TOPEX/Poseidon MGDR
Quality Assessment Report

Cycle 365

11-08-2002 21-08-2002

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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

The crossover standard deviation is 6.24 cm rms, and the standard deviation of Sea Level Anomalies (SLA) relative to a Mean Sea Surface is 9.04 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

- TOPEX/Poseidon Tandem Mission Orbit Maneuvers : Starting on August 15, a six-maneuver sequence was conducted over a period of about 30 days to move T/P to the new Tandem Mission orbit 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.

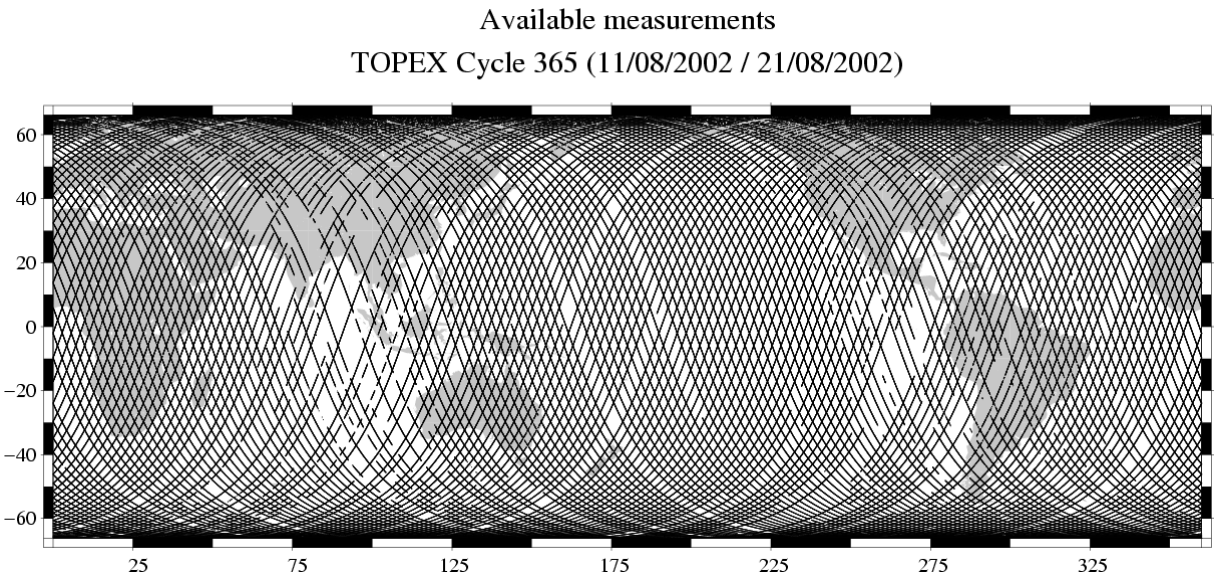
  The two first maneuvers to move TOPEX/Poseidon to the new orbit (approximately 160 km west) were executed during this cycle, the first one on 15 August 2002 at 12h10 pm, the second on 19 August at 11h47.
- Missing measurements : 11 passes are missing due to tape recorder problems or maneuvers.
- The Alt_bad_1 quality flag is set on passes 112 and 214. These measurements have been removed in the editing procedure due to bad altimeter measurement.
- Problems in the interpolation of the TMR parameters occur when there are missing measurements (tape recorder failures). As a result 4.15% of the measurements are removed by the TMR correction criterion.
- Due to the two maneuvers in this cycle there are some significant differences between CNES and NASA ephemeris (passes 111, 112 and 213 to 216). Some Sat_Alt (NASA orbit) latitude and longitude values are equal to zero in these passes.

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

638222 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 365 and illustrates the tape recorder problems.

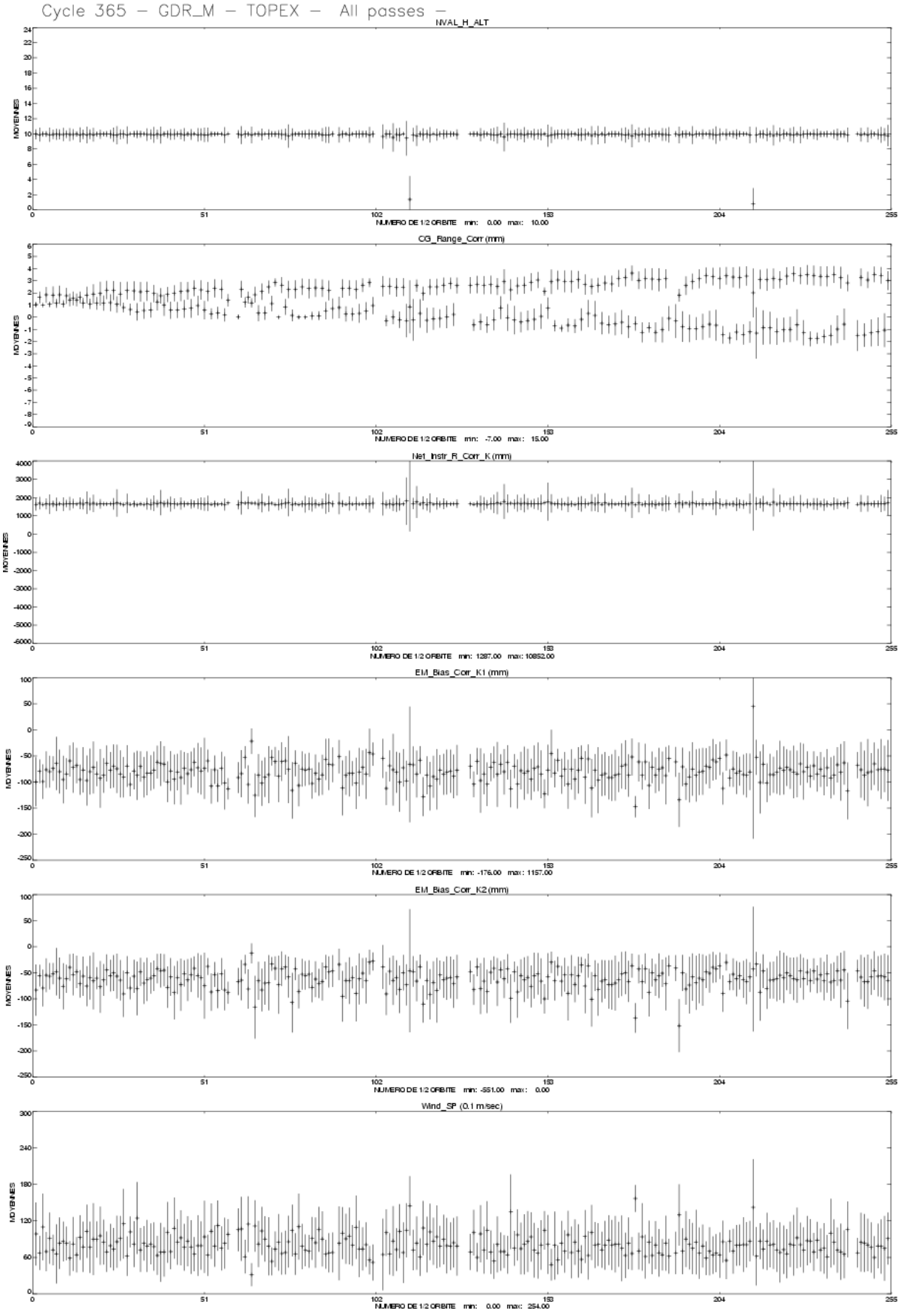


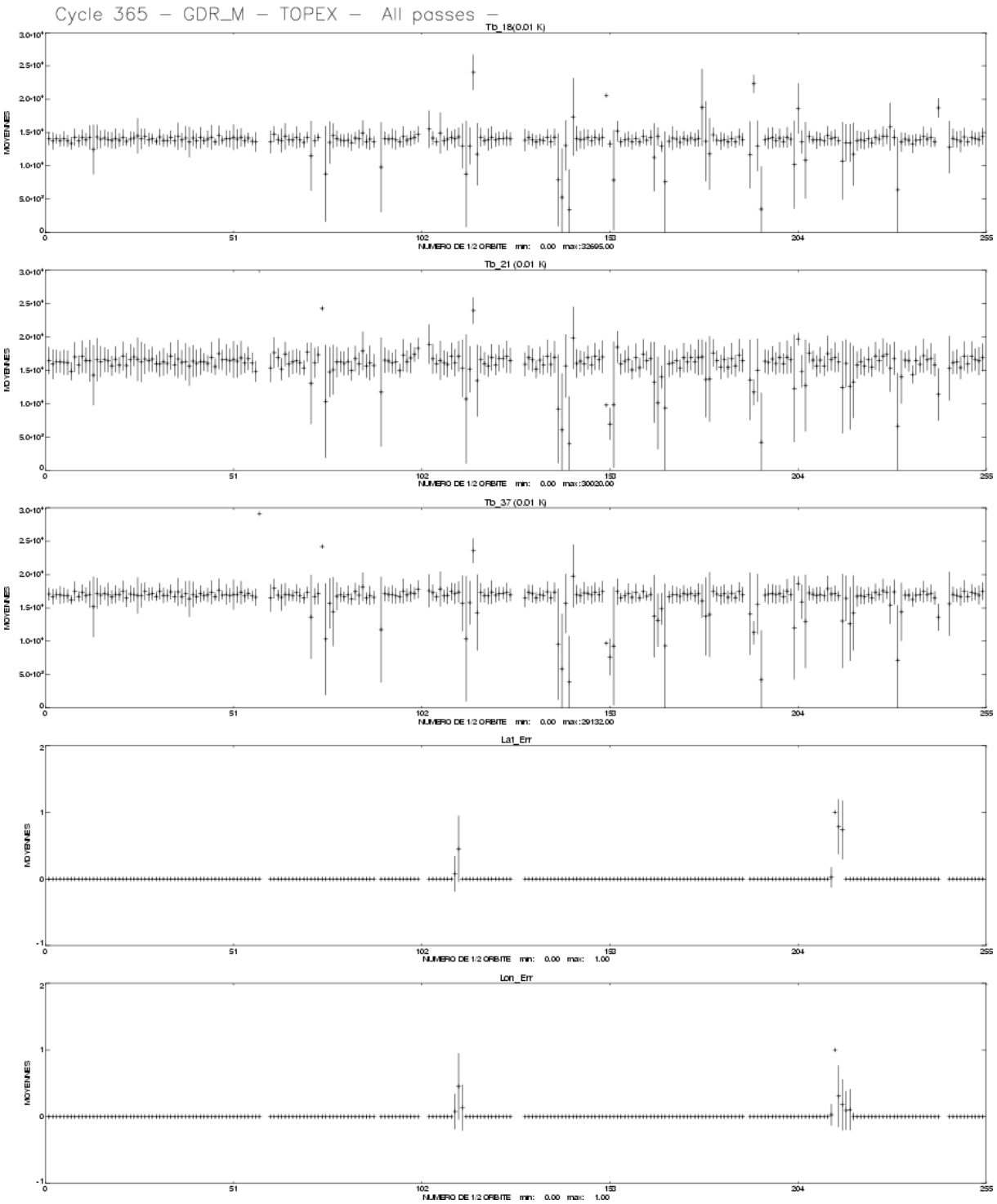
3.2 M-GDR quality flags

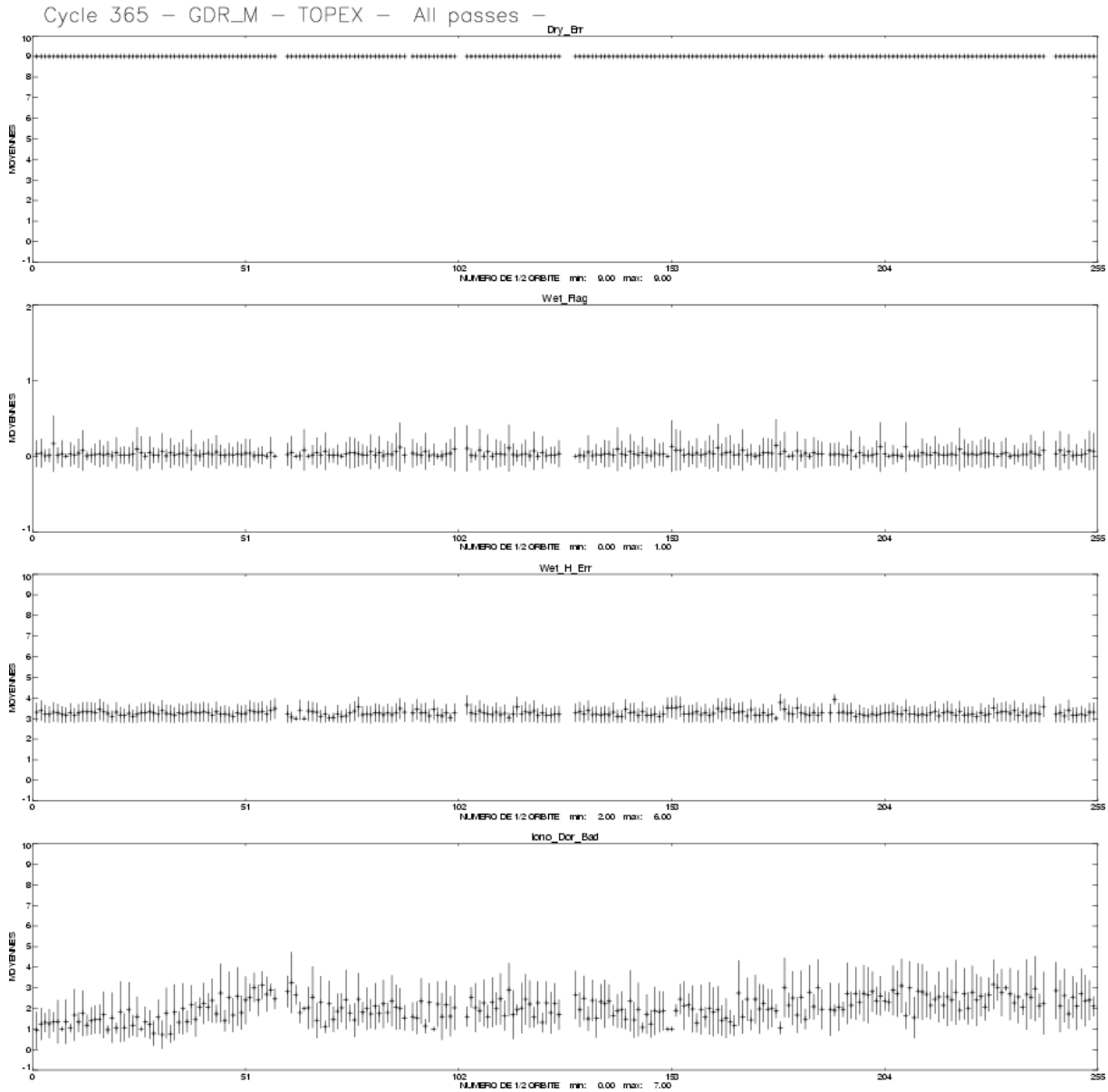
The following table indicates the percentage of measurements for which those flags are set.

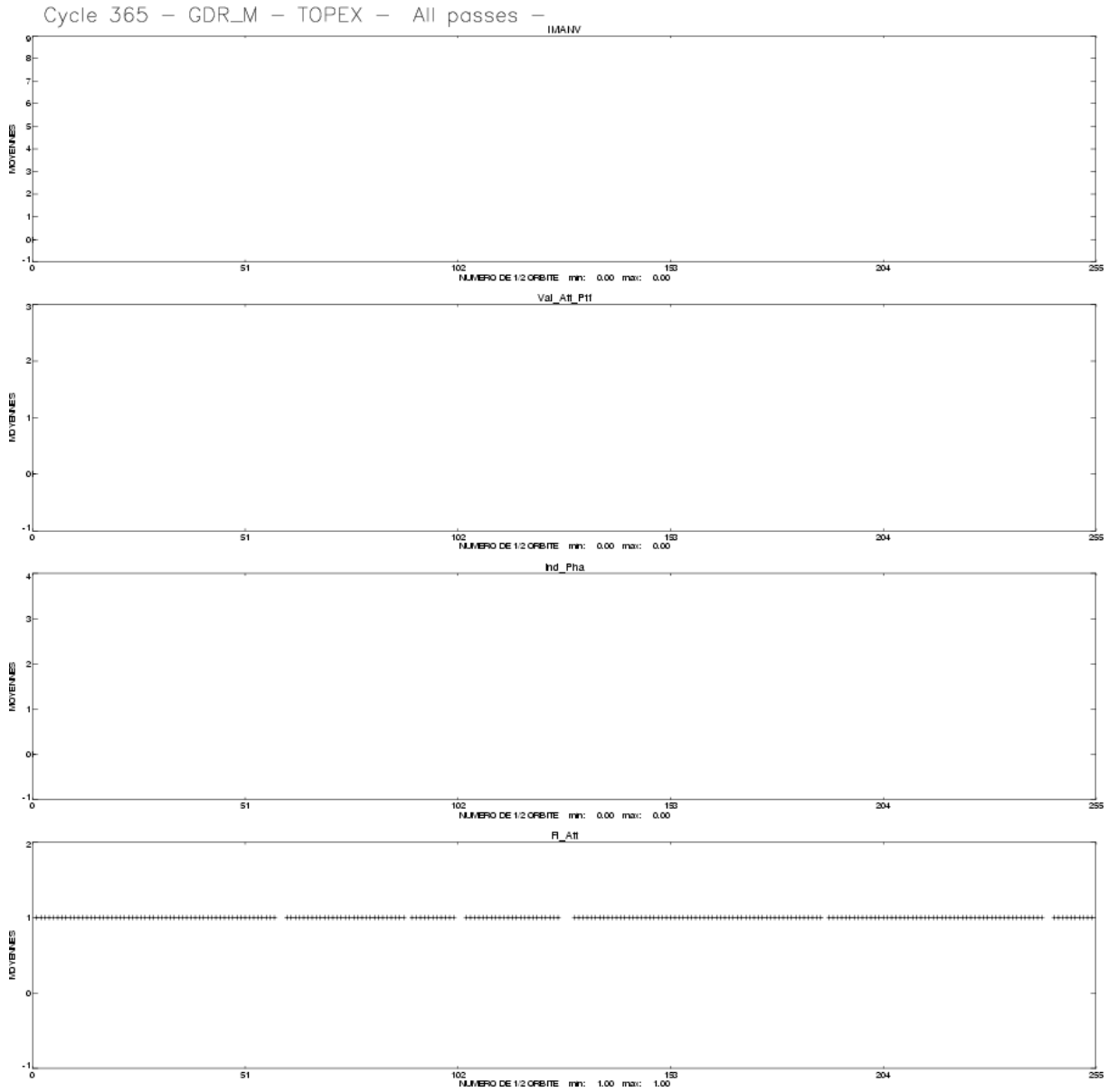
Name	Descrition	% bad
Geo_Bad_1	altimeter land flag	25.31
Geo_Bad_1	ice flag	8.52
Geo_Bad_1	radiometer land flag	27.86
Alt_Bad_1	conditions 1 altimeter	5.92
Alt_Bad_2	conditions 2 altimeter	5.75
Geo_Bad_2	rain (liquid water in excess)	6.86
Geo_Bad_2	less than 4 points for CSR3.0 tide calculation	0.45
Geo_Bad_2	less than 4 points for FES95.2.1 tide calculation	3.08
TOPEX	TOPEX not valid	0.00
TMR	TMR not valid	0.00
TMR_Bad	Brightness temperatures not valid	5.34
DORIS	DORIS not valid	0.00

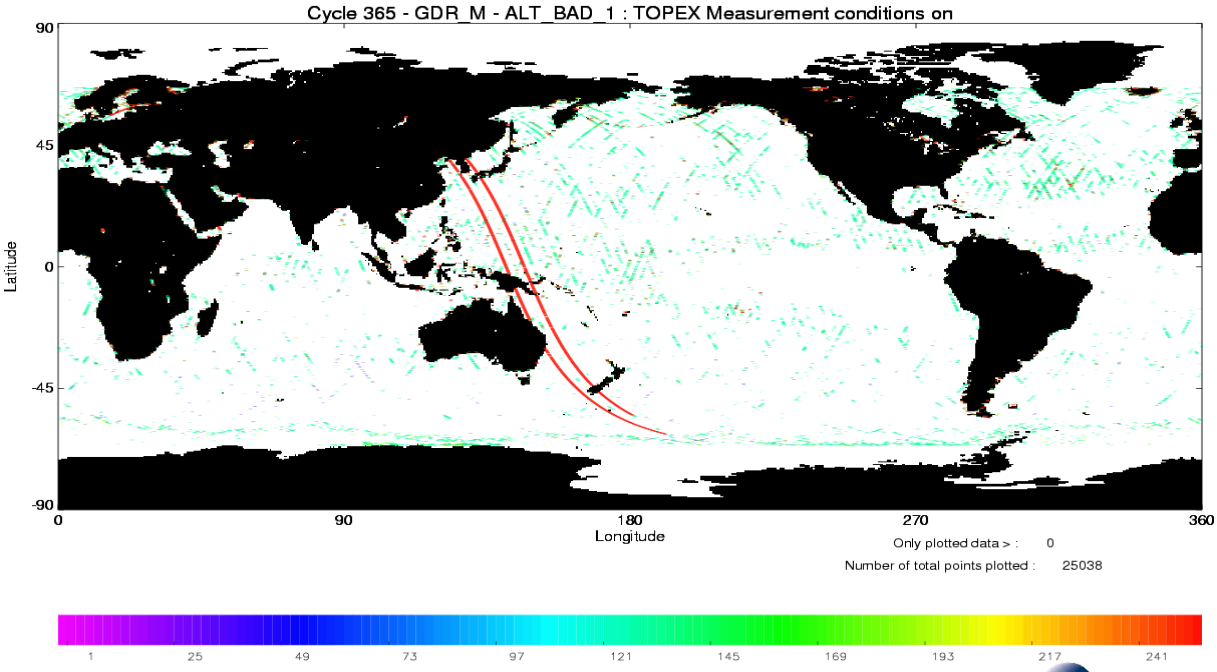
3.3 M-GDR parameter plots

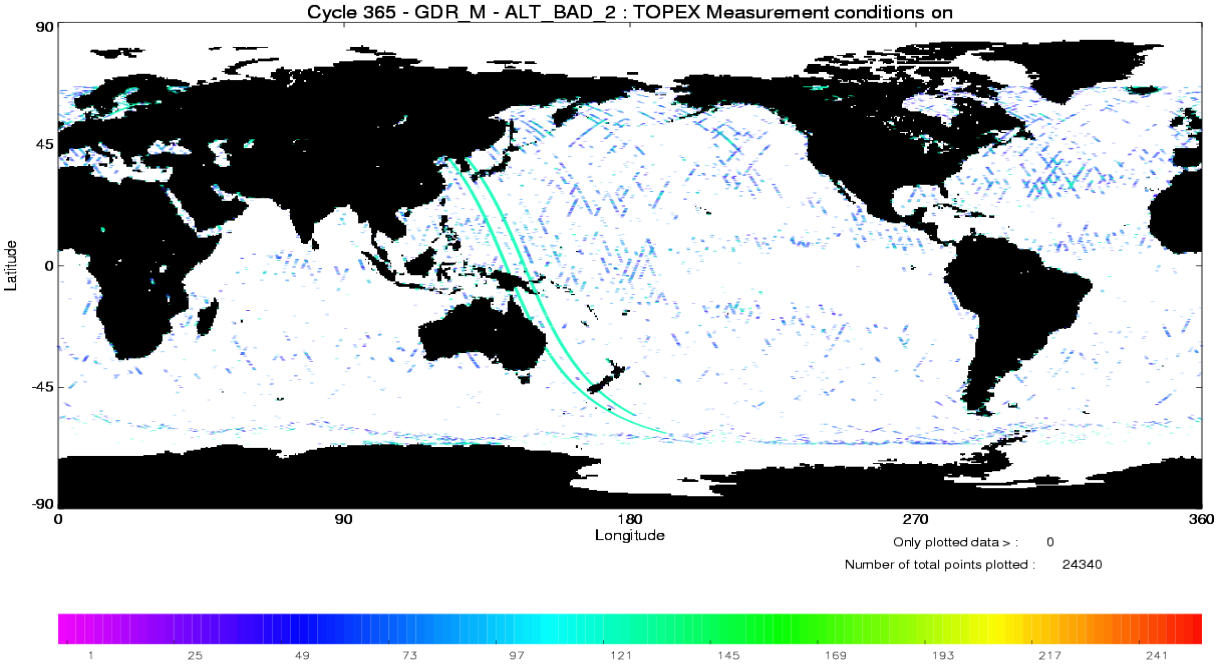


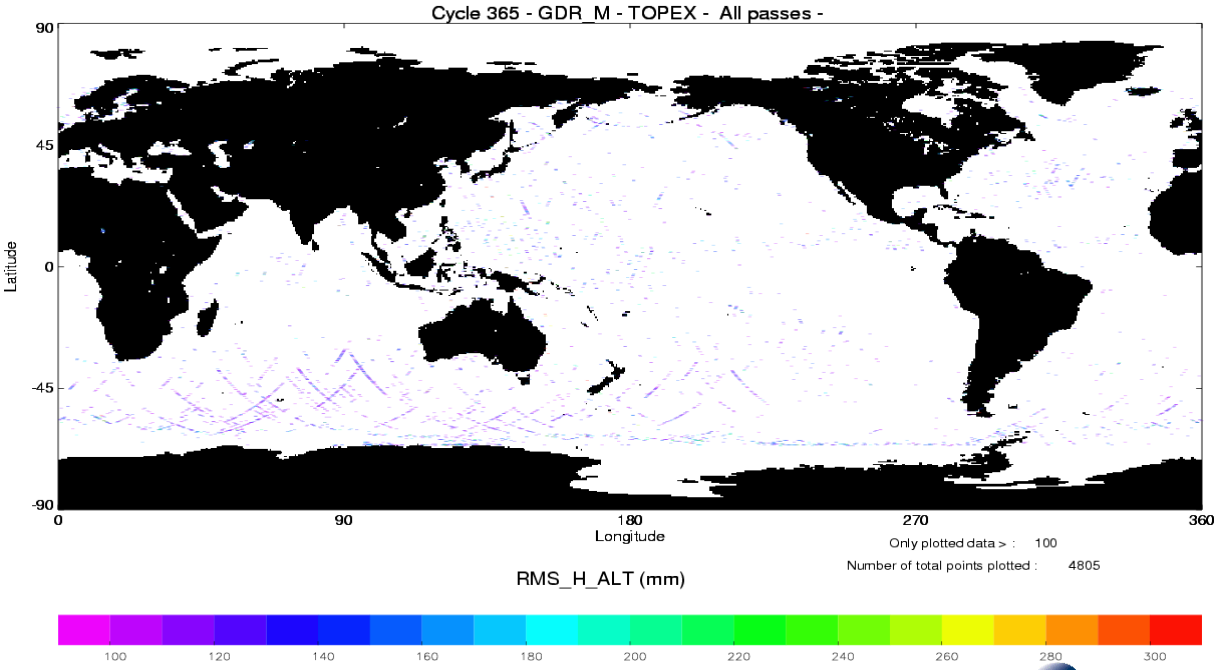

Cycle 365 – GDR_M – TOPEX – All passes –
Tb_18(0.01 K)
Tb_21 (0.01 K)
Tb_37 (0.01 K)
Lat_Err
Lon_Err
MOYENNES
NUMERO DE 1/2 ORBITE

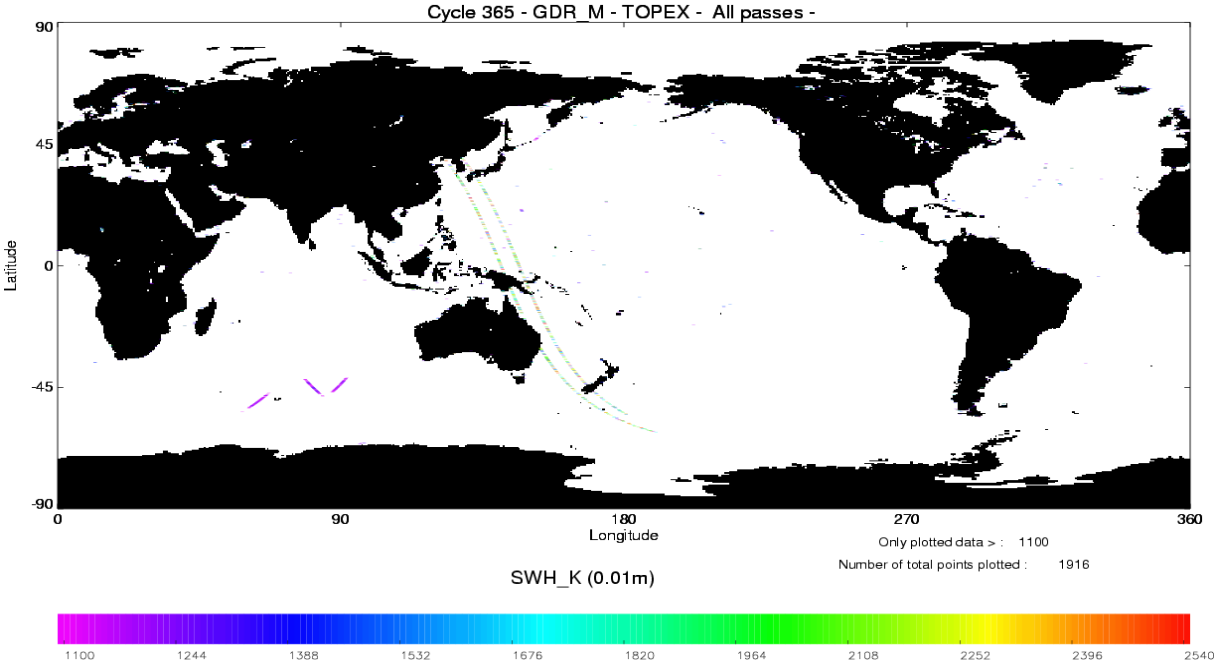

Cycle 365 – GDR_M – TOPEX – All passes –
Dry_Err
MOYENNES
NUMERO DE 1/2 ORBITE min: 9.00 max: 9.00
Wet_Flag
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 1.00
Wet_H_Err
MOYENNES
NUMERO DE 1/2 ORBITE min: 2.00 max: 6.00
Iono_Dor_Bad
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 7.00

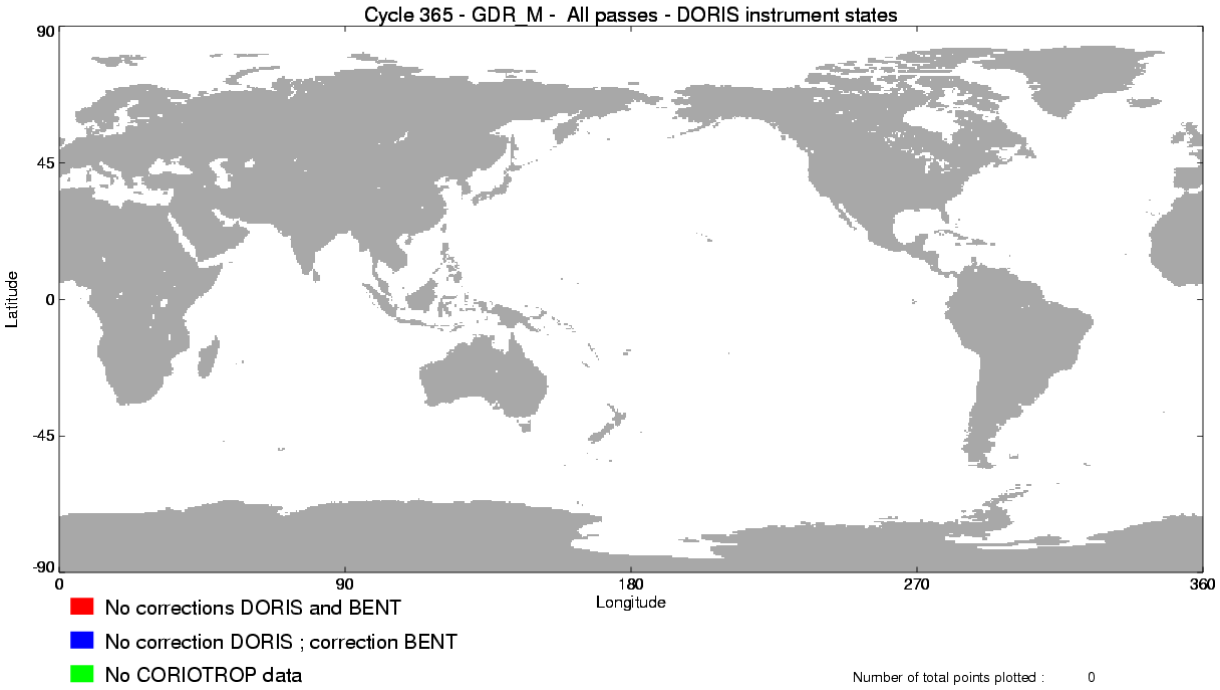

Cycle 365 – GDR_M – TOPEX – All passes –
IMANV
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Val_Att_P1f
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Ind_Pha
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Fl_Att
MOYENNES
NUMERO DE 1/2 ORBITE min: 1.00 max: 1.00


Cycle 365 - 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 : 25038
1
25
49
73
97
121
145
169
193
217
241


Cycle 365 - 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 : 24340
1
25
49
73
97
121
145
169
193
217
241


Cycle 365 - 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 : 4805
RMS_H_ALT (mm)
100
120
140
160
180
200
220
240
260
280
300


Cycle 365 - 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 : 1916
SWH_K (0.01m)
1100
1244
1388
1532
1676
1820
1964
2108
2252
2396
2540


Cycle 365 - 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

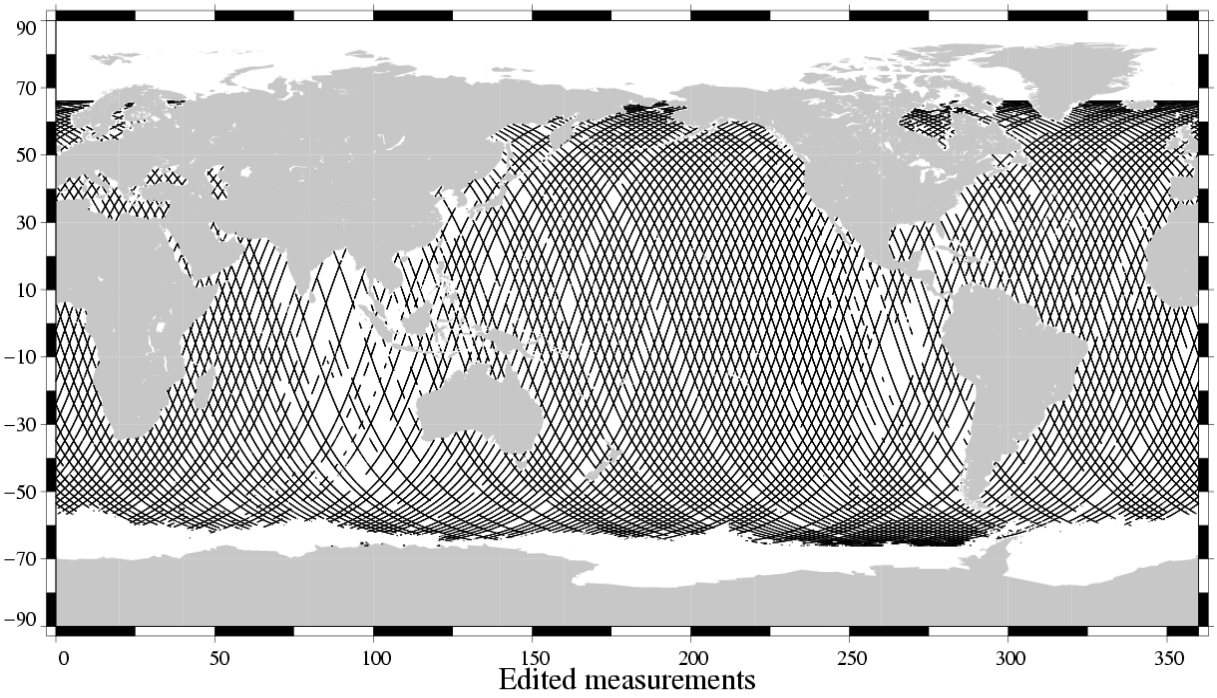
The following table gives for each parameter, the minimum and maximum thresholds, the number and the percentage of points removed.
As a comparison, the mean percentage over one year (1997) is also given.

Parameters	Min Thres.	Max Thres.	Unit	Mean % removed in 1997	% removed
Sea surface height	-130.000	100.000	m	1.37	1.35
Number of 20/10Hz valid points Poseidon/TOPEX	5.000	-		1.37	1.89
Std. deviation of range	0.000	0.100	m	1.85	2.87
Off nadir angle from waveform	0.000	0.400	deg	1.36	5.39
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	4.15
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	0.67
Sea state Bias	-0.500	0.000	m	1.39	1.50
Backscatter coefficient	7.000	30.000	dB	1.44	1.42
Ocean tide height	-5.000	5.000	m	0.01	0.93
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.

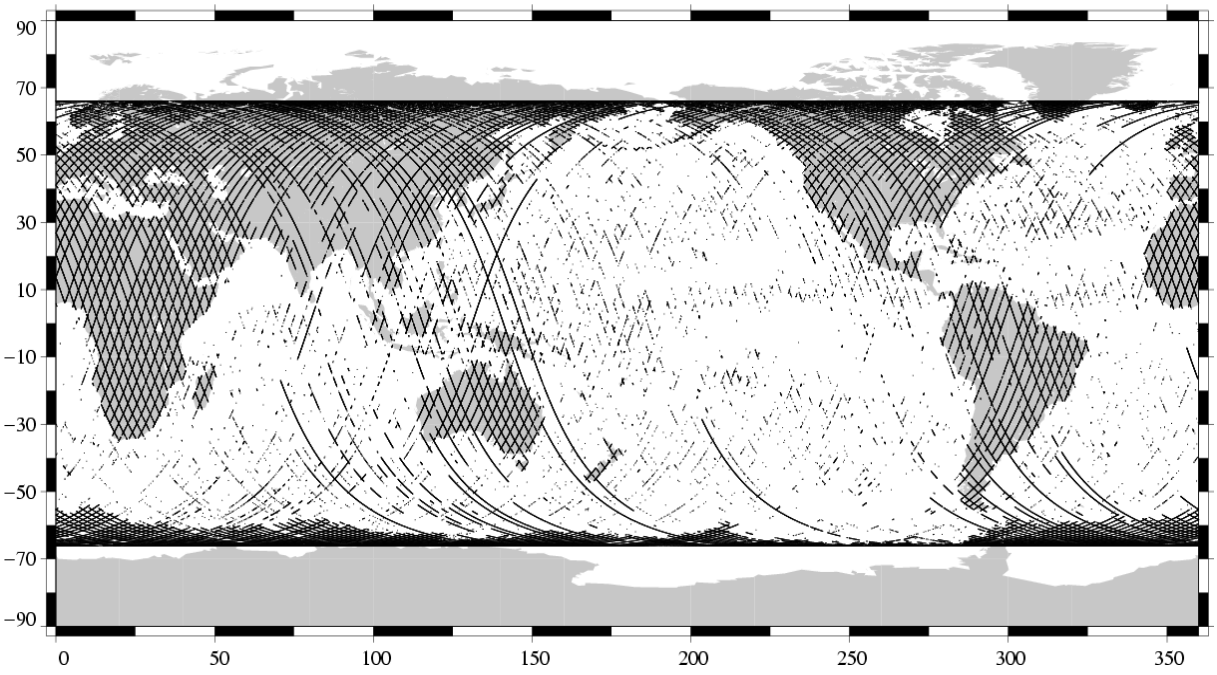
Valid data

TOPEX/Poseidon Cycle 365 (11/08/2002 / 21/08/2002)

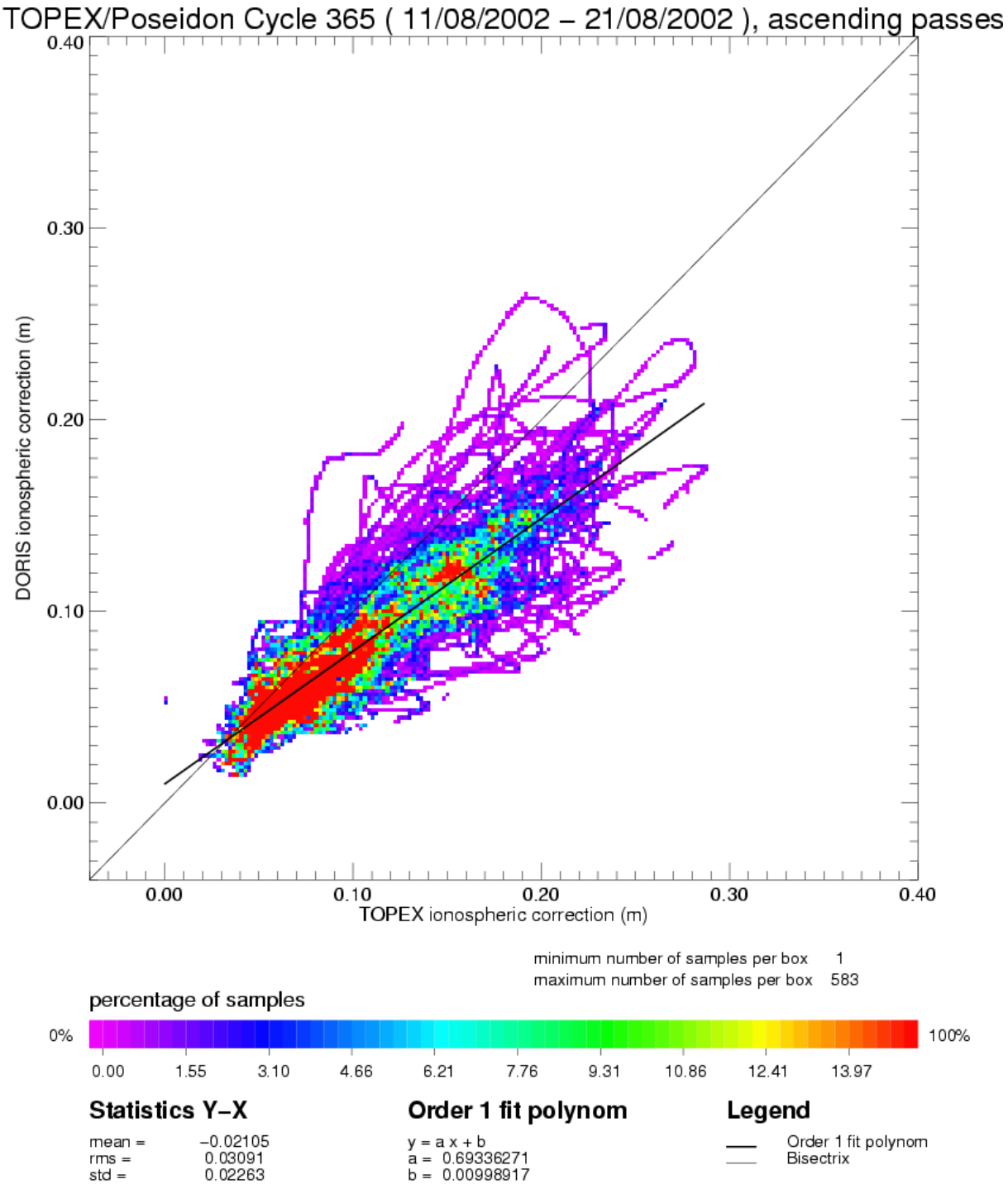


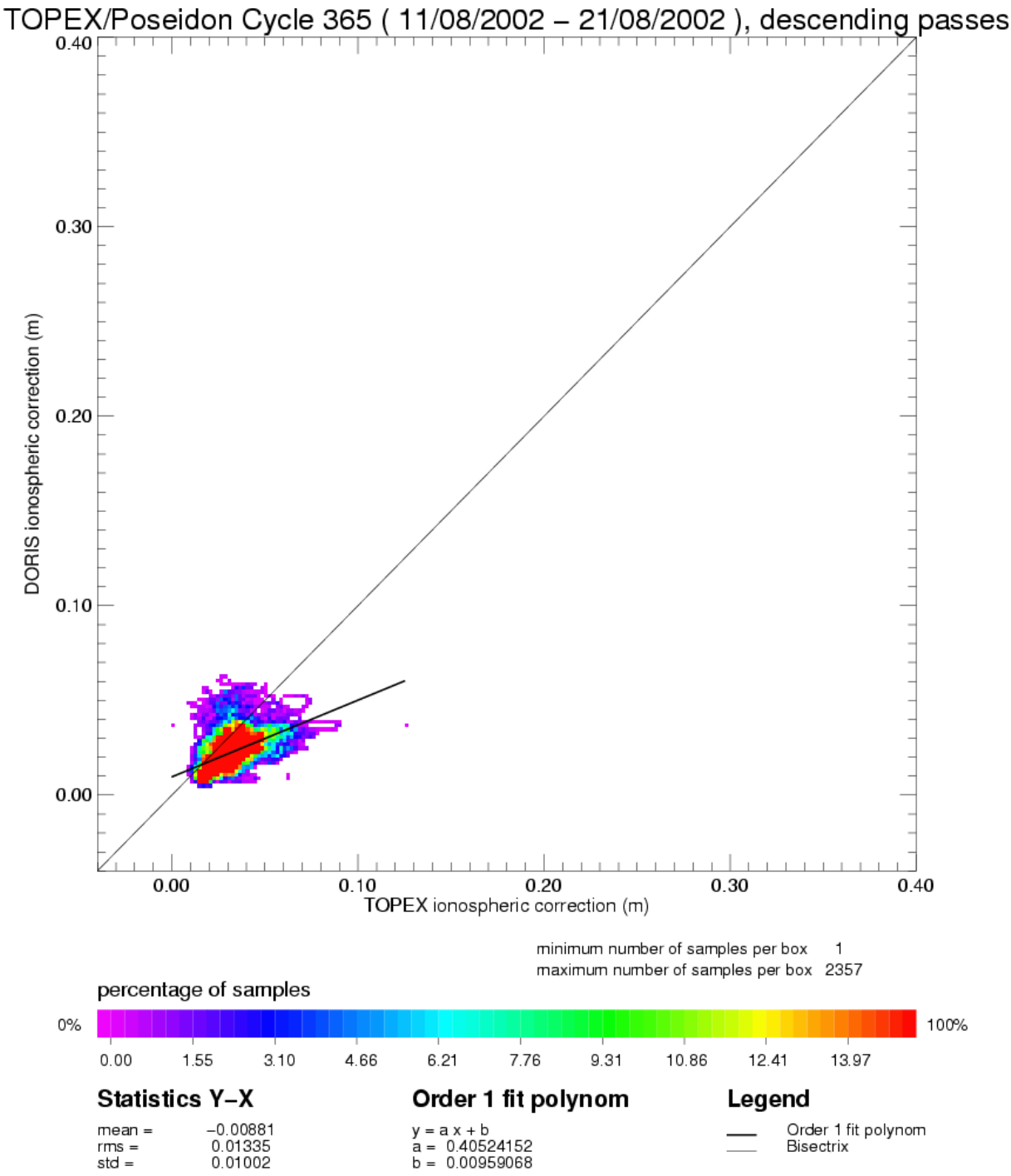
Edited measurements

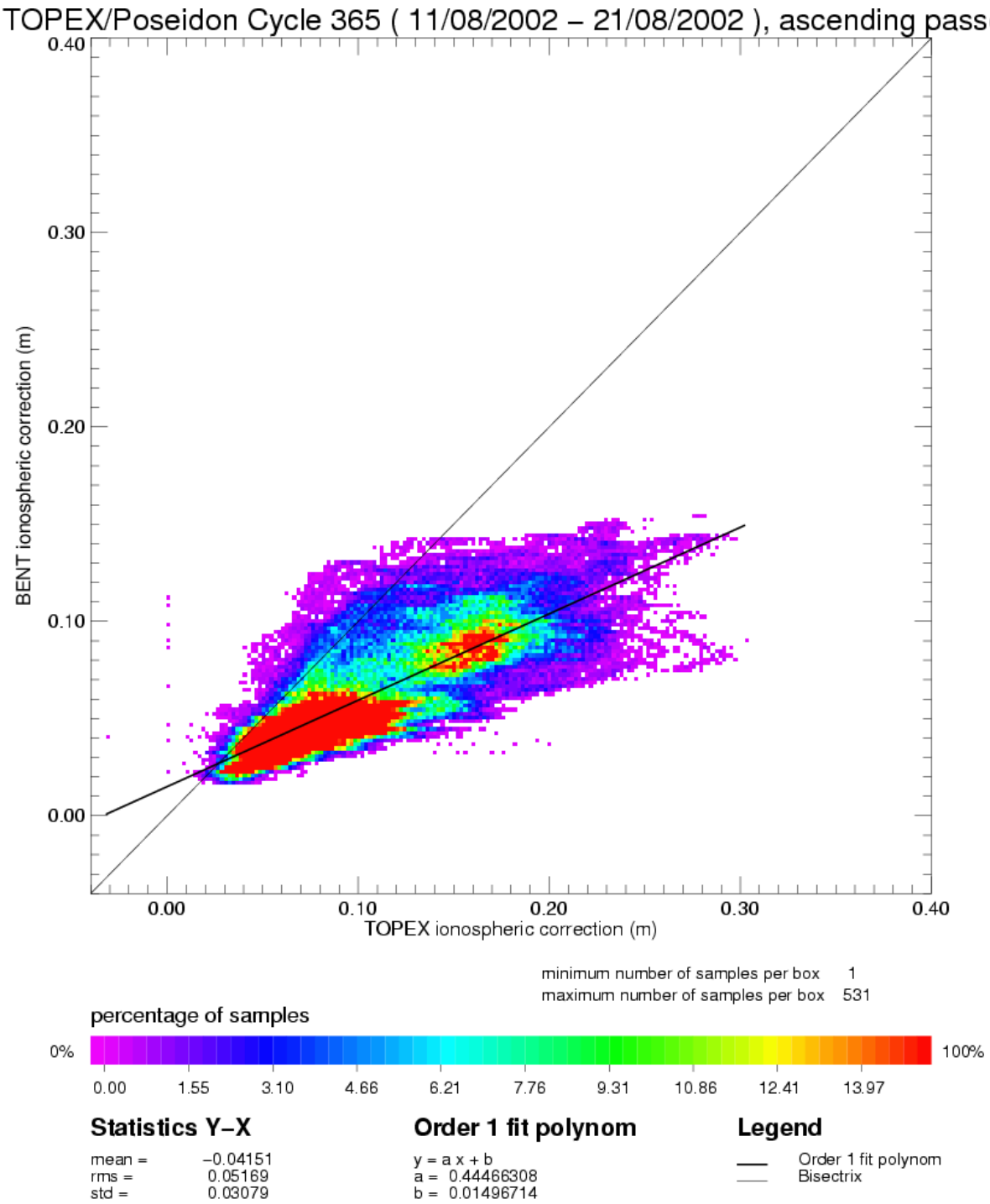
TOPEX Cycle 365 (11/08/2002 / 21/08/2002)

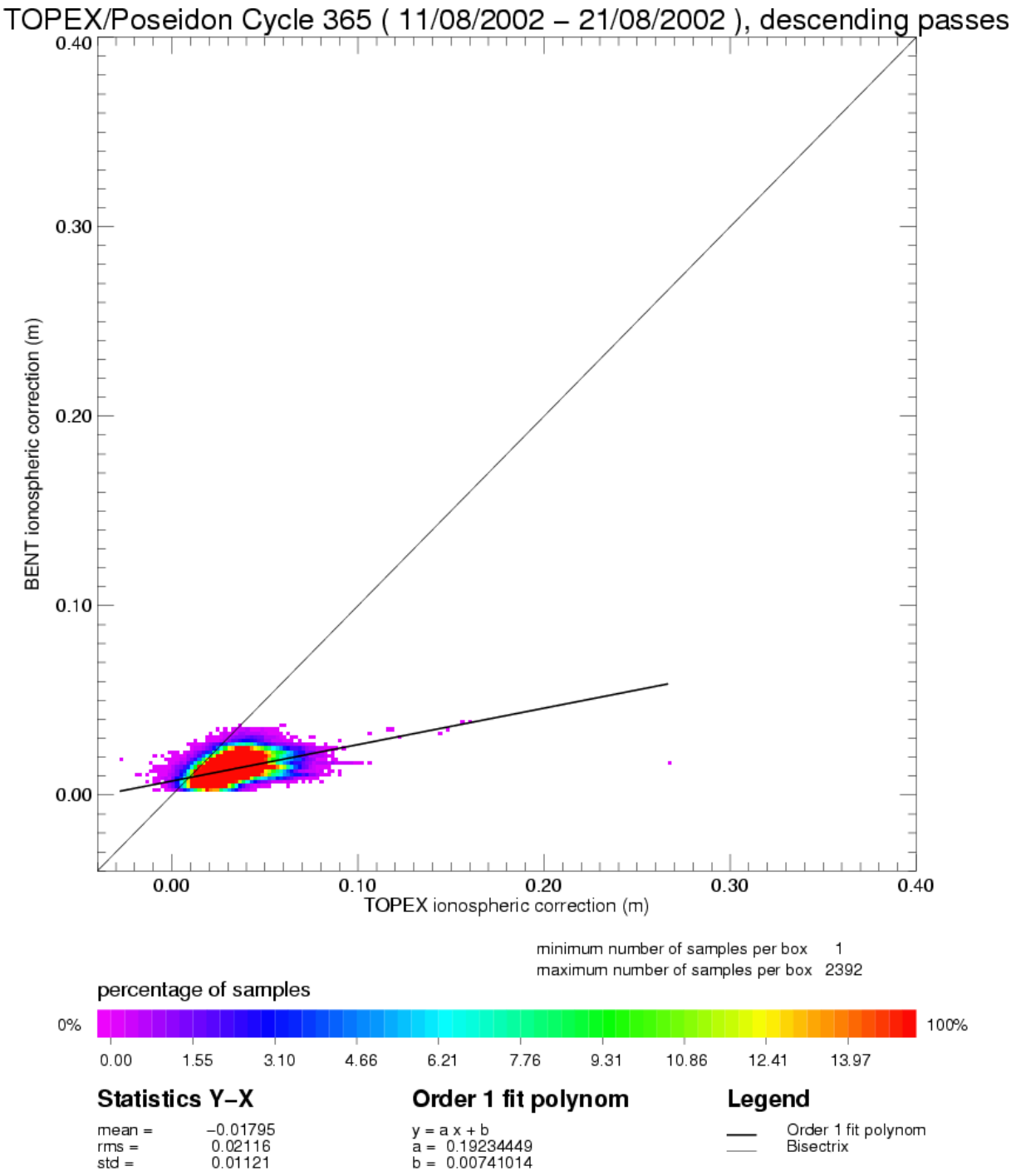


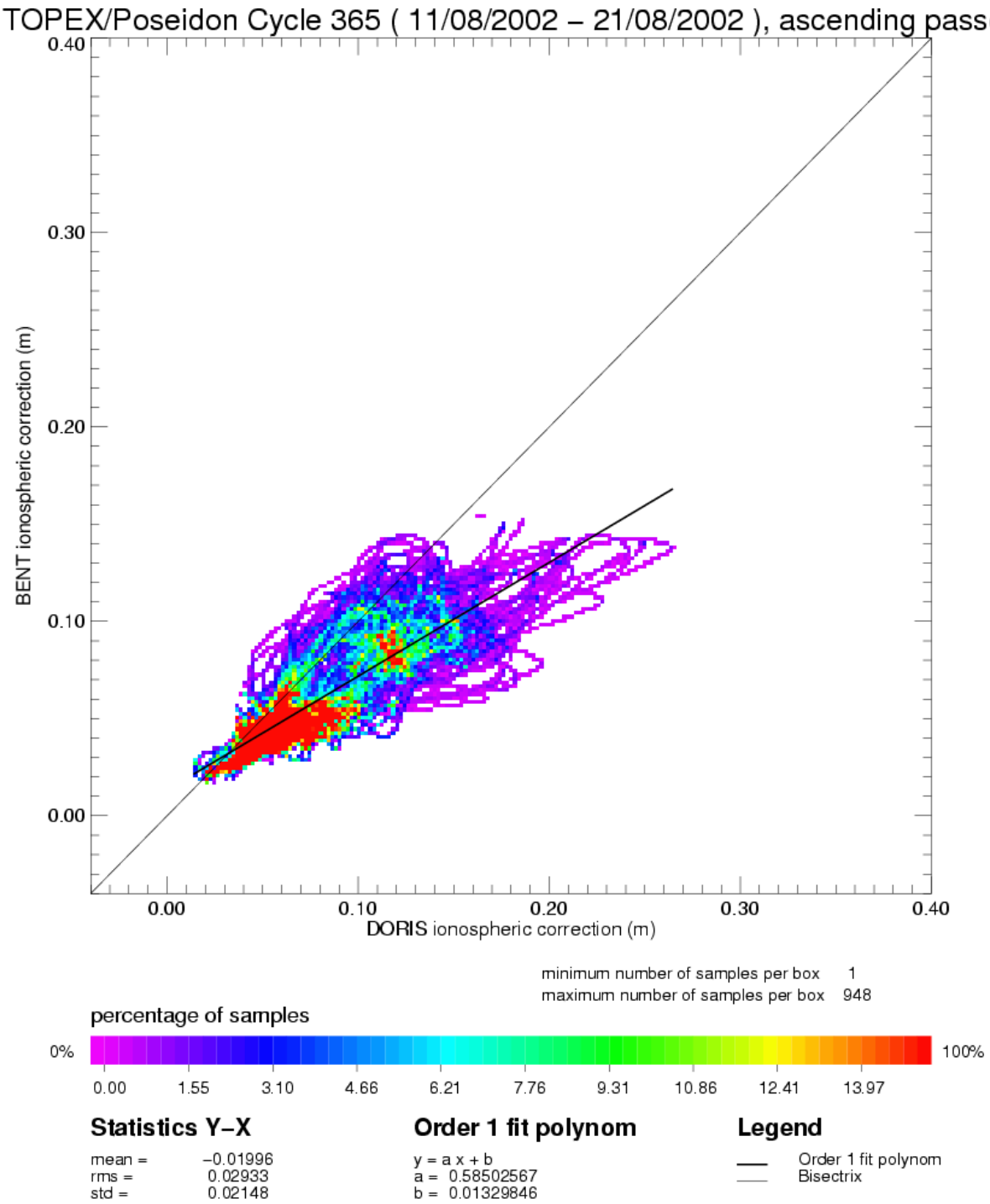
3.5 Ionospheric correction

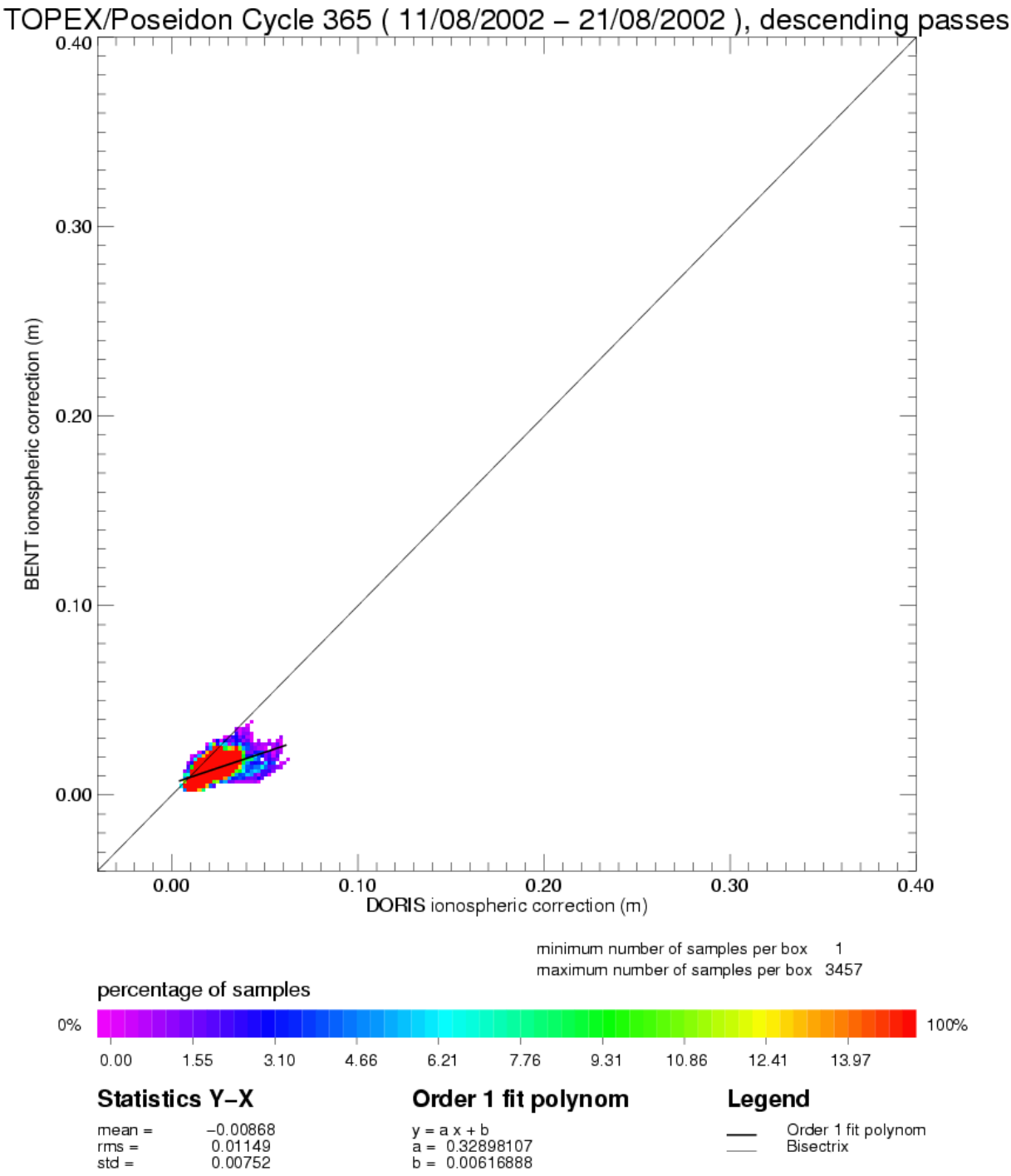



TOPEX/Poseidon Cycle 365 (11/08/2002 – 21/08/2002), descending passes
DORIS ionospheric correction (m)
TOPEX ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 2357
percentage of samples
0%
100%
0.00
1.55
3.10
4.66
6.21
7.76
9.31
10.86
12.41
13.97
Statistics Y–X
mean = −0.00881
rms = 0.01335
std = 0.01002
Order 1 fit polynom
y = a x + b
a = 0.40524152
b = 0.00959068
Legend
Order 1 fit polynom
Bisectrix

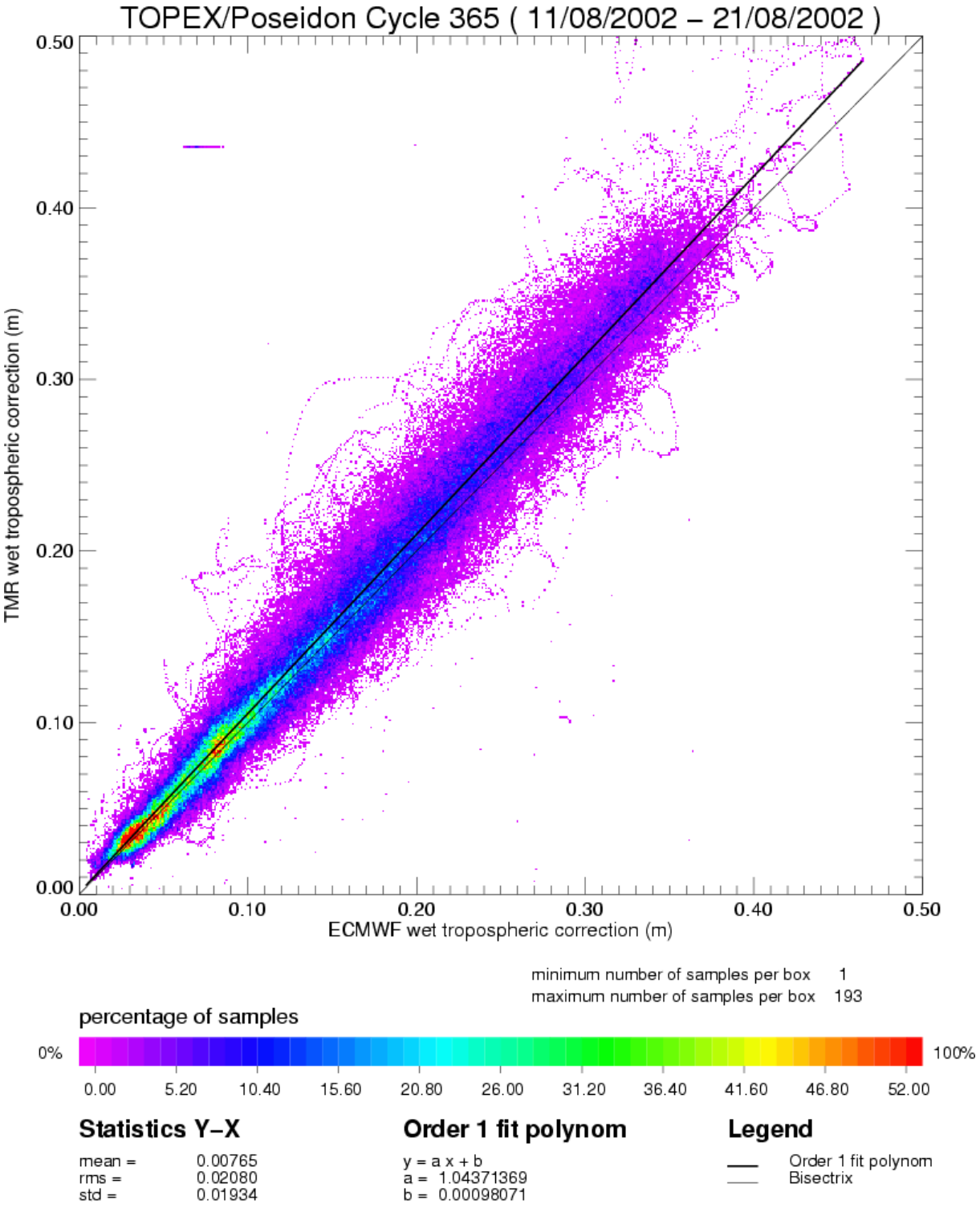

TOPEX/Poseidon Cycle 365 (11/08/2002 – 21/08/2002), ascending passes
BENT ionospheric correction (m)
TOPEX ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 531
percentage of samples
0%
100%
0.00
1.55
3.10
4.66
6.21
7.76
9.31
10.86
12.41
13.97
Statistics Y–X
mean = −0.04151
rms = 0.05169
std = 0.03079
Order 1 fit polynom
y = a x + b
a = 0.44466308
b = 0.01496714
Legend
Order 1 fit polynom
Bisectrix


TOPEX/Poseidon Cycle 365 (11/08/2002 – 21/08/2002), 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 2392
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 = −0.01795
rms = 0.02116
std = 0.01121
Order 1 fit polynom
y = a x + b
a = 0.19234449
b = 0.00741014
Legend
Order 1 fit polynom
Bisectrix

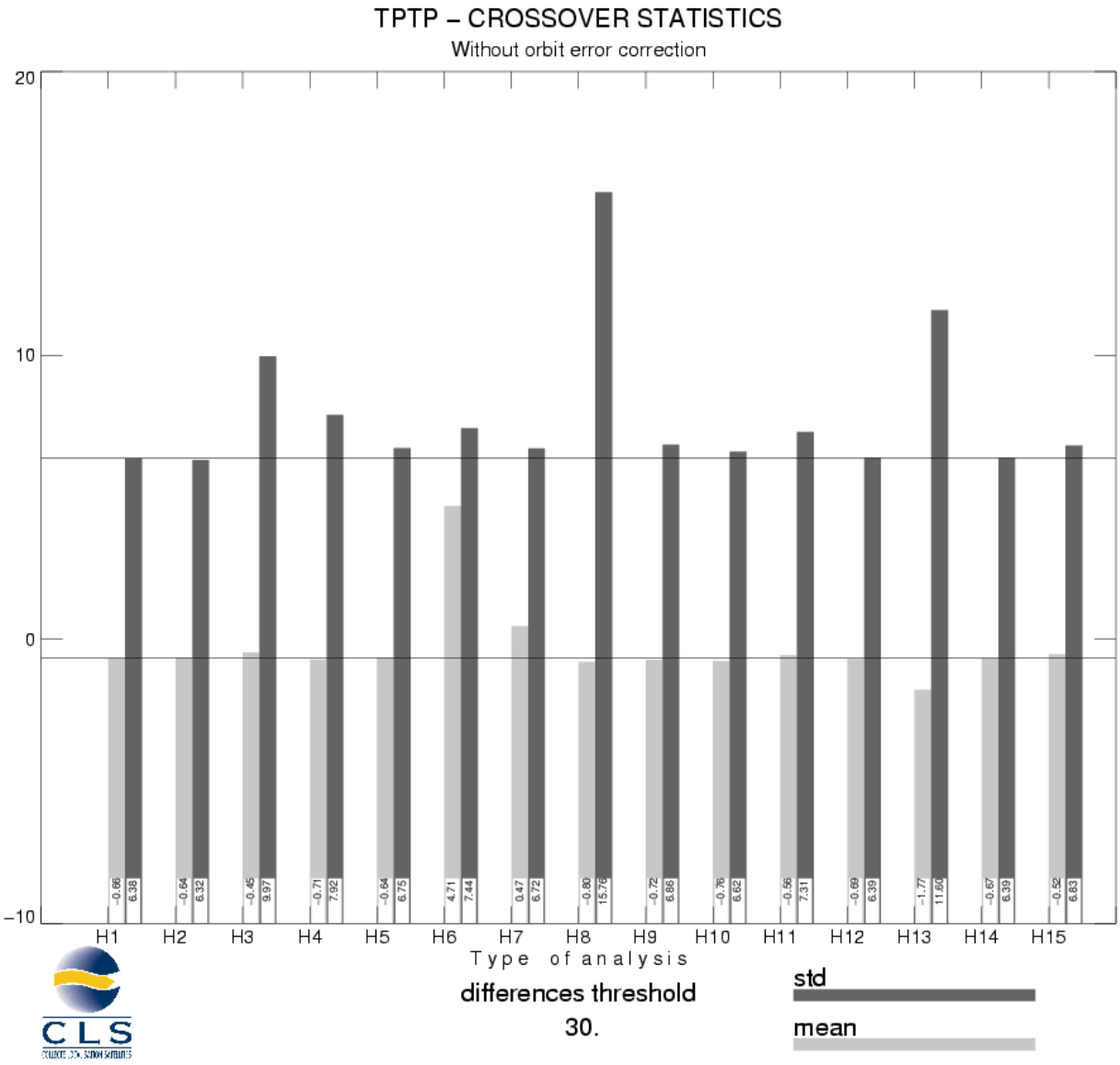

TOPEX/Poseidon Cycle 365 (11/08/2002 – 21/08/2002), ascending passes
BENT ionospheric correction (m)
DORIS ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 948
percentage of samples
0%
100%
0.00
1.55
3.10
4.66
6.21
7.76
9.31
10.86
12.41
13.97
Statistics Y–X
mean = −0.01996
rms = 0.02933
std = 0.02148
Order 1 fit polynom
y = a x + b
a = 0.58502567
b = 0.01329846
Legend
Order 1 fit polynom
Bisectrix


TOPEX/Poseidon Cycle 365 (11/08/2002 – 21/08/2002), 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 3457
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 = −0.00868
rms = 0.01149
std = 0.00752
Order 1 fit polynom
y = a x + b
a = 0.32898107
b = 0.00616888
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 : –28.3500

Valeur maximale : 27.5400

Difference Max – Min: 55.8900

Nombre de points lus: 3802

Nombre de points selectionnes: 3690

Moyenne : –0.660087

Ecart–type : 6.37576

Moyenne Quadratique : 6.40984

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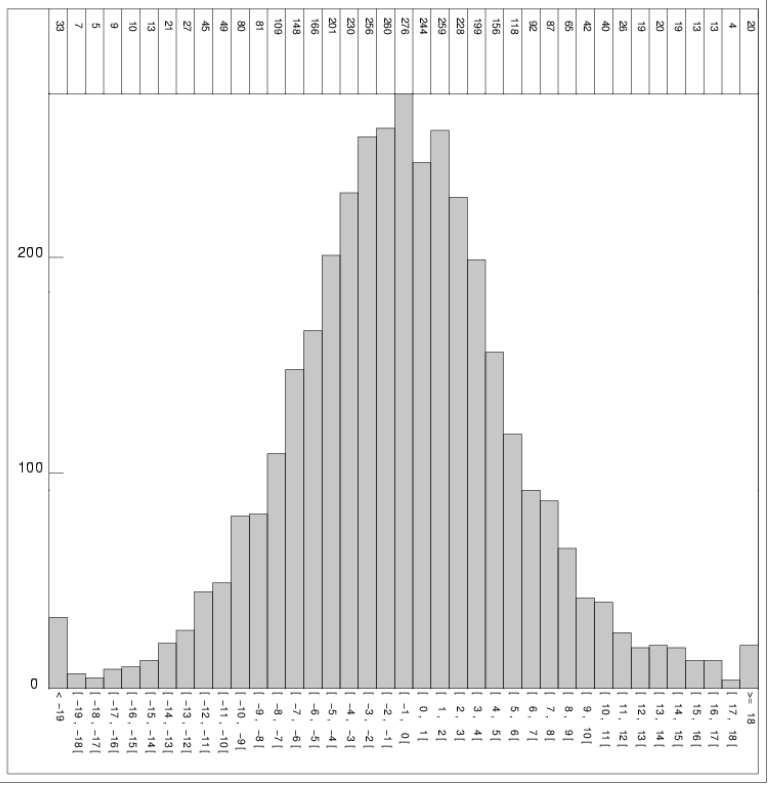

TPTP – CROSSOVER STATISTICS

With orbit error correction

SSH = Corrected sea surface height

RAPPEL DES SELECTIONS

Type de points de croisement: TPTP

Zone 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 : –29.7200

Valeur maximale : 28.0700

Difference Max – Min: 57.7900

Nombre de points lus: 3802

Nombre de points selectionnes: 3676

Moyenne : –0.0769970

Ecart–type : 5.81622

Moyenne Quadratique : 5.81673

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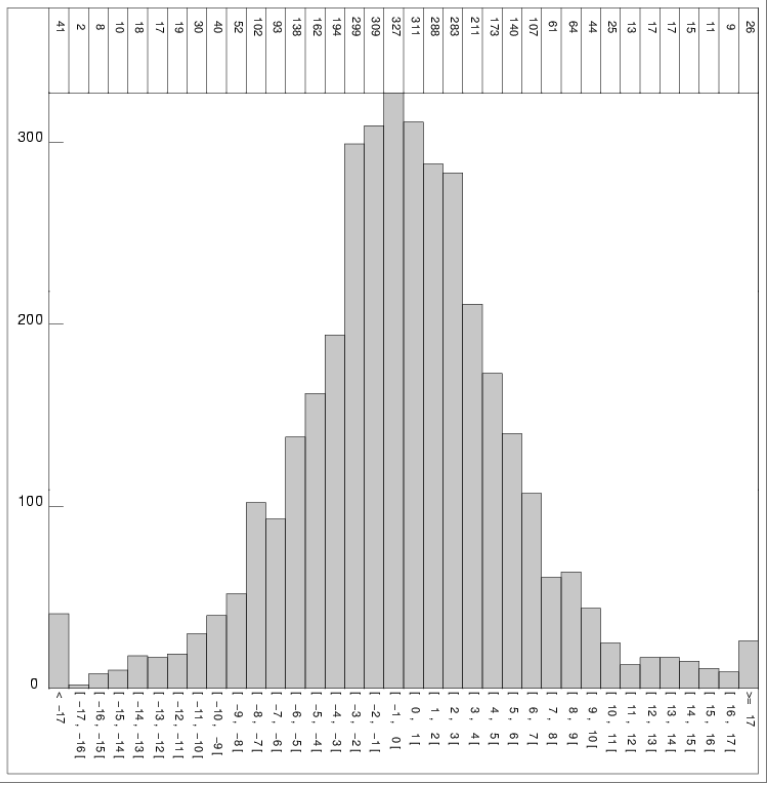

TPTP – CROSSOVER STATISTICS

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 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 :	–30.6700
Valeur maximale :	24.3500
Difference Max – Min:	55.0200
Nombre de points lus:	2103
Nombre de points selectionnes:	1929
Moyenne :	–0.874821
Ecart–type :	5.37637
Moyenne Quadratique :	5.44708

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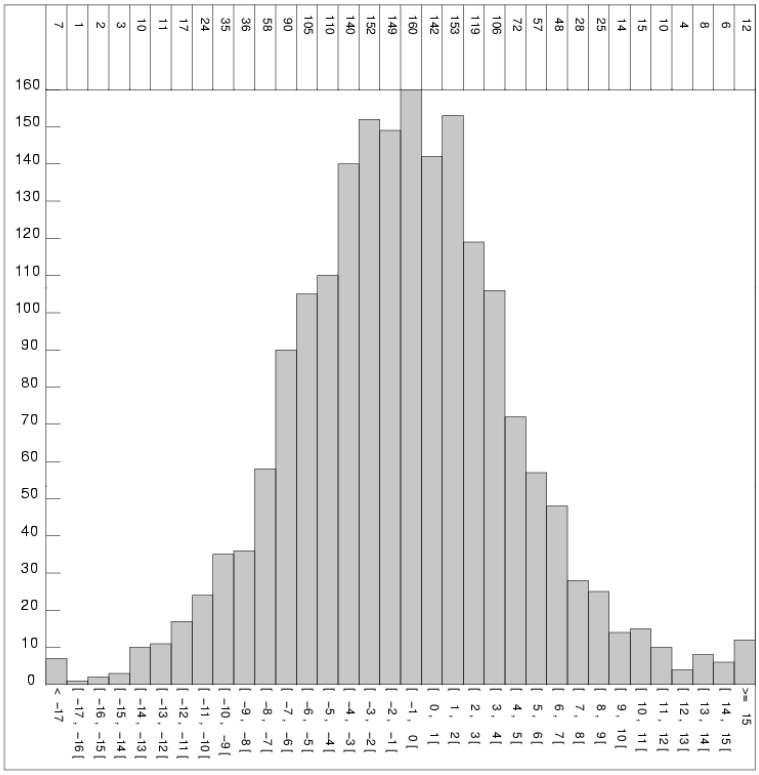


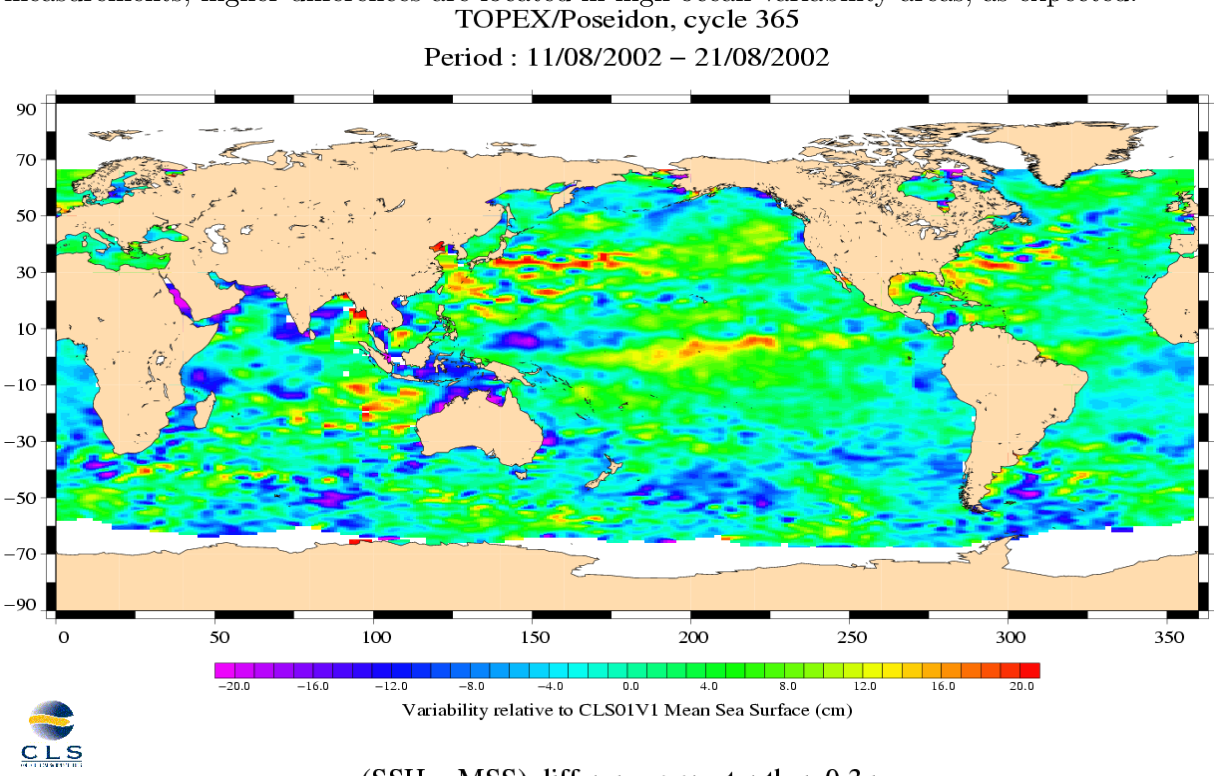
3.8 SSH variability

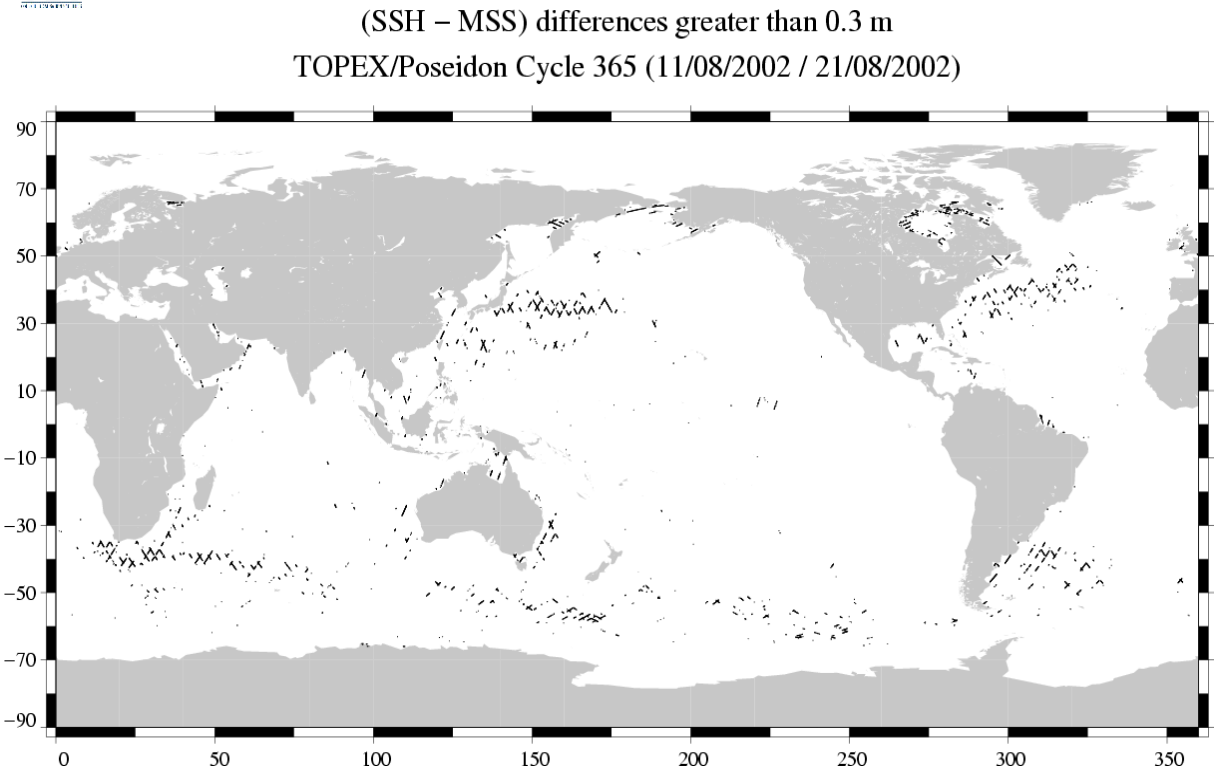
3.8.1 Sea Level Anomaly

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.

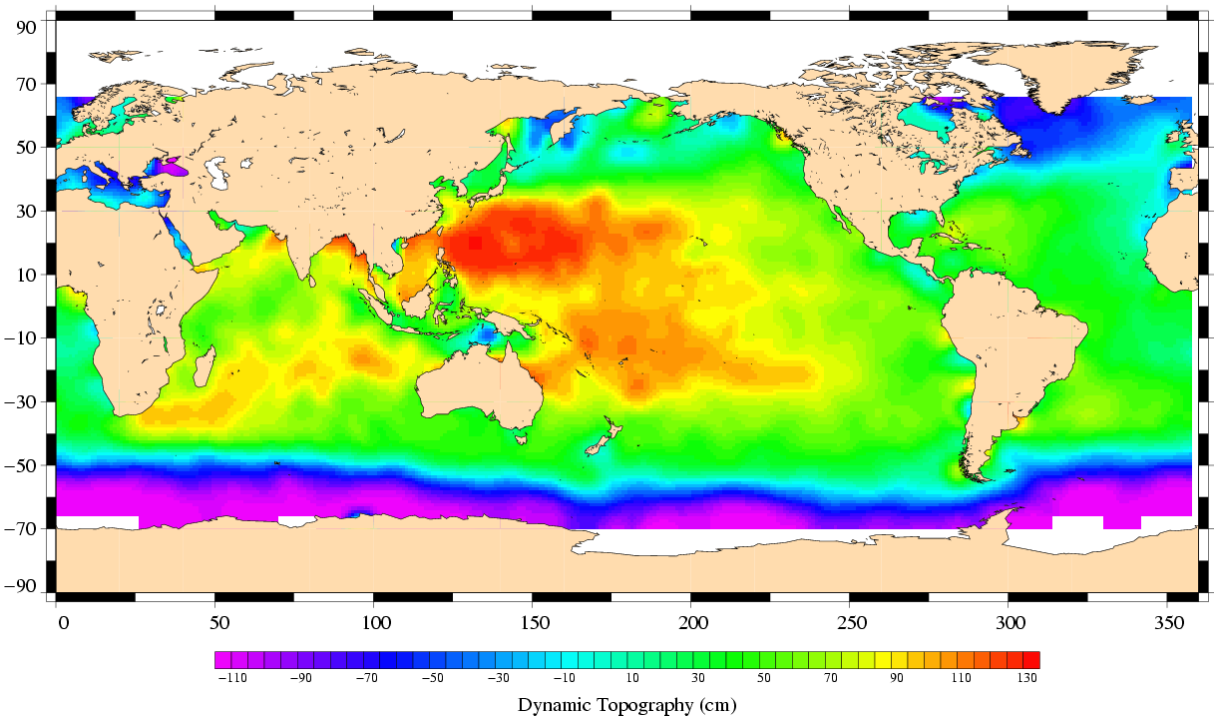




3.9 Dynamic topography

TOPEX/Poseidon, cycle 365

Period : 11/08/2002 – 21/08/2002

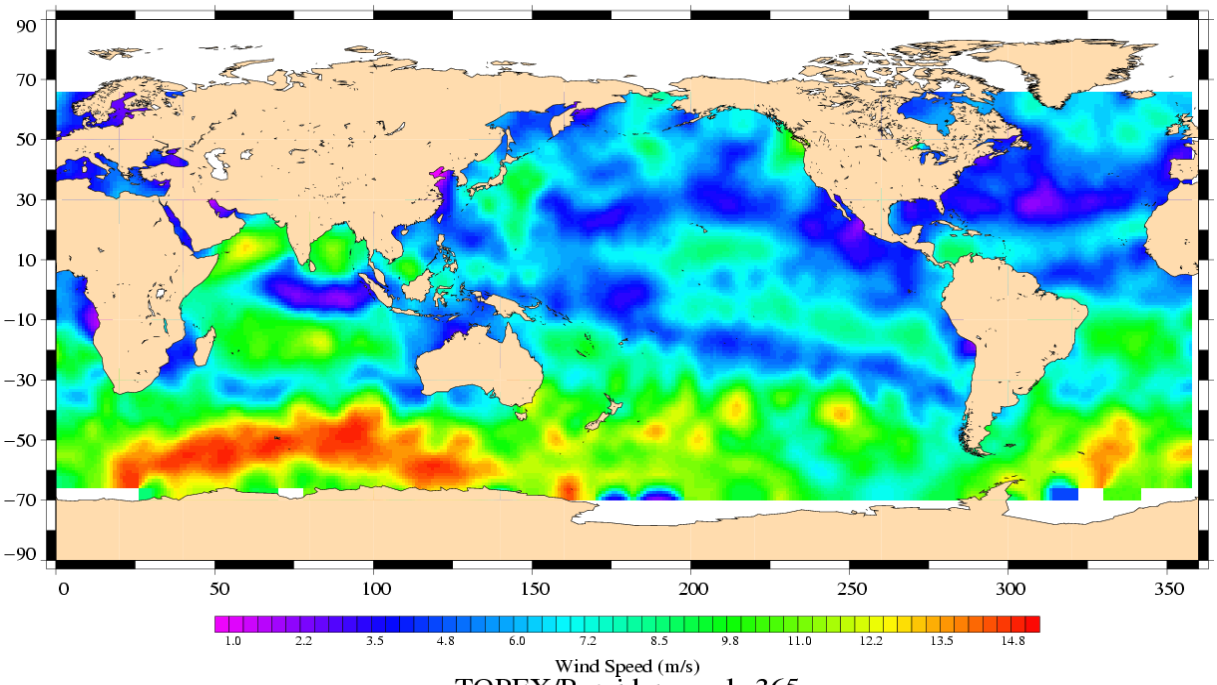


3.10 Wind and wave maps

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

TOPEX/Poseidon, cycle 365

Period : 11/08/2002 – 21/08/2002



TOPEX/Poseidon, cycle 365

Period : 11/08/2002 – 21/08/2002