.16
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 two maps are complementary: they show respectively the removed and the selected measurements in the editing procedure.
From cycle 365 to 368, the orbit is not on a repeat ground track. Thus it is not possible to use a nominal pass to compute the percentage of available measurements relative to the theory.

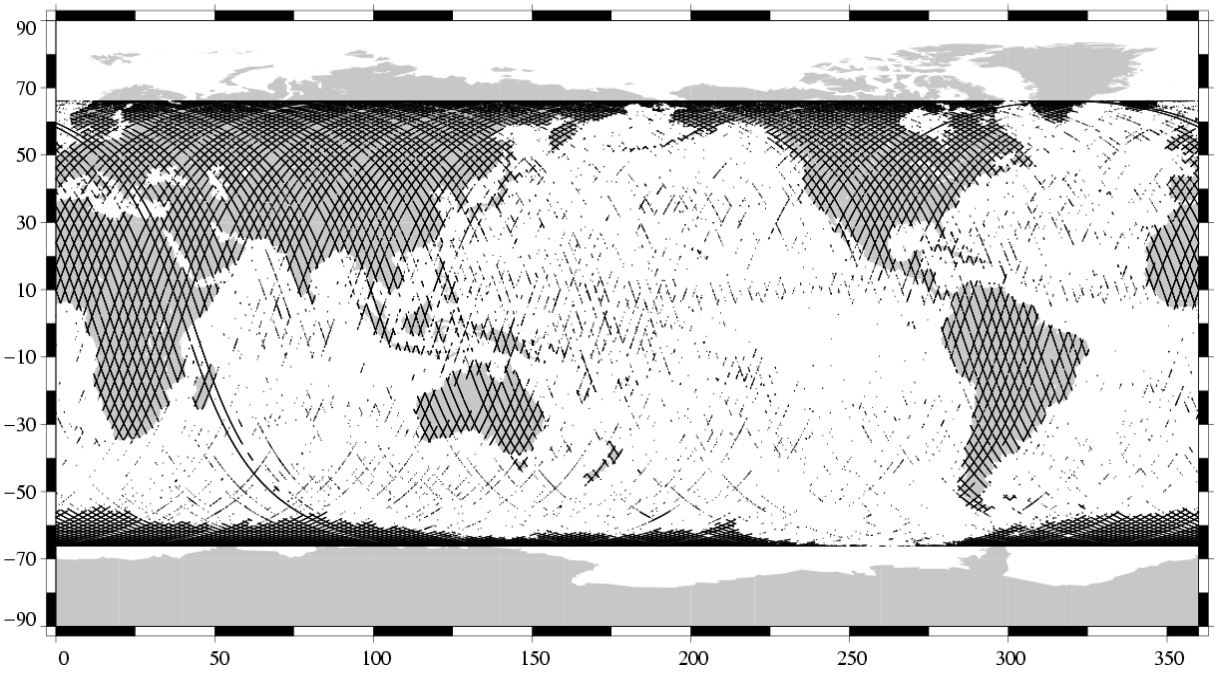
Valid data

TOPEX/Poseidon Cycle 368 (10/09/2002 / 20/09/2002)

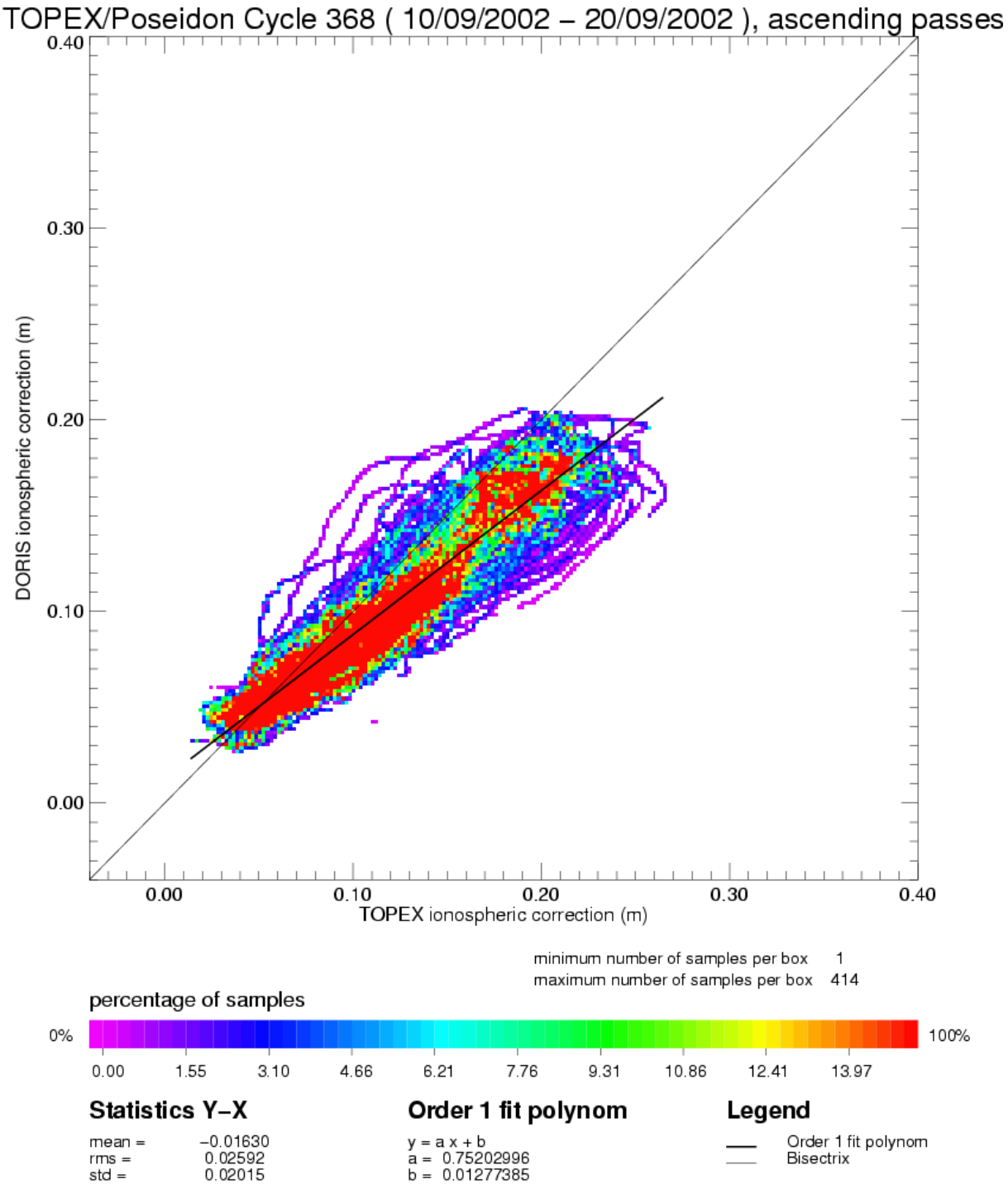


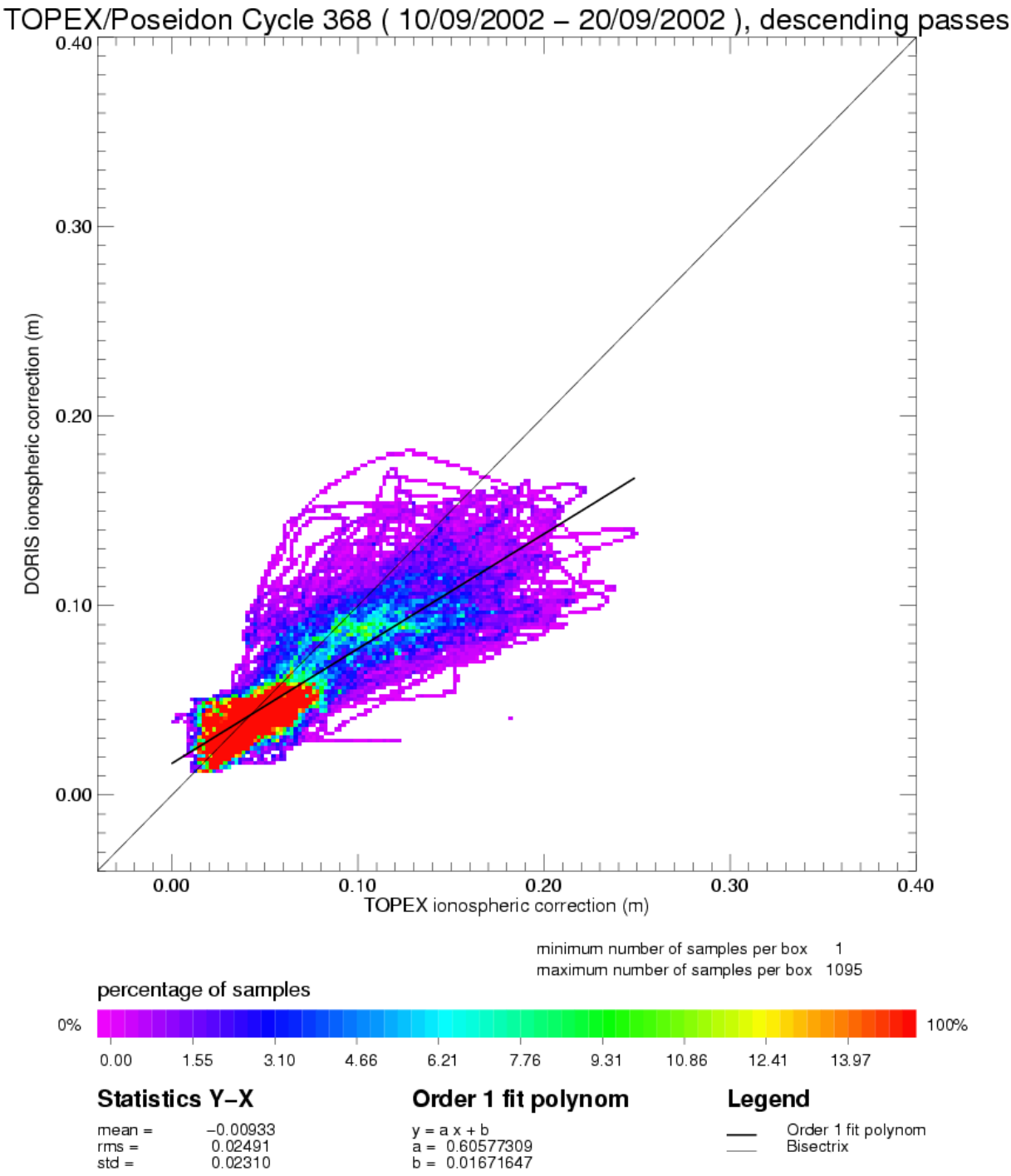
Edited measurements

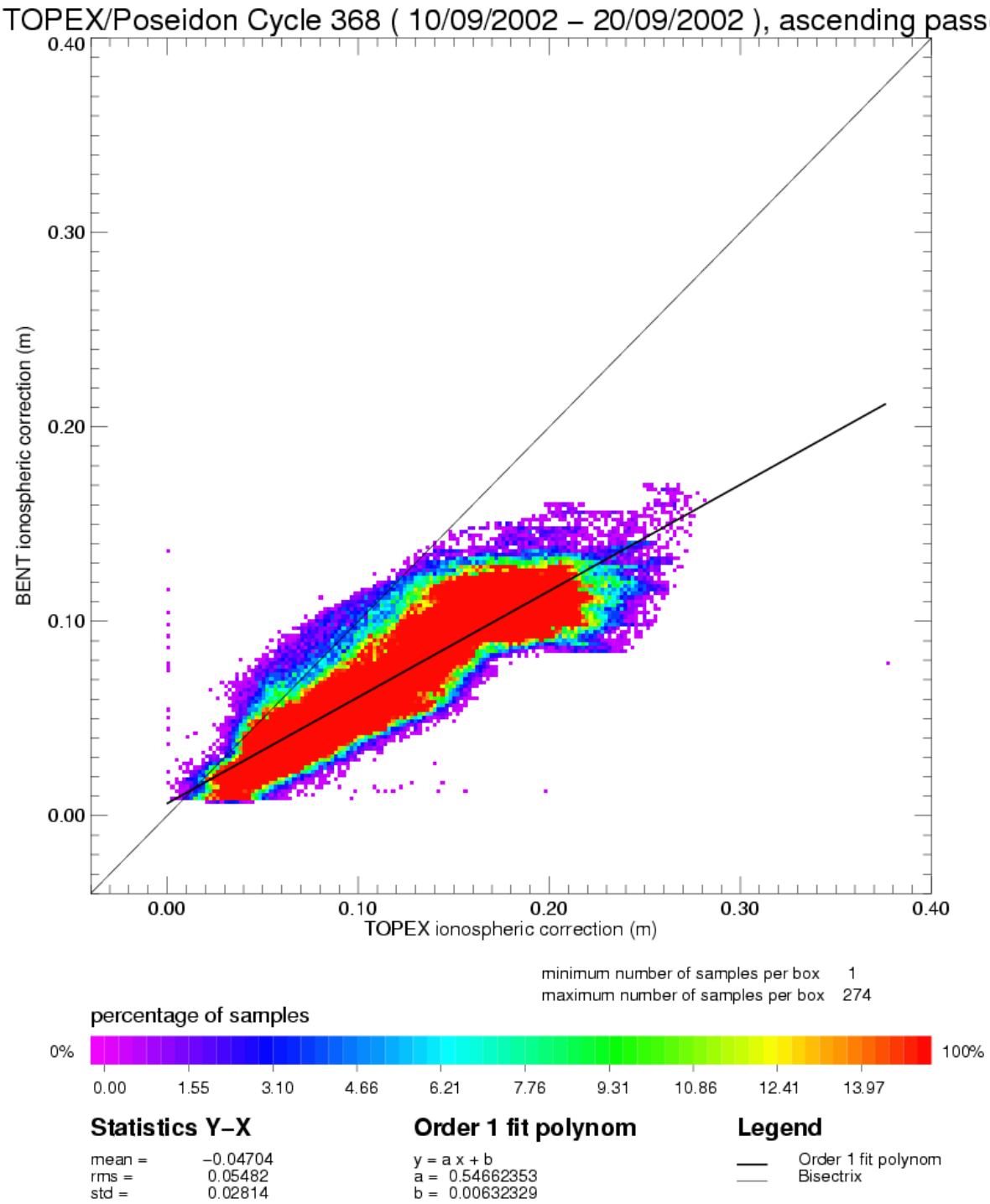
TOPEX Cycle 368 (10/09/2002 / 20/09/2002)

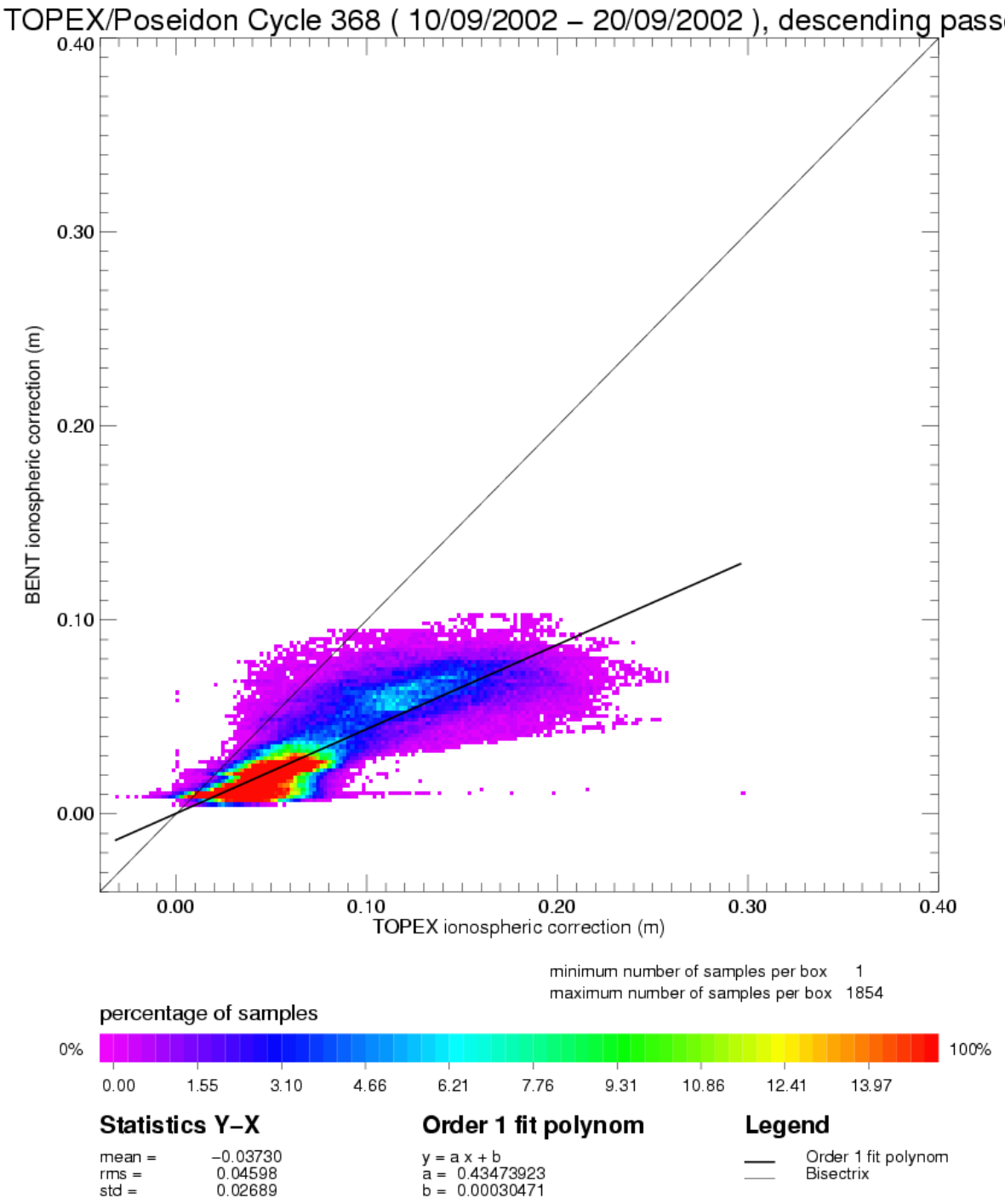


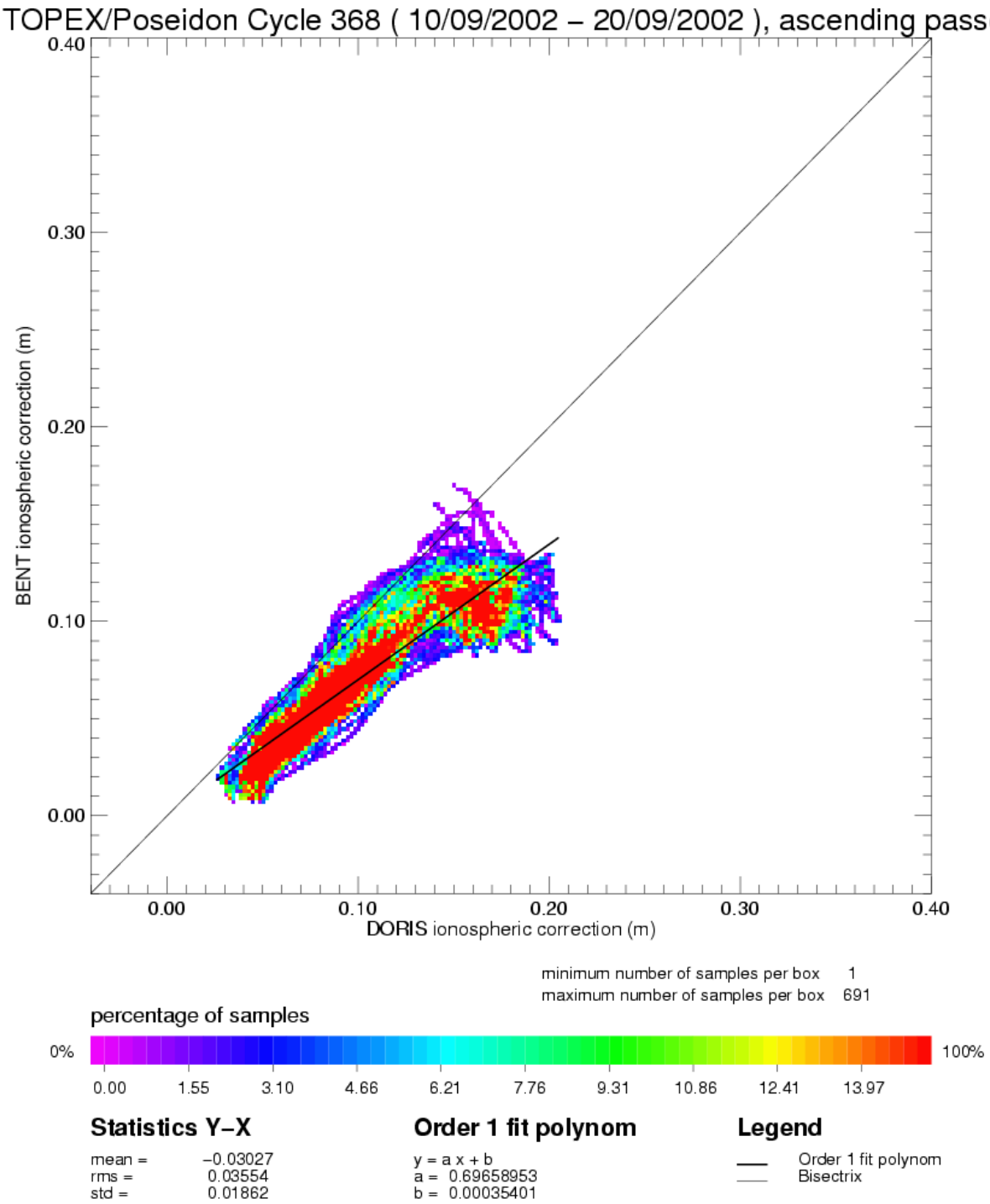
3.5 Ionospheric correction

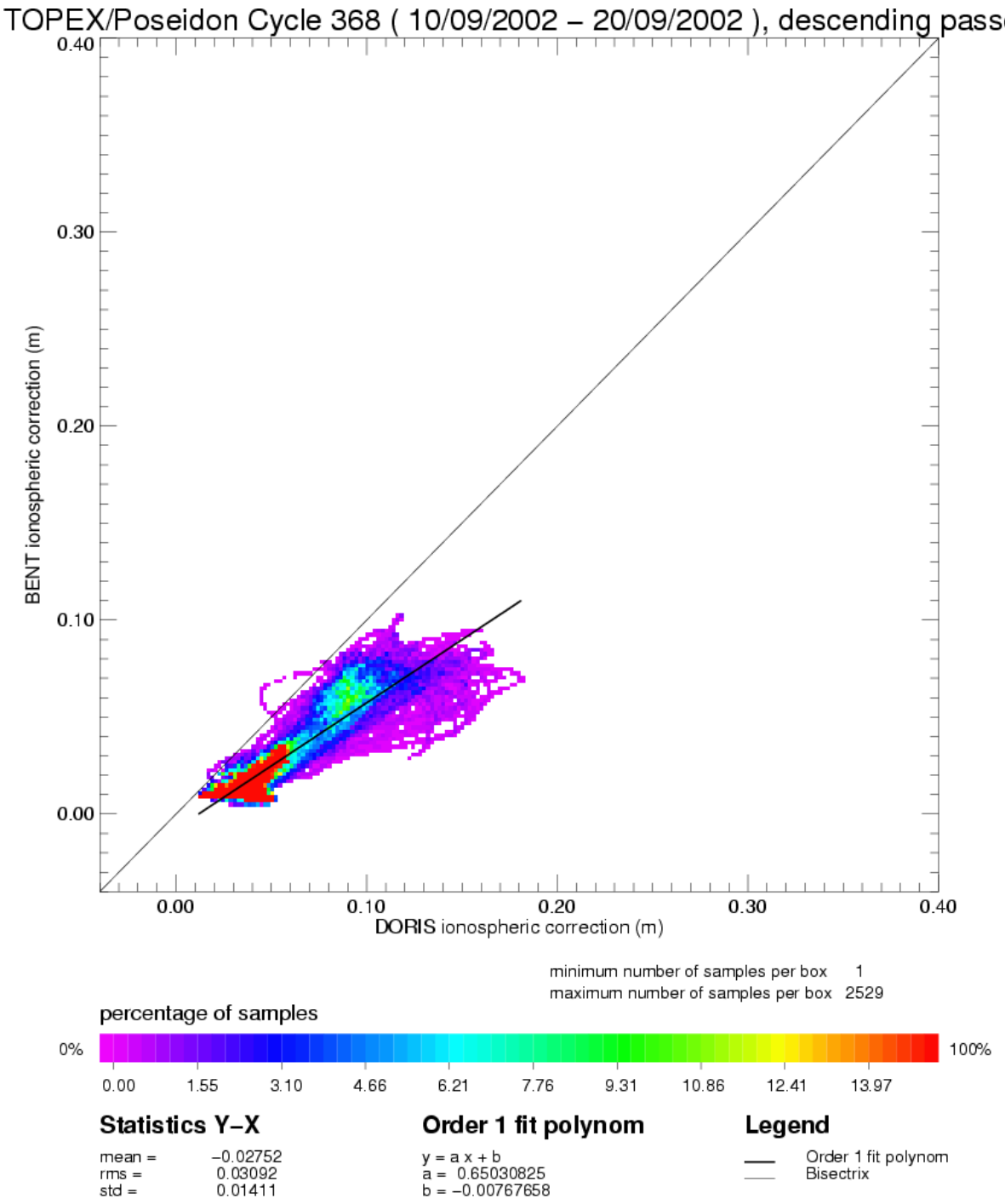



TOPEX/Poseidon Cycle 368 (10/09/2002 – 20/09/2002), descending passes
DORIS ionospheric correction (m)
TOPEX ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 1095
percentage of samples
0%
100%
0.00
1.55
3.10
4.66
6.21
7.76
9.31
10.86
12.41
13.97
Statistics Y–X
mean = −0.00933
rms = 0.02491
std = 0.02310
Order 1 fit polynom
y = a x + b
a = 0.60577309
b = 0.01671647
Legend
Order 1 fit polynom
Bisectrix

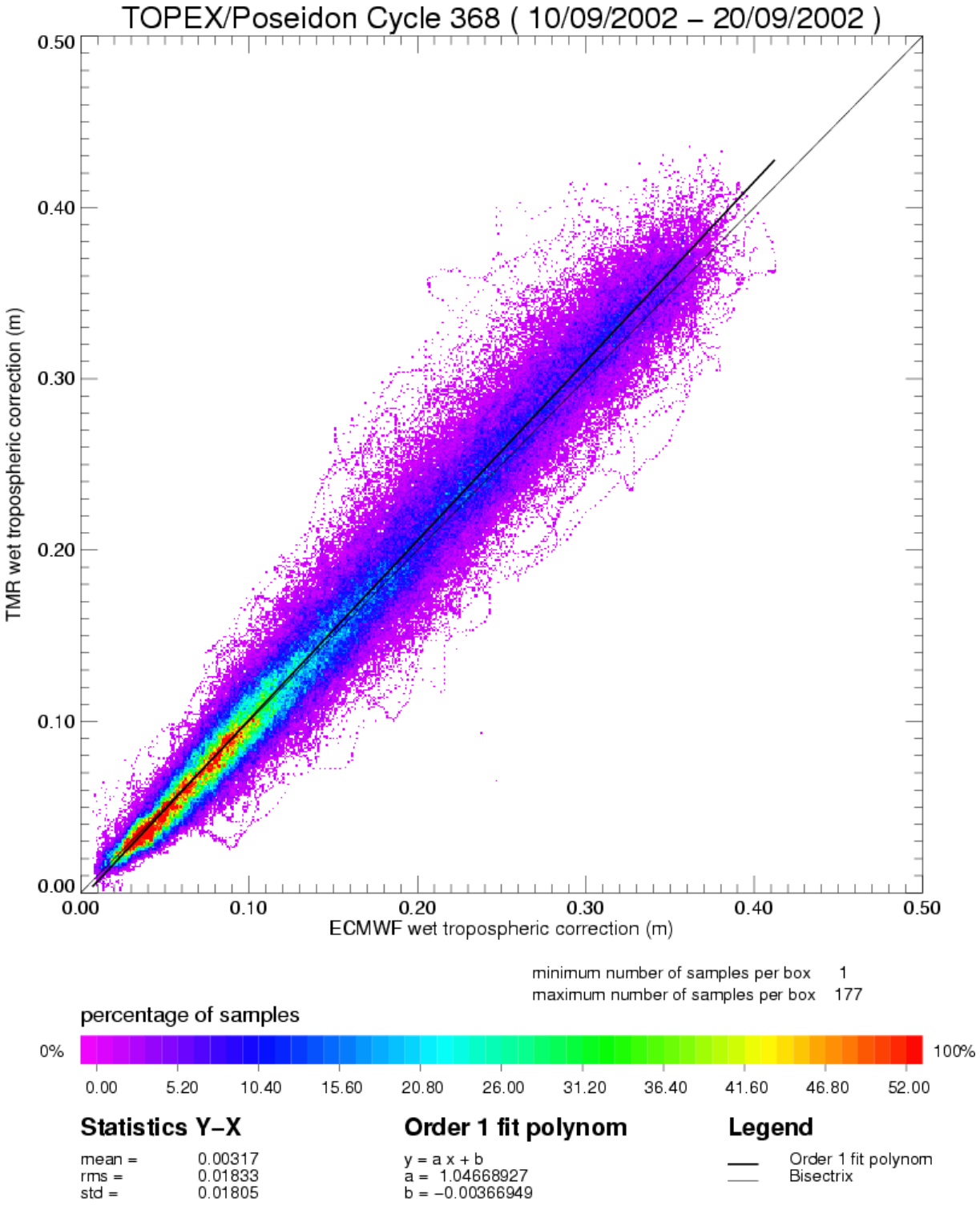

TOPEX/Poseidon Cycle 368 (10/09/2002 – 20/09/2002), ascending passes
BENT ionospheric correction (m)
TOPEX ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 274
percentage of samples
0%
100%
0.00
1.55
3.10
4.66
6.21
7.76
9.31
10.86
12.41
13.97
Statistics Y–X
mean = −0.04704
rms = 0.05482
std = 0.02814
Order 1 fit polynom
y = a x + b
a = 0.54662353
b = 0.00632329
Legend
Order 1 fit polynom
Bisectrix


TOPEX/Poseidon Cycle 368 (10/09/2002 – 20/09/2002), descending passes
BENT ionospheric correction (m)
TOPEX ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 1854
percentage of samples
0%
100%
0.00
1.55
3.10
4.66
6.21
7.76
9.31
10.86
12.41
13.97
Statistics Y–X
mean = −0.03730
rms = 0.04598
std = 0.02689
Order 1 fit polynom
y = a x + b
a = 0.43473923
b = 0.00030471
Legend
Order 1 fit polynom
Bisectrix

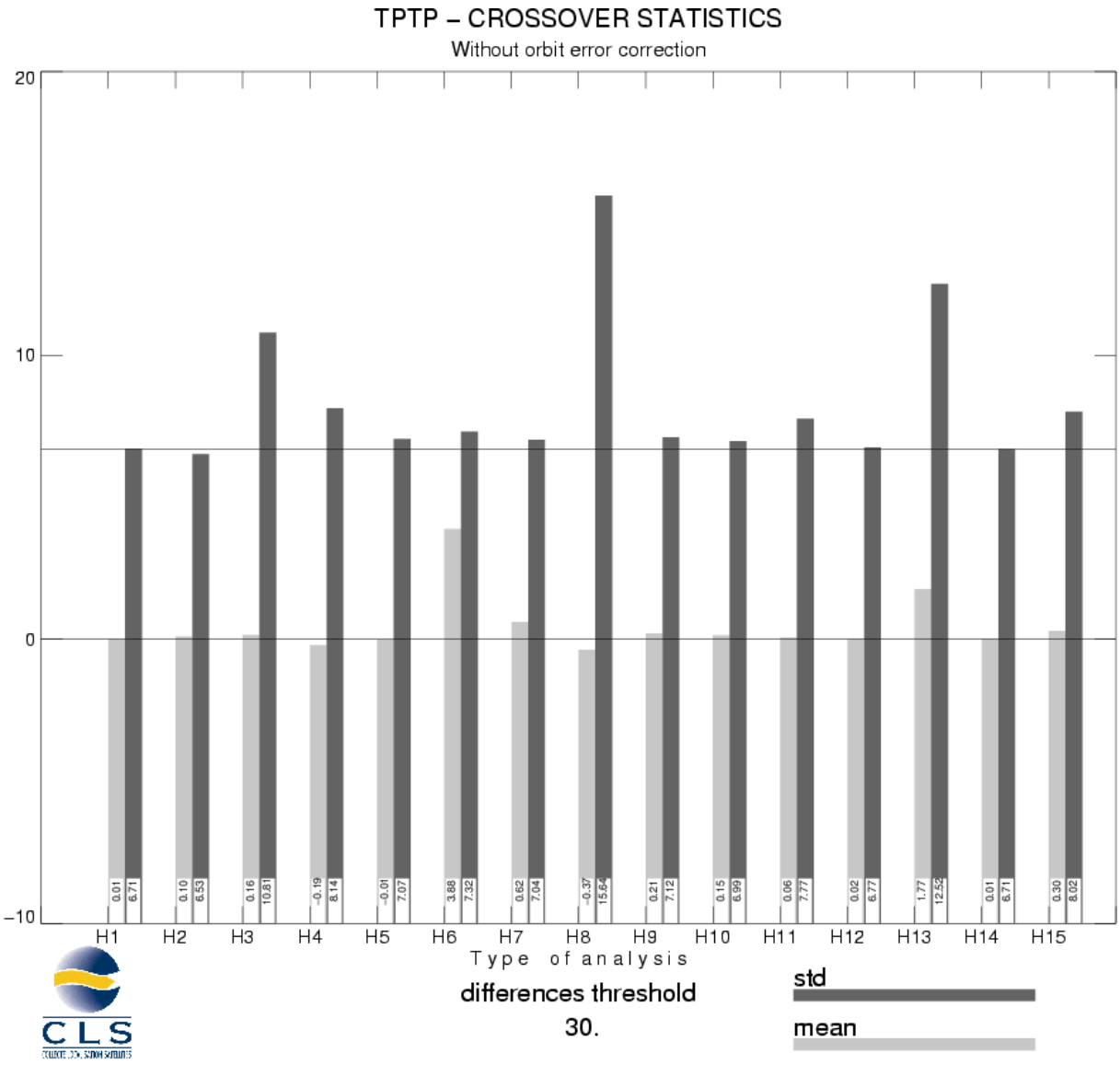

TOPEX/Poseidon Cycle 368 (10/09/2002 – 20/09/2002), ascending passes
BENT ionospheric correction (m)
DORIS ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 691
percentage of samples
0%
100%
0.00 1.55 3.10 4.66 6.21 7.76 9.31 10.86 12.41 13.97
Statistics Y–X
mean = −0.03027
rms = 0.03554
std = 0.01862
Order 1 fit polynom
y = a x + b
a = 0.69658953
b = 0.00035401
Legend
Order 1 fit polynom
Bisectrix


TOPEX/Poseidon Cycle 368 (10/09/2002 – 20/09/2002), descending passes
BENT ionospheric correction (m)
DORIS ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 2529
percentage of samples
0%
100%
0.00 1.55 3.10 4.66 6.21 7.76 9.31 10.86 12.41 13.97
Statistics Y–X
mean = −0.02752
rms = 0.03092
std = 0.01411
Order 1 fit polynom
y = a x + b
a = 0.65030825
b = −0.00767658
Legend
Order 1 fit polynom
Bisectrix

3.6 Wet tropospheric corection



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 geographique (deg): –90 / 90 , 0 / 360

Seuil sur les ecarts 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

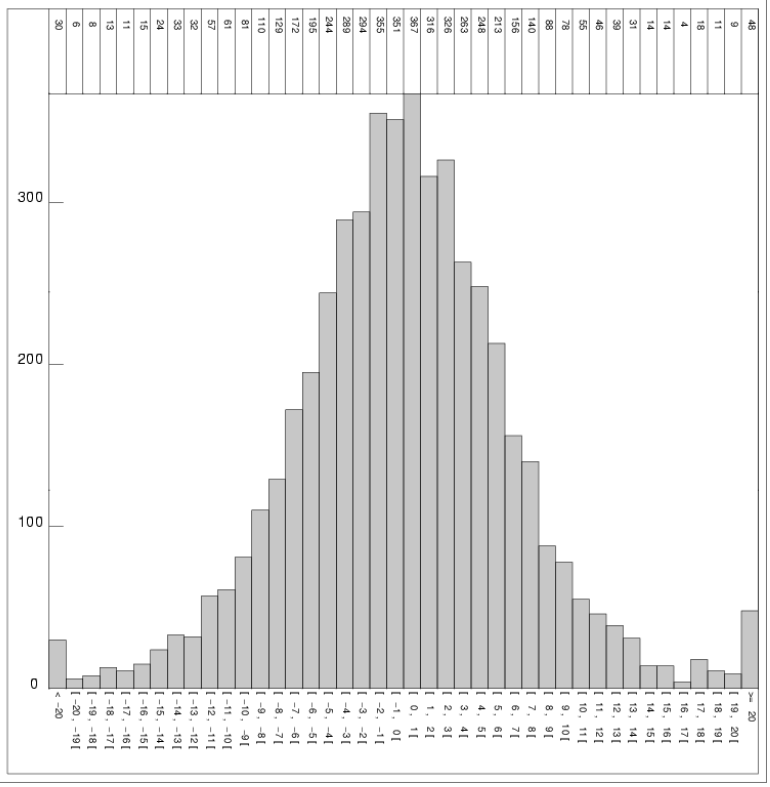
Selection(s) sur les ecarts :

Aucune

RESULTATS STATISTIQUES

Valeur minimale : –29.2500
Valeur maximale : 29.7300
Difference Max – Min: 58.9800
Nombre de points lus: 5140
Nombre de points selectionnes: 4994
Moyenne : 0.0113760
Ecart–type : 6.71392
Moyenne Quadratique : 6.71393

CLS Space Oceanography Division



TPTP – CROSSOVER STATISTICS

With orbit error correction

SSH = Corrected sea surface height

RAPPEL DES SELECTIONS

Type de points de croisement: TPTP

Zone geographique (deg): –90 / 90 , 0 / 360

Seuil sur les ecarts 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

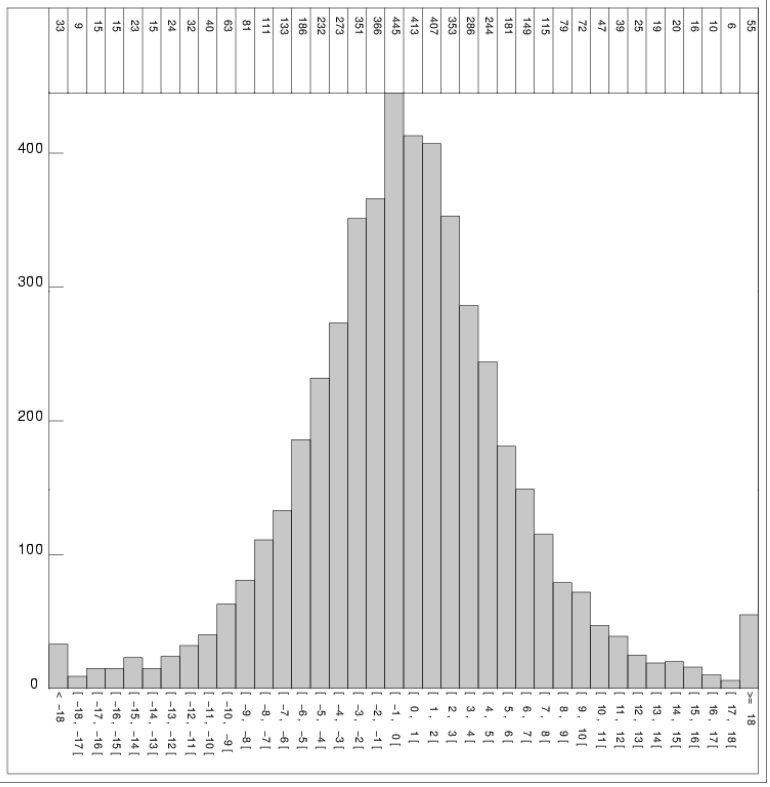
Selection(s) sur les ecarts :

Aucune

RESULTATS STATISTIQUES

Valeur minimale : –29.5800
Valeur maximale : 29.7100
Difference Max – Min: 59.2900
Nombre de points lus: 5140
Nombre de points selectionnes: 4983
Moyenne : 0.182276
Ecart–type : 6.13518
Moyenne Quadratique : 6.13789

CLS Space Oceanography Division



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 geographique (deg): –50 / 50 , 0 / 360

Seuil sur les ecarts 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

[...]

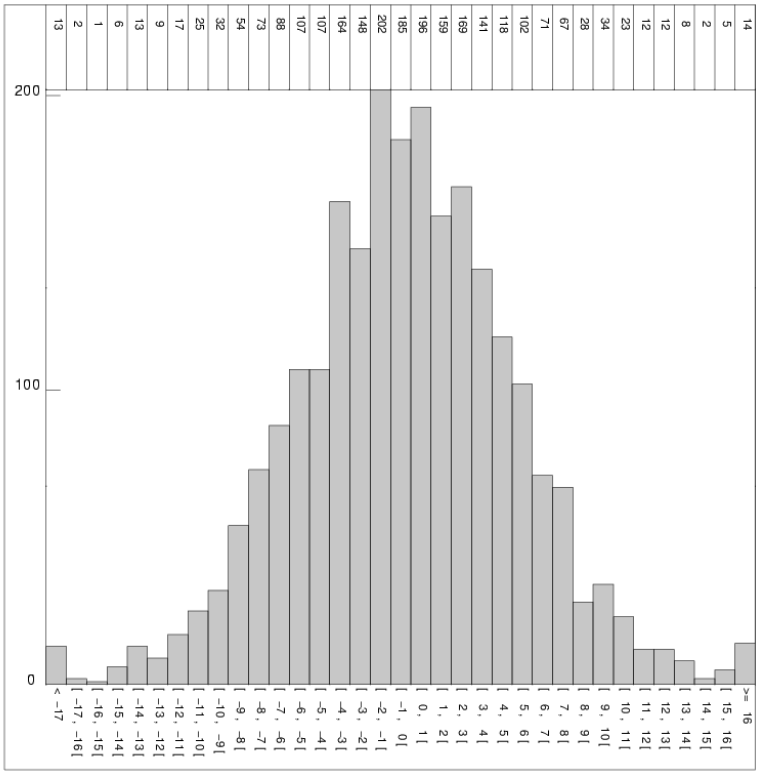
Selection(s) sur les ecarts :

Aucune

RESULTATS STATISTIQUES

Valeur minimale :	–22.3900
Valeur maximale :	29.7300
Difference Max – Min:	52.1200
Nombre de points lus:	2658
Nombre de points selectionnes:	2407
Moyenne :	–0.216435
Ecart–type :	5.61964
Moyenne Quadratique :	5.62380

CLS Space Oceanography Division



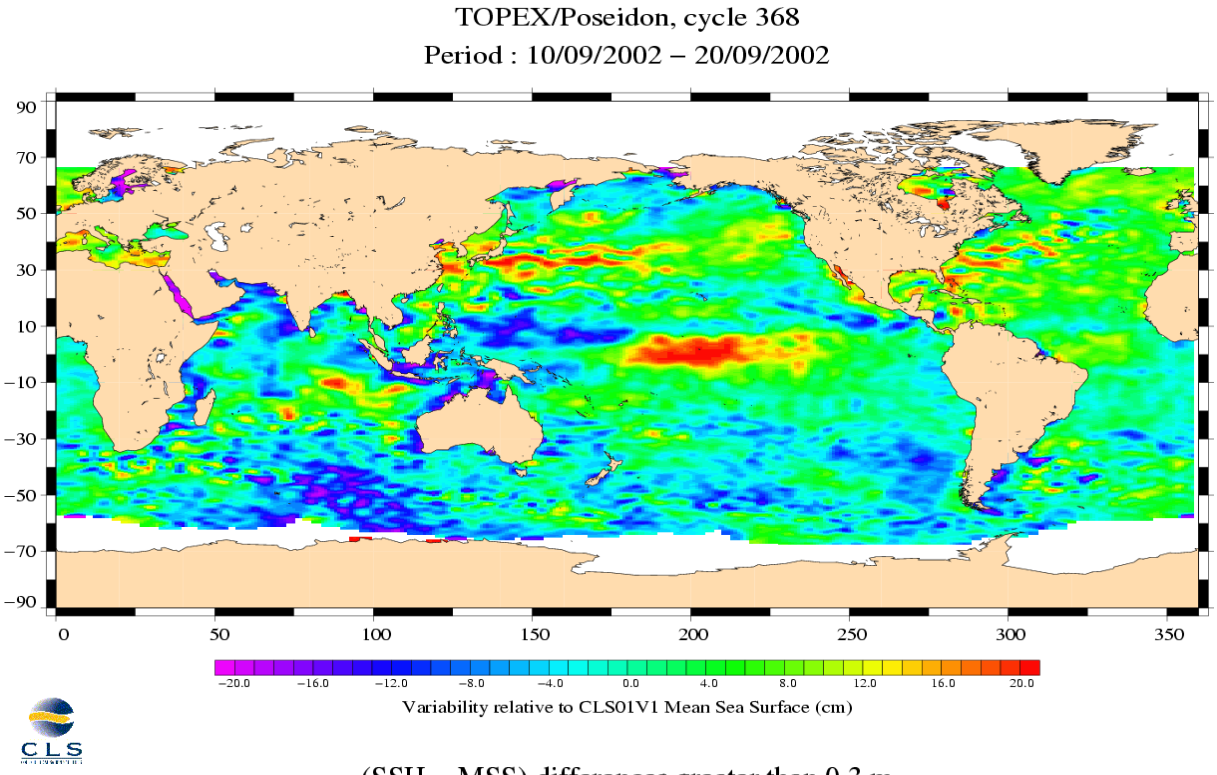
3.8 SSH variability

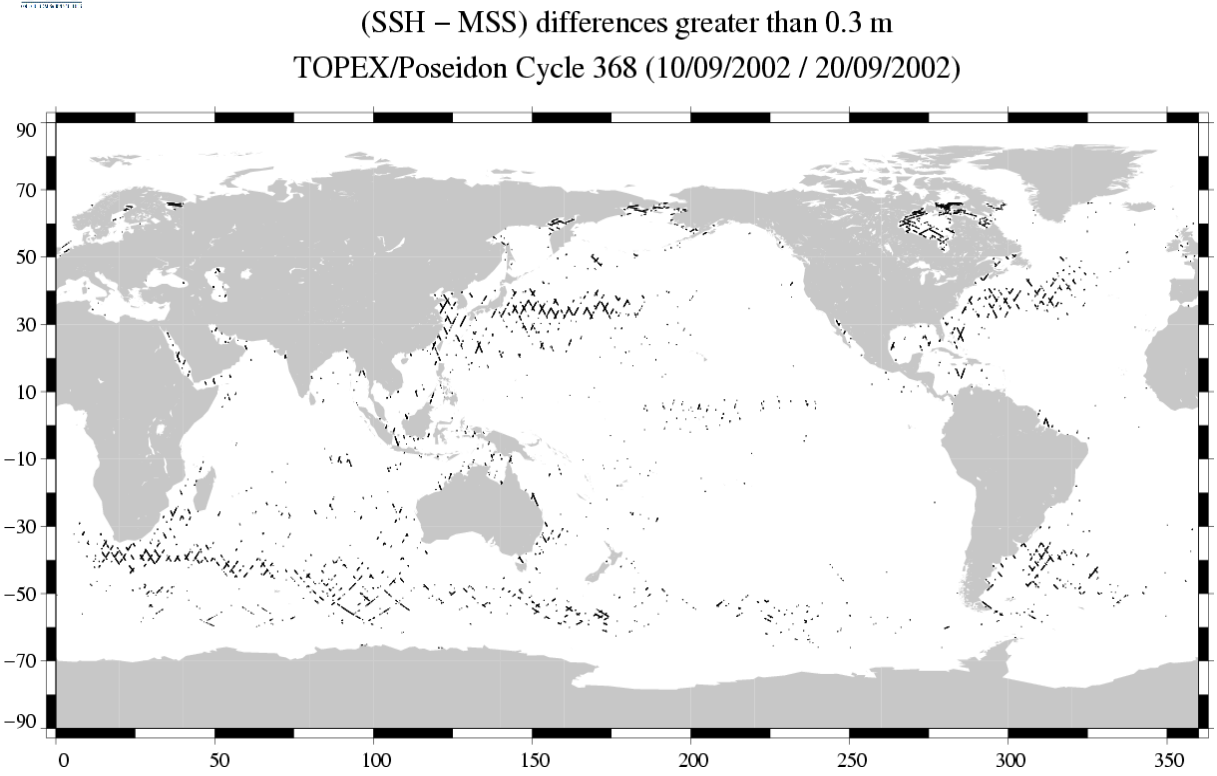
3.8.1 Sea Level Anomaly

It is not possible to compute the sea level anomaly maps through cycles 365-368 because the satellite is not on a repeat cycle orbit.

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.

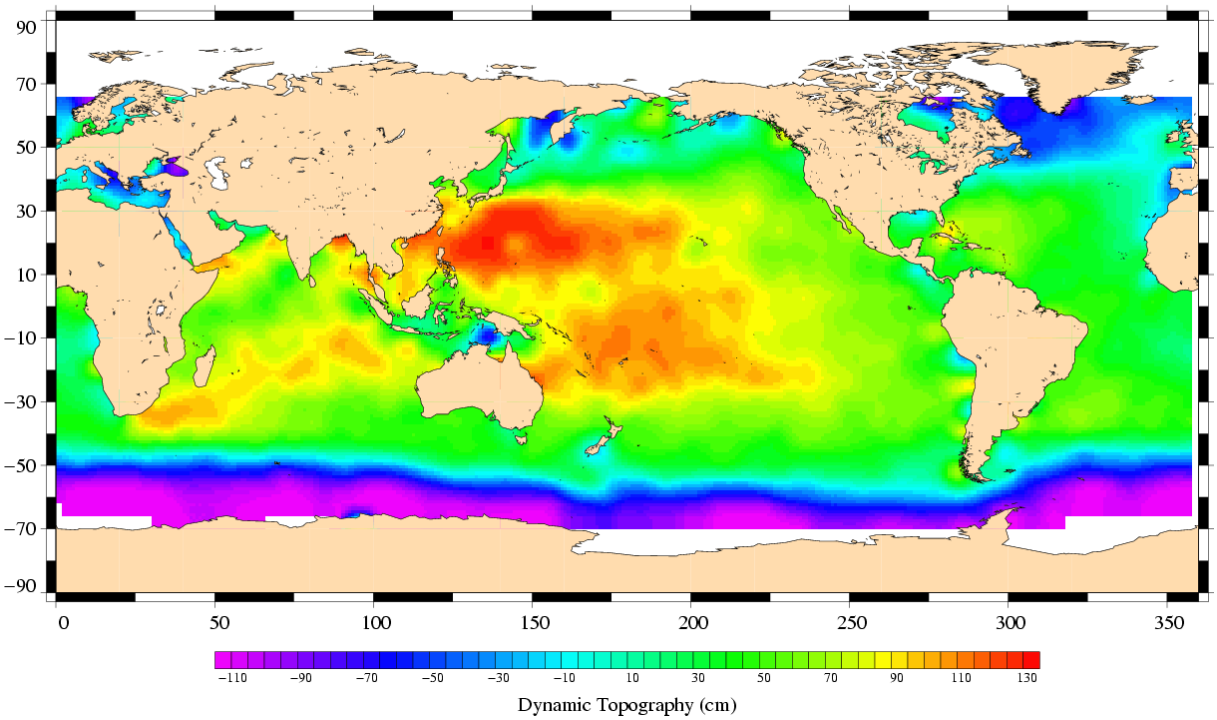




3.9 Dynamic topography

TOPEX/Poseidon, cycle 368

Period : 10/09/2002 – 20/09/2002

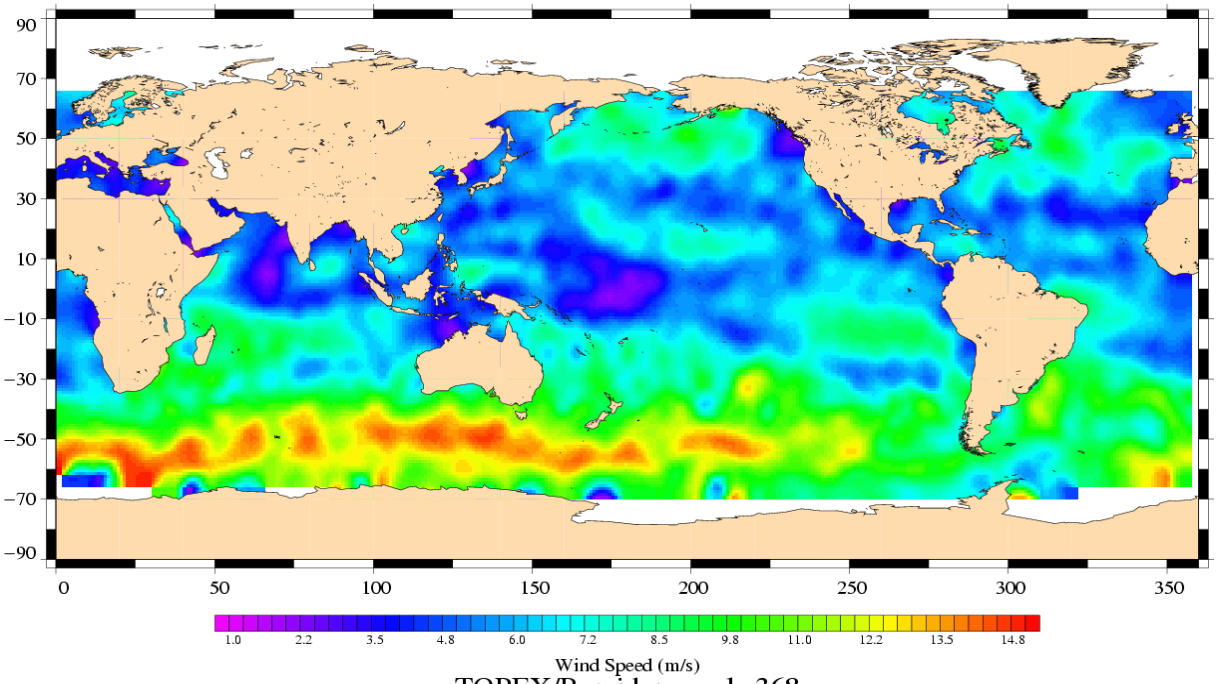


3.10 Wind and wave maps

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

TOPEX/Poseidon, cycle 368

Period : 10/09/2002 – 20/09/2002



TOPEX/Poseidon, cycle 368

Period : 10/09/2002 – 20/09/2002