TOPEX/Poseidon MGDR
Quality Assessment Report

Cycle 395

04-06-2003 14-06-2003

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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

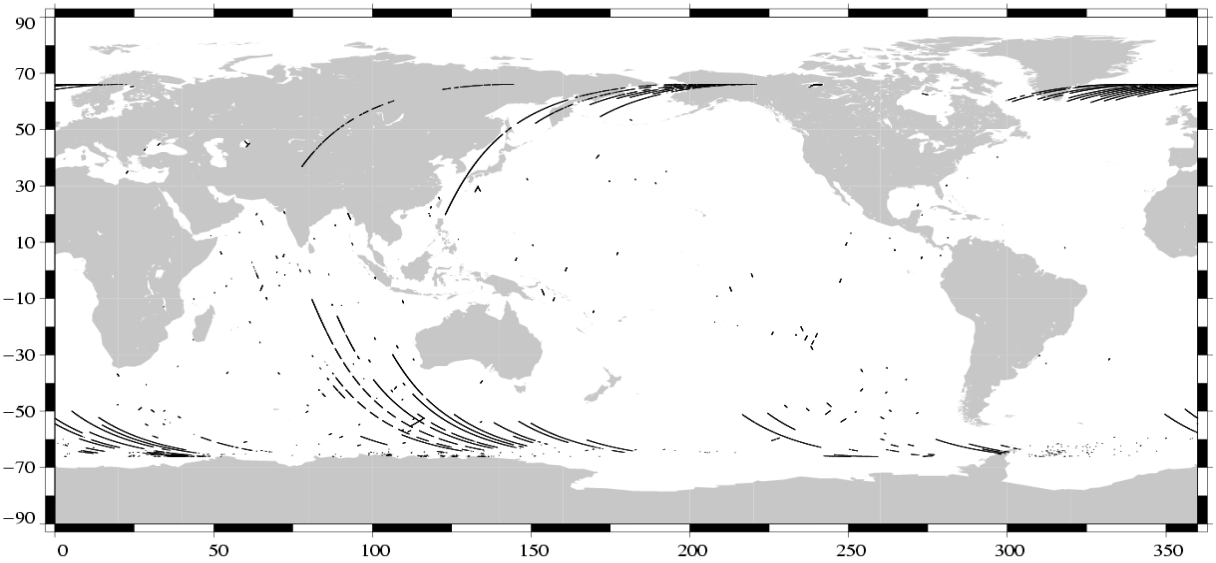
2.1 Cycle quality and performances

Data quality for this cycle appears to be nominal. For this cycle, the crossover standard deviation is 6.35 cm rms, and the standard deviation of Sea Level Anomalies (SLA) relative to a Mean Sea Surface is 11.46 cm.

2.2 Warnings and recommendations

- Missing measurements :
  - There is a lot of data gaps due to tape recorder anomalies, especially in the Indian Ocean and in the Pacific Ocean below the South America coasts.
  - A large part of the pass 023 is missing.
- Measurements edited by the TMR parameters :
  The following anomalies are explained by the problems in the interpolation of the TMR parameters due to tape recorder failures :
  - 4.01% of the measurements are removed by the TMR correction criterion (see the following figure).
  - Some passes have radiometer earth flag set to valid over earth. But these measurements are not kept and edited by the altimetric parameters.

Edited parameter : Radiometer wet tropospheric correction
T/P Cycle 395 (04/06/2003 / 14/06/2003)



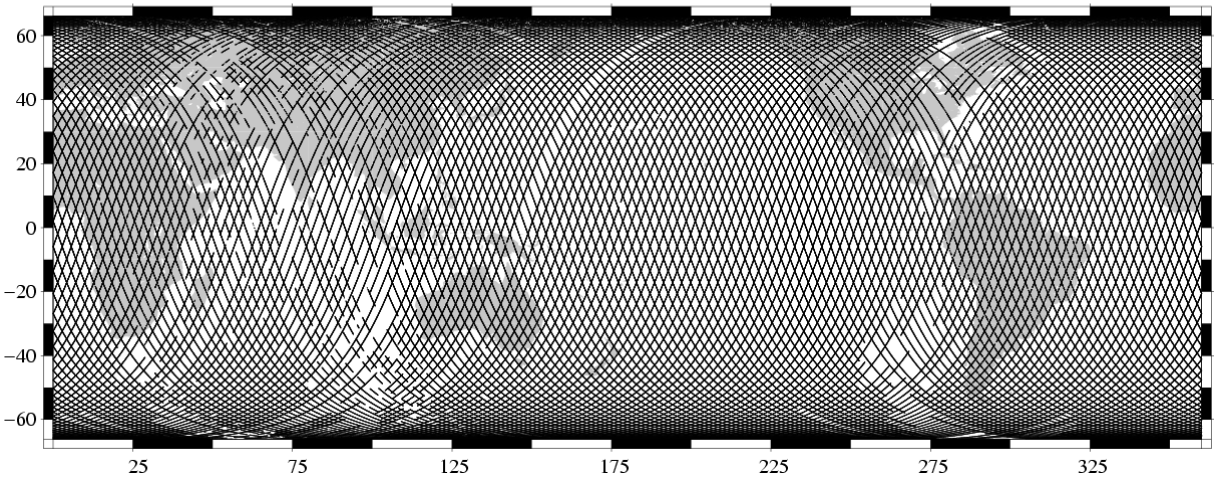
3 CALVAL main results

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.

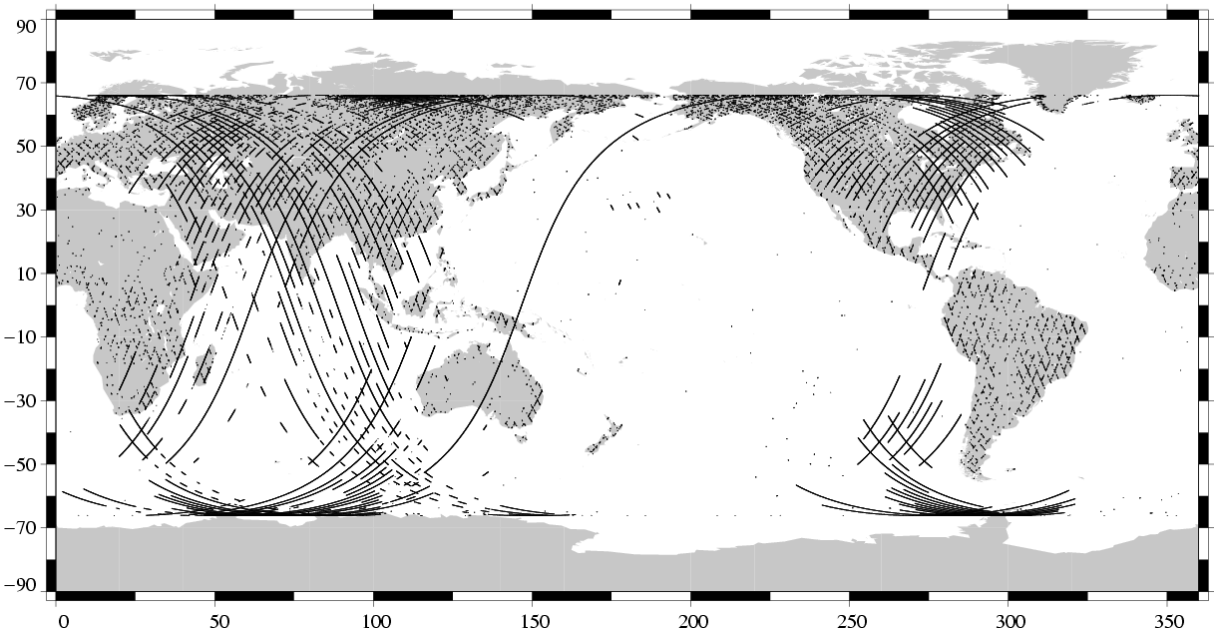
3.1 Missing measurements

692638 altimeter measurements are present, and 101888 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.

Available measurements
TOPEX Cycle 395 (04/06/2003 / 14/06/2003)



Missing measurements
TOPEX/Poseidon Cycle 395 (04/06/2003 / 14/06/2003)

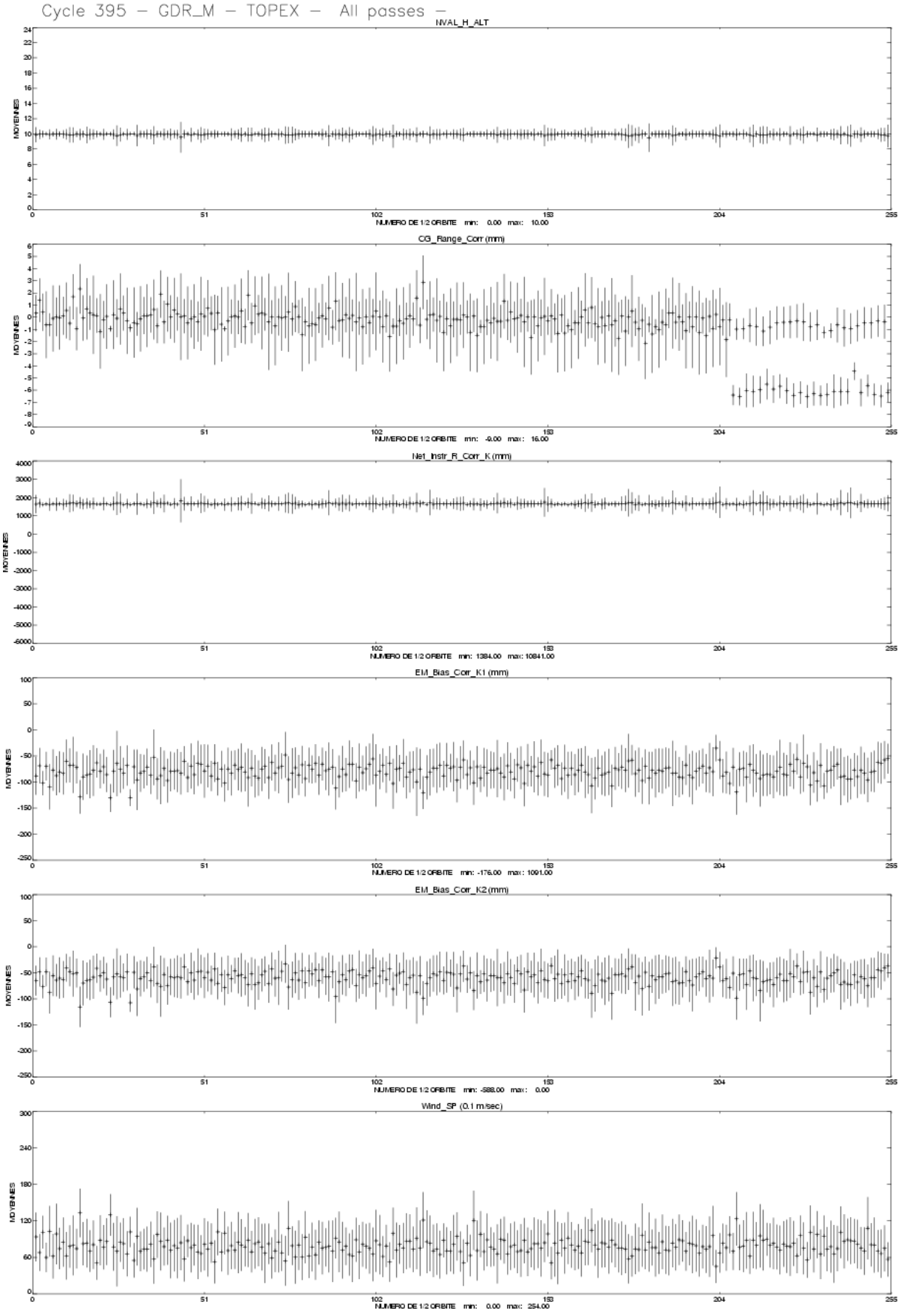


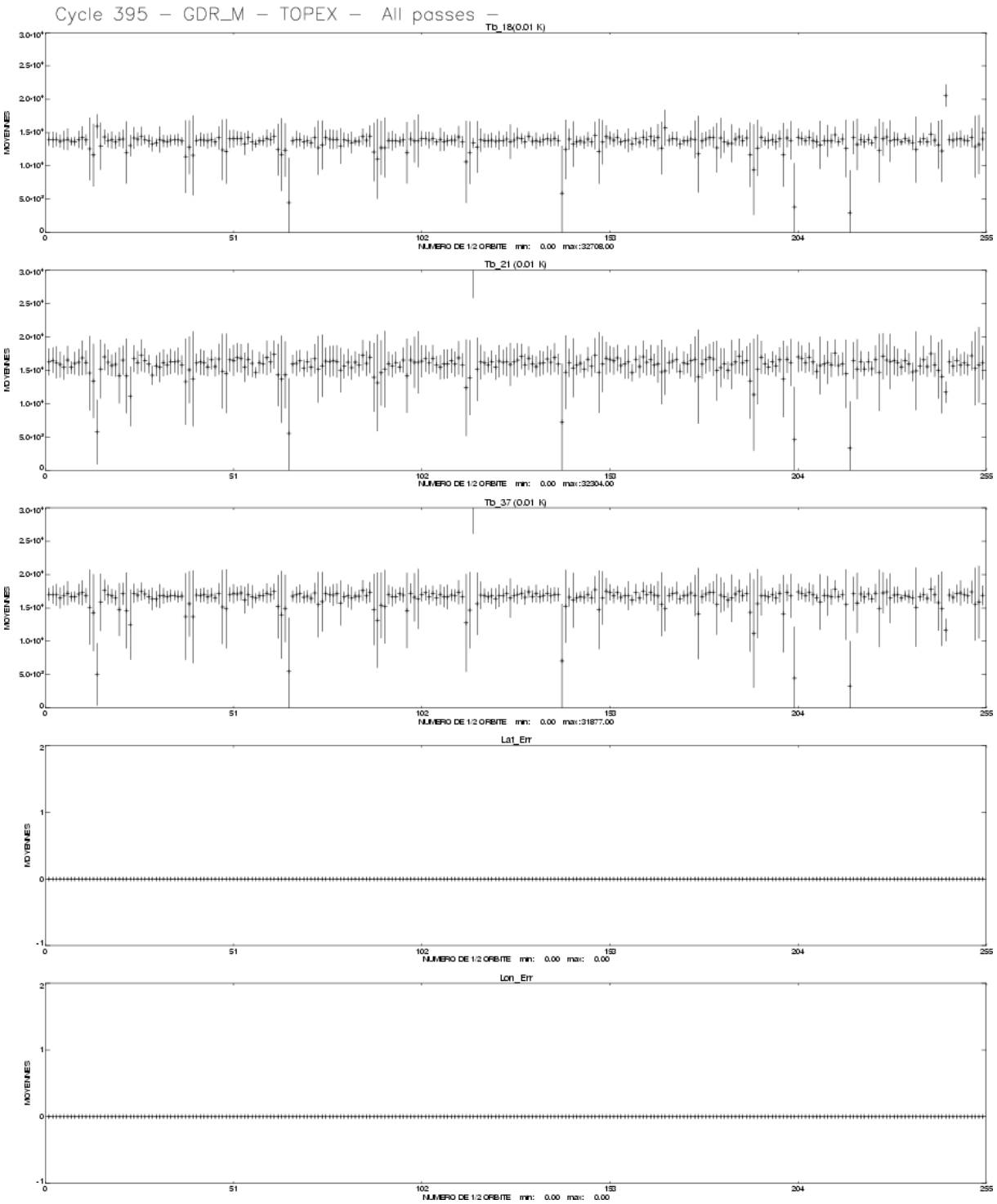
3.2 M-GDR quality flags

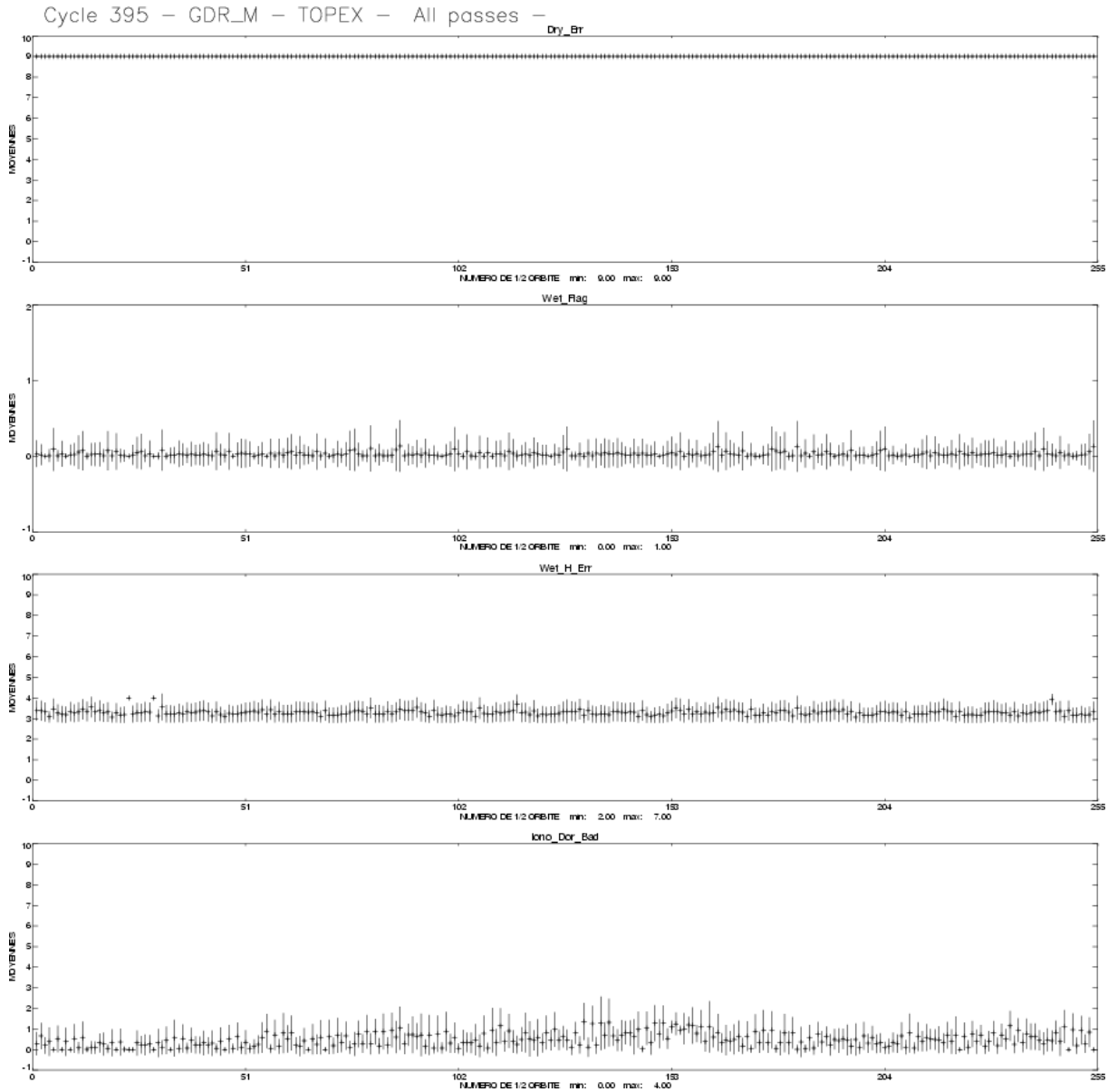
The following table indicates the percentage of measurements for which those flags are set.

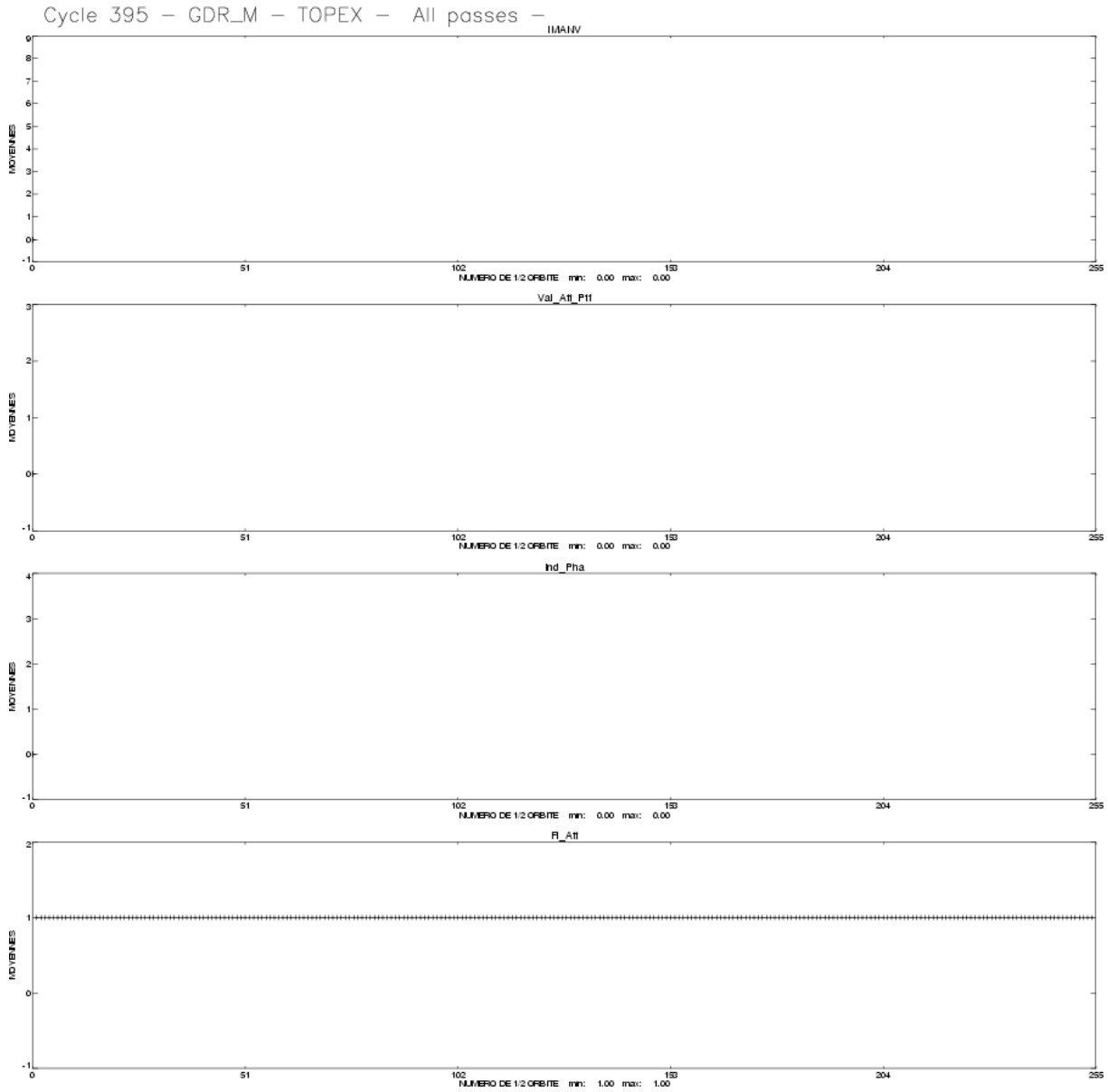
Name	Descrition	% bad
Geo_Bad_1	altimeter land flag	25.52
Geo_Bad_1	ice flag	6.82
Geo_Bad_1	radiometer land flag	27.48
Alt_Bad_1	conditions 1 altimeter	5.17
Alt_Bad_2	conditions 2 altimeter	5.03
Geo_Bad_2	rain (liquid water in excess)	6.21
Geo_Bad_2	less than 4 points for CSR3.0 tide calculation	0.40
Geo_Bad_2	less than 4 points for FES95.2.1 tide calculation	2.74
TOPEX	TOPEX not valid	0.00
TMR	TMR not valid	0.00
TMR_Bad	Brightness temperatures not valid	5.51
DORIS	DORIS not valid	0.00

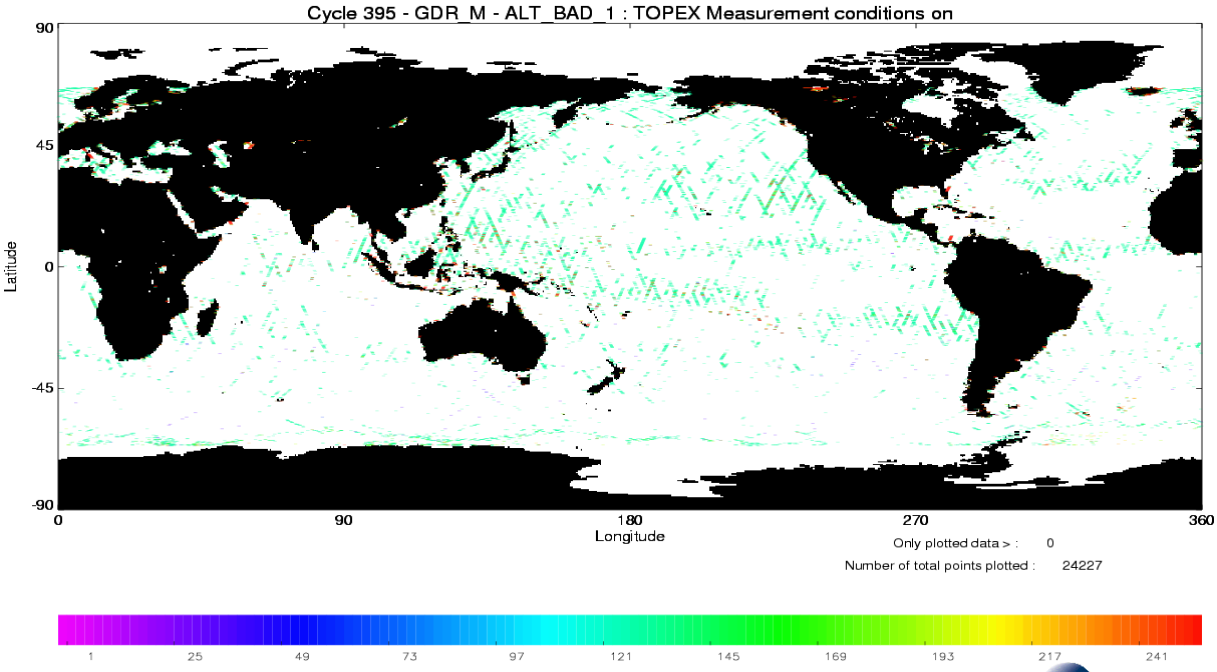
3.3 M-GDR parameter plots

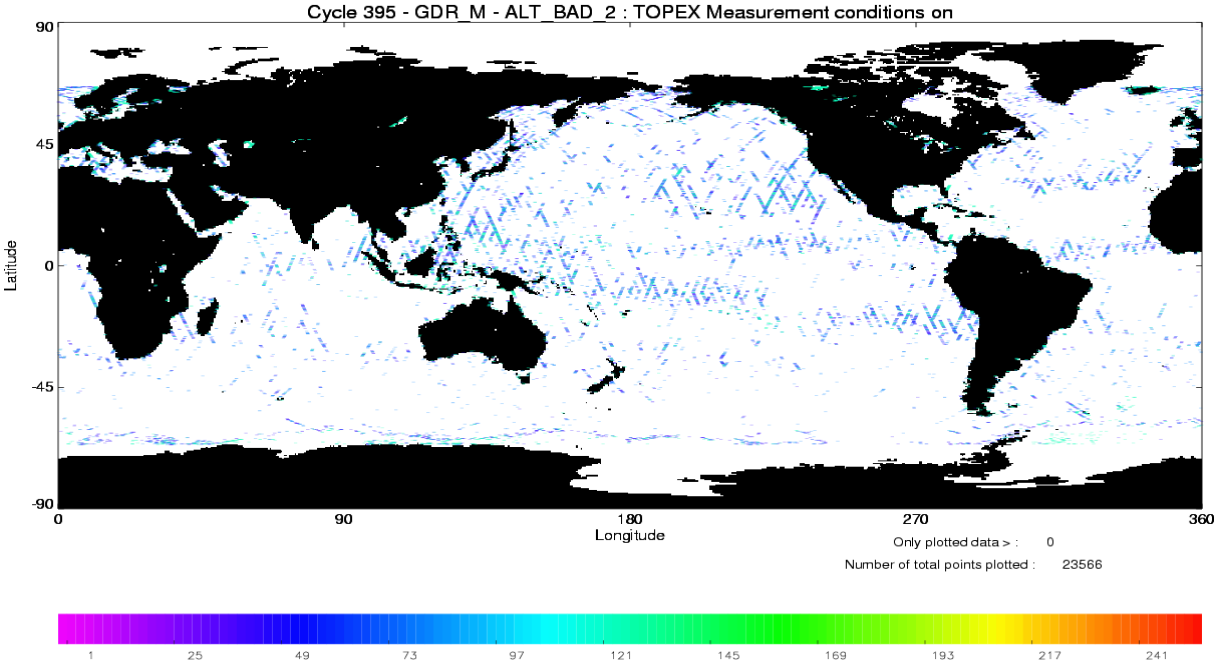


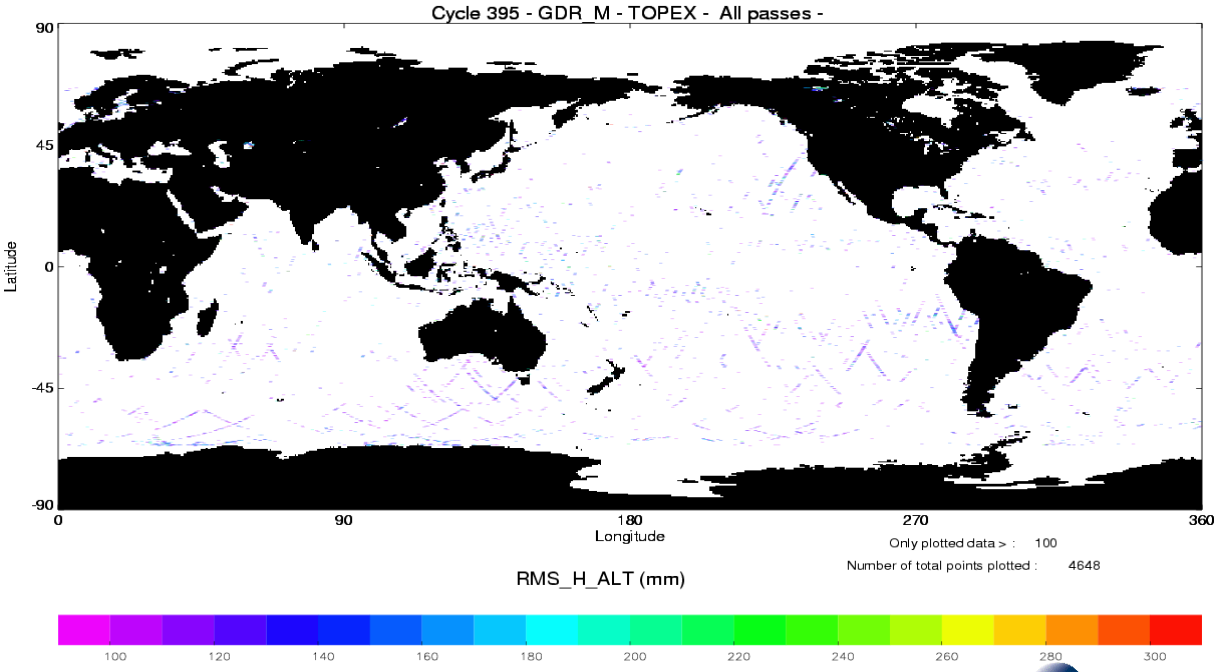

Cycle 395 – GDR_M – TOPEX – All passes –
Tb_18(0.01 K)
Tb_21 (0.01 K)
Tb_37 (0.01 K)
Lat_Err
Lon_Err
MOYENNES
NUMERO DE 1/2 ORBITE

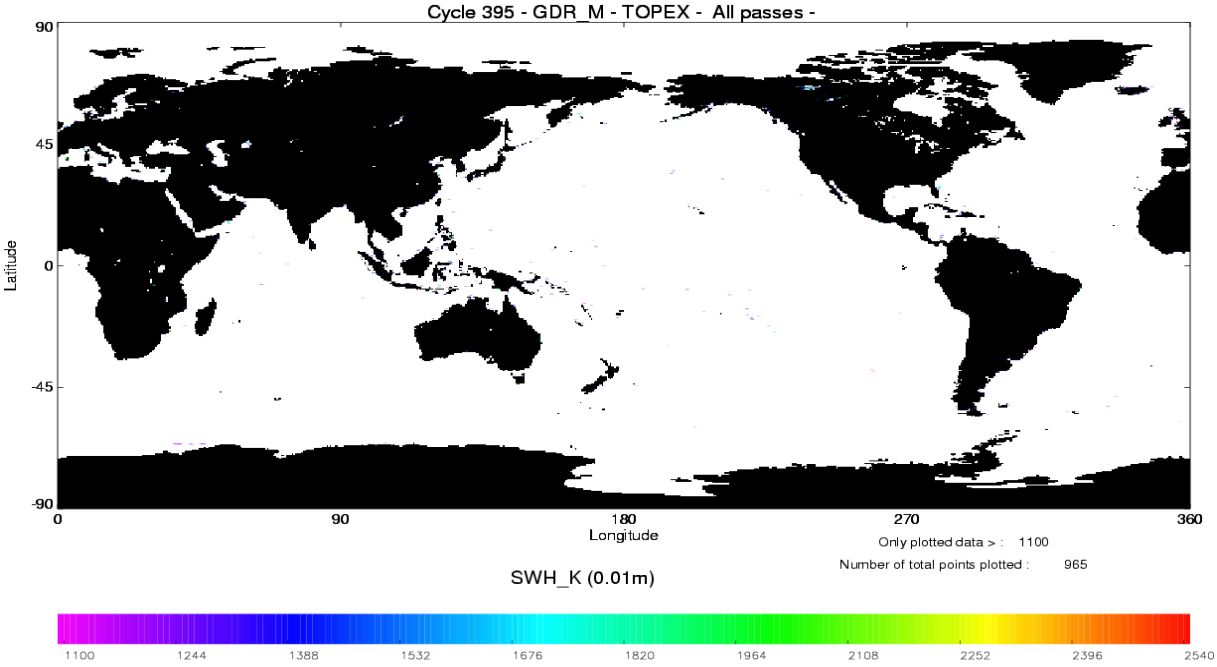

Cycle 395 – GDR_M – TOPEX – All passes –
Dry_Err
MOYENNES
NUMERO DE 1/2 ORBITE min: 9.00 max: 9.00
Wet_Flag
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 1.00
Wet_H_Err
MOYENNES
NUMERO DE 1/2 ORBITE min: 2.00 max: 7.00
Iono_Dor_Bad
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 4.00

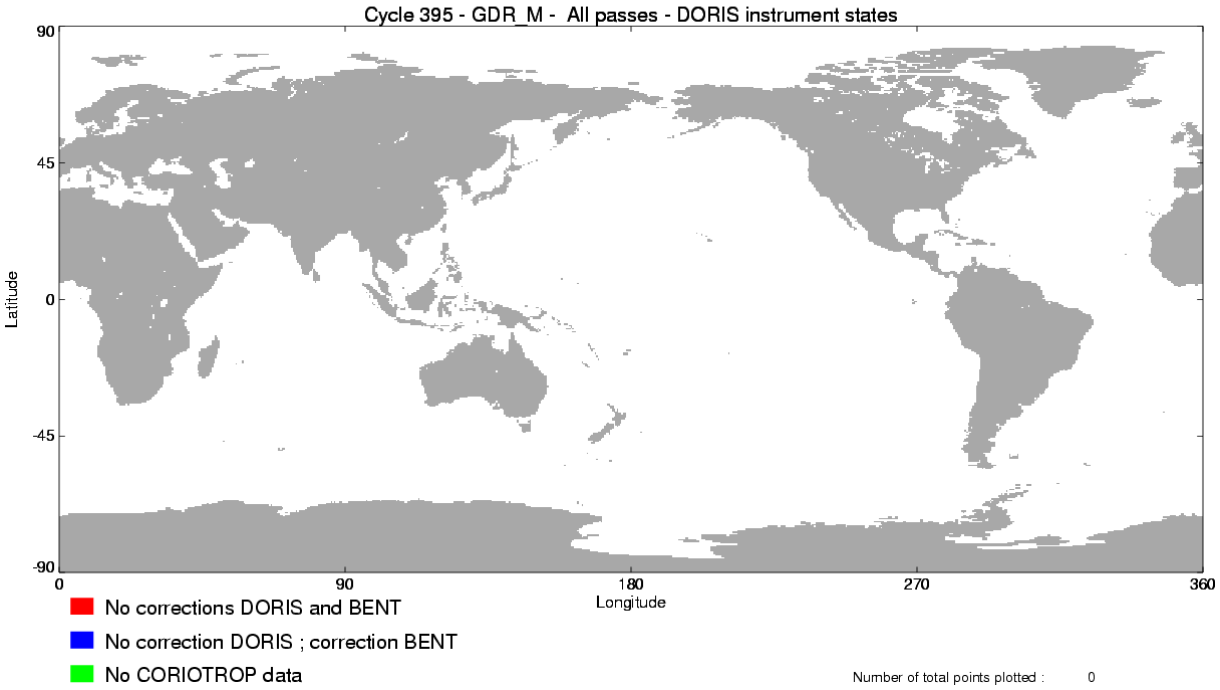

Cycle 395 – GDR_M – TOPEX – All passes –
IMANV
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Val_Att_P1f
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Ind_Pha
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Fl_Att
MOYENNES
NUMERO DE 1/2 ORBITE min: 1.00 max: 1.00


Cycle 395 - GDR_M - ALT_BAD_1 : TOPEX Measurement conditions on
90
45
0
-45
-90
Latitude
0
90
180
270
360
Longitude
Only plotted data > : 0
Number of total points plotted : 24227
1
25
49
73
97
121
145
169
193
217
241


Cycle 395 - GDR_M - ALT_BAD_2 : TOPEX Measurement conditions on
90
45
0
-45
-90
Latitude
0
90
180
270
360
Longitude
Only plotted data > : 0
Number of total points plotted : 23566
1
25
49
73
97
121
145
169
193
217
241


Cycle 395 - GDR_M - TOPEX - All passes -
Latitude
Longitude
Only plotted data > : 100
Number of total points plotted : 4648
RMS_H_ALT (mm)


Cycle 395 - GDR_M - TOPEX - All passes -
Latitude
Longitude
Only plotted data > : 1100
Number of total points plotted : 965
SWH_K (0.01m)


Cycle 395 - 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.

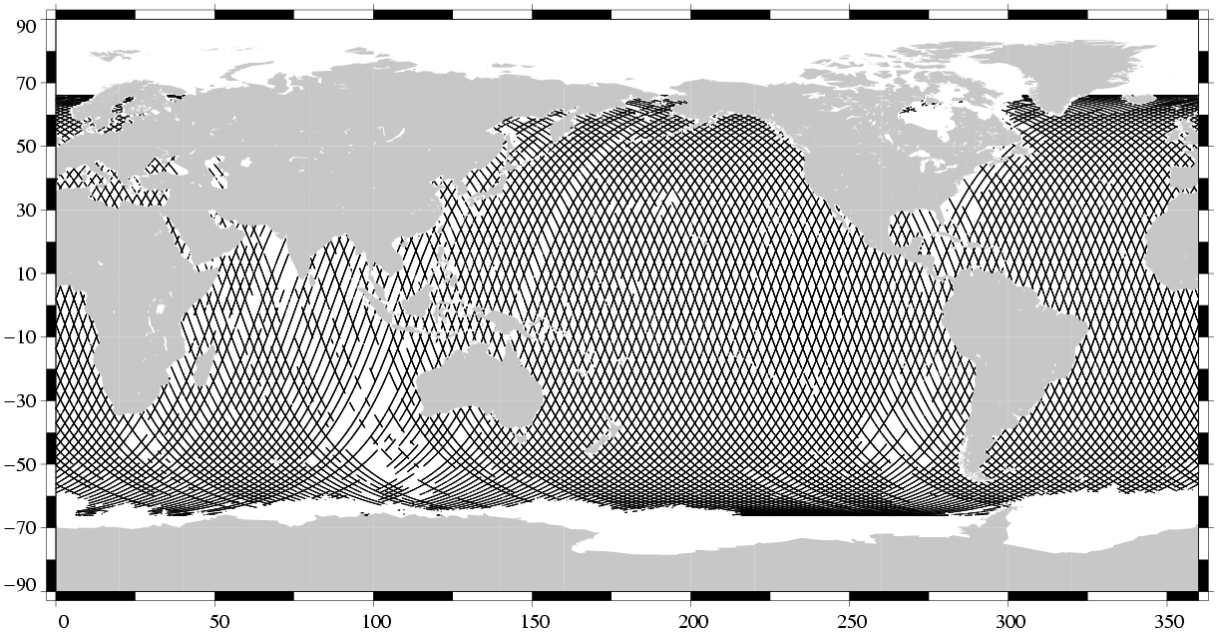
There are problems in the interpolation of the TMR parameters since cycle 371 when there are missing measurements (tape recorder failures). These bad measurements are removed by the TMR correction criterion but some of them have been kept. Thus a new criterion has been added to the editing procedure since the cycle 376 to remove all the mesurements where the absolute value of the difference between the TMR correction and the ECMWF model wet tropospheric correction is greater than 20 cm.

The number and percentage of points removed by each criterion is given on the following table. Note that these statistics are obtained with measurements already edited for radiometer land flag (27.48 % of points removed) and ice flag (6.82 % of points removed).

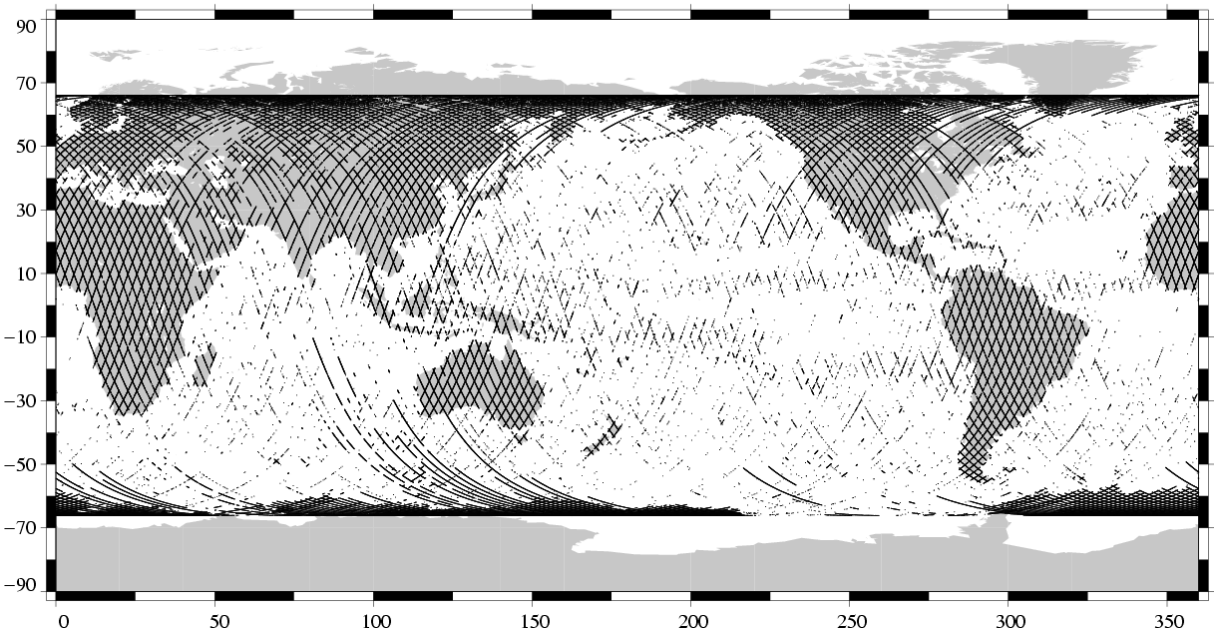
Parameters	Min Thres.	Max Thres.	Unit	Mean % removed in 1997	% removed
Sea surface height	-130.000	100.000	m	1.37	0.54
Number of 20/10Hz valid points Poseidon/TOPEX	5.000	-		1.37	0.76
Std. deviation of range	0.000	0.100	m	1.85	1.56
Off nadir angle from waveform	0.000	0.400	deg	1.36	4.08
Dry tropospheric 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	4.01
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	0.32
Sea state Bias	-0.500	0.000	m	1.39	0.49
Backscatter coefficient	7.000	30.000	dB	1.44	0.41
Ocean tide height	-5.000	5.000	m	0.01	0.66
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	0.78
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.

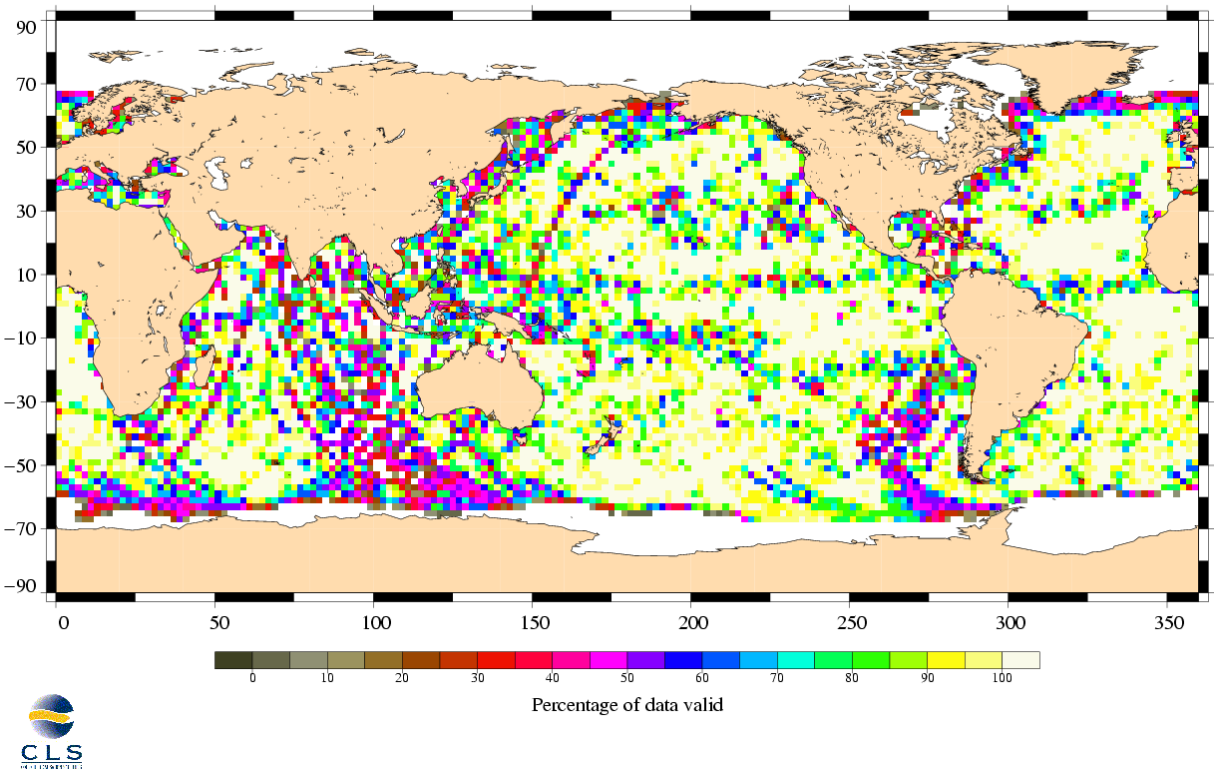
Valid data
TOPEX/Poseidon Cycle 395 (04/06/2003 / 14/06/2003)



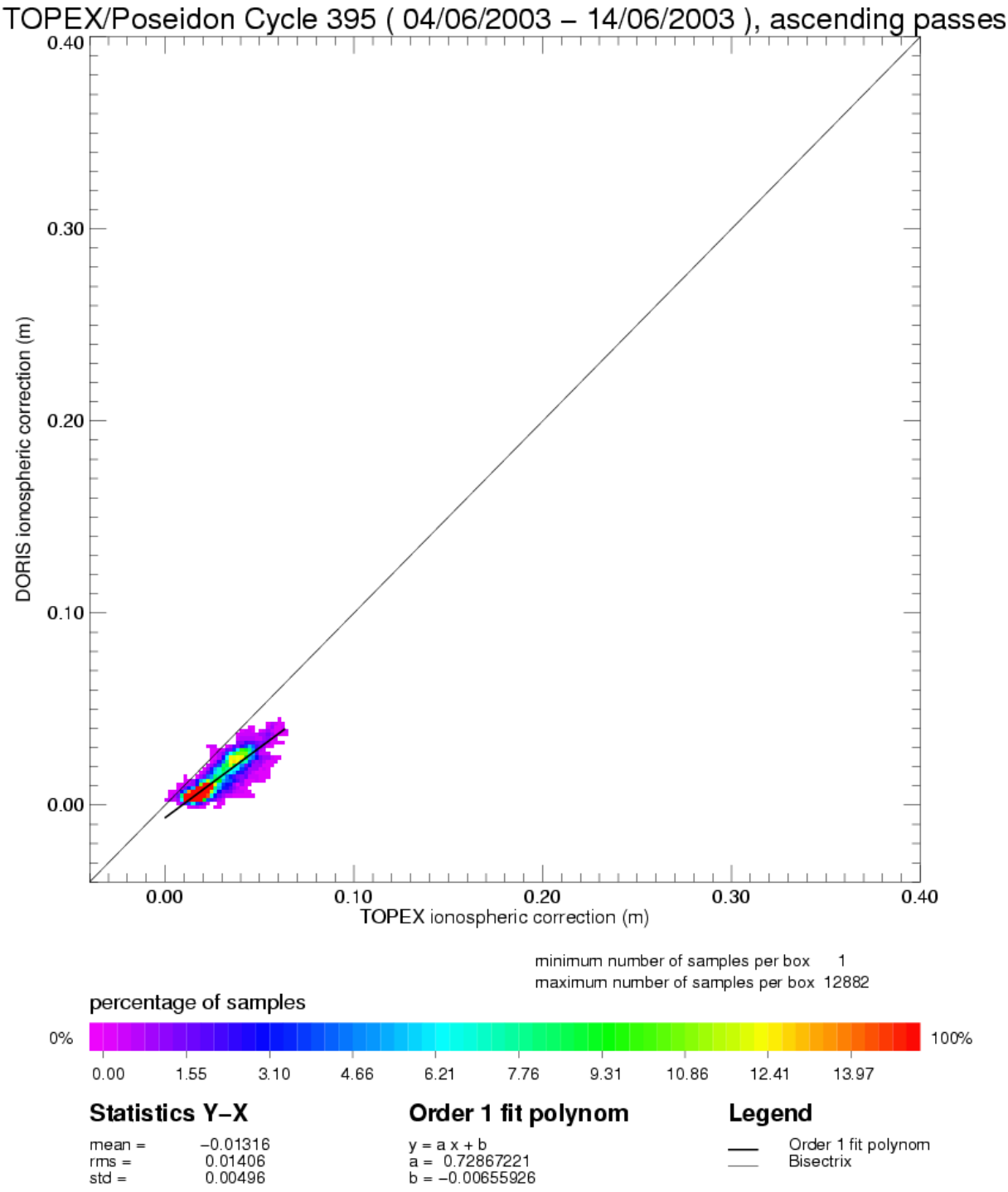
Edited measurements
TOPEX Cycle 395 (04/06/2003 / 14/06/2003)

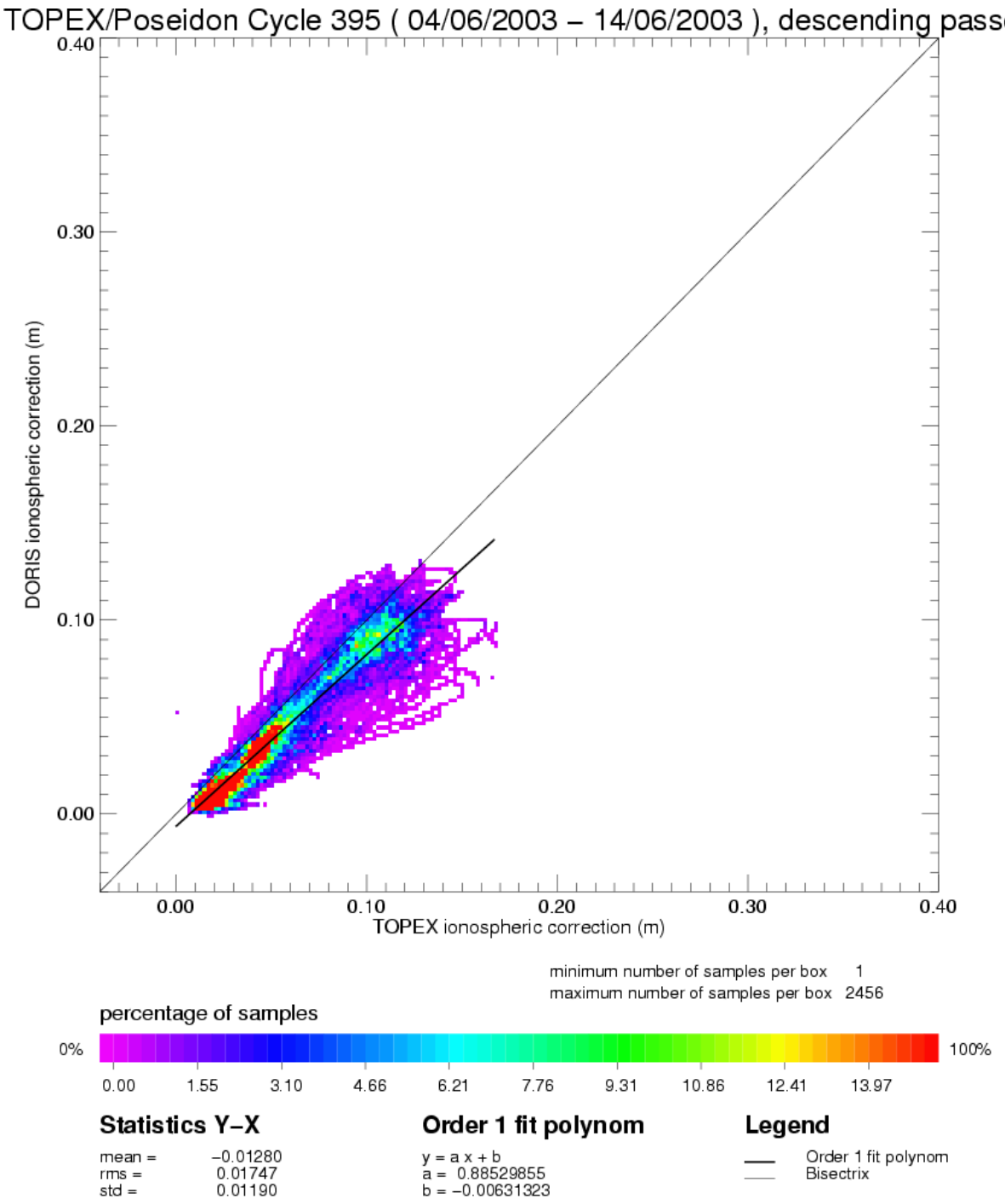


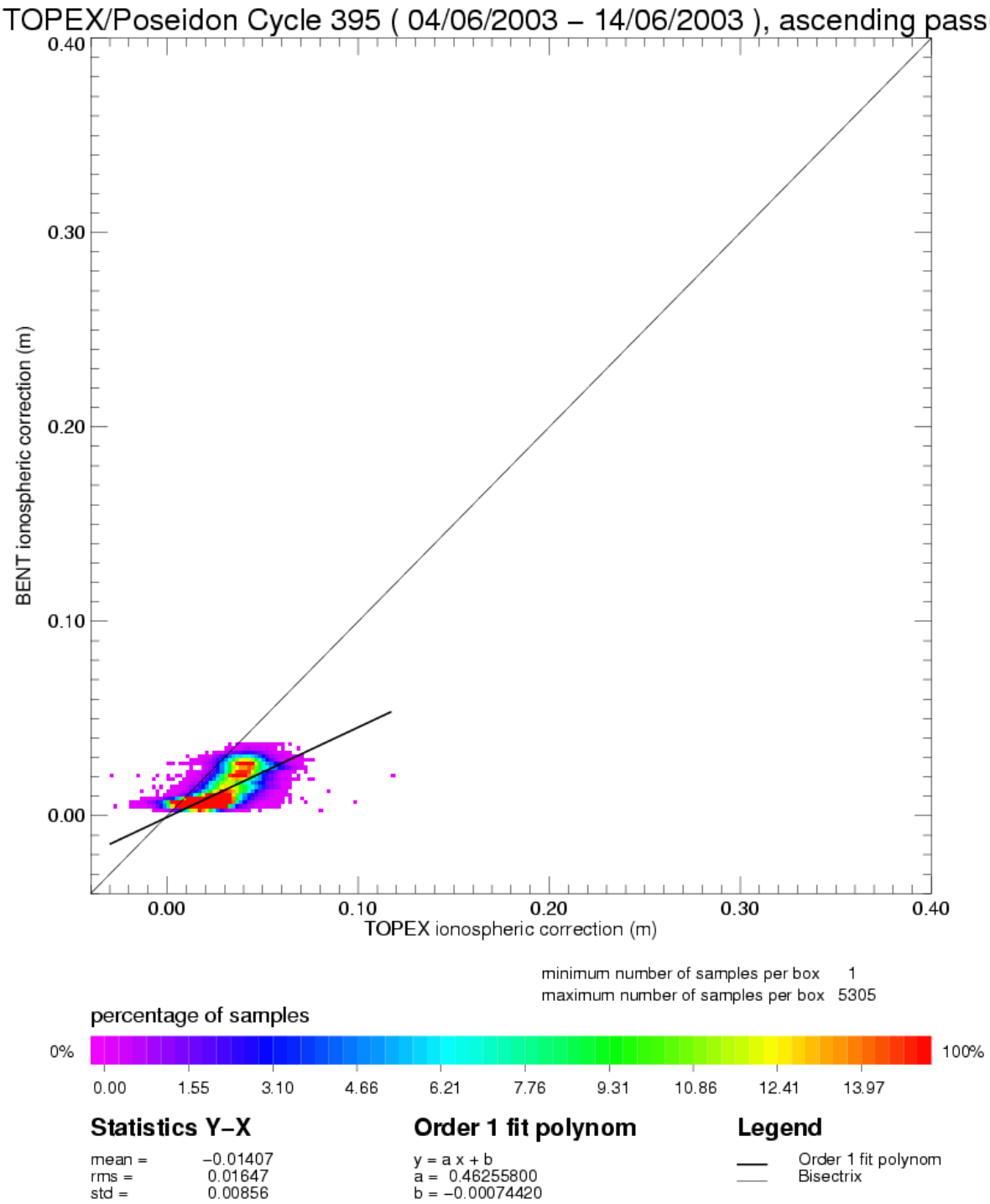
Percentage of valid data relative to the nominal pass
TOPEX/Poseidon Cycle 395 (04/06/2003 / 14/06/2003)

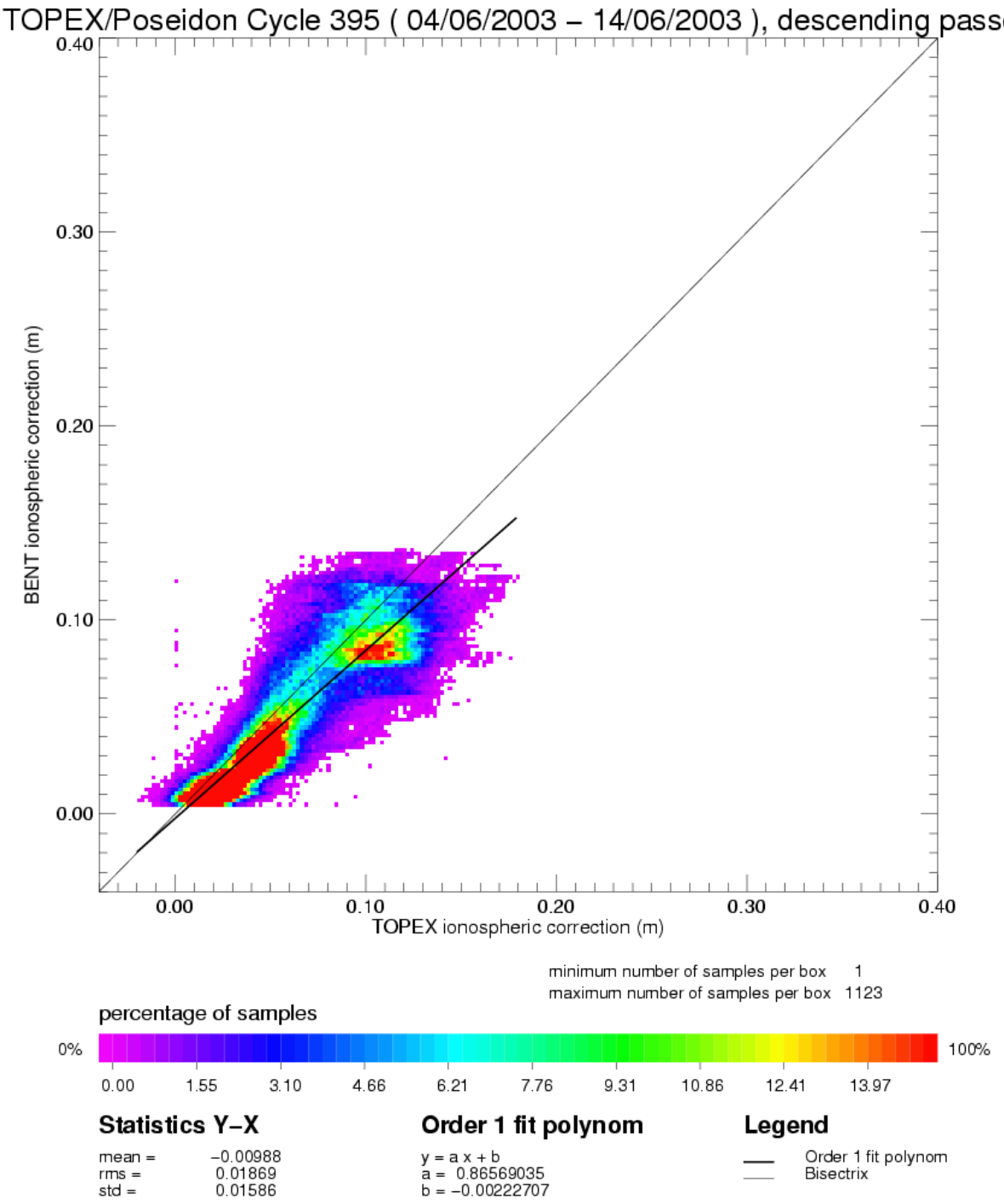


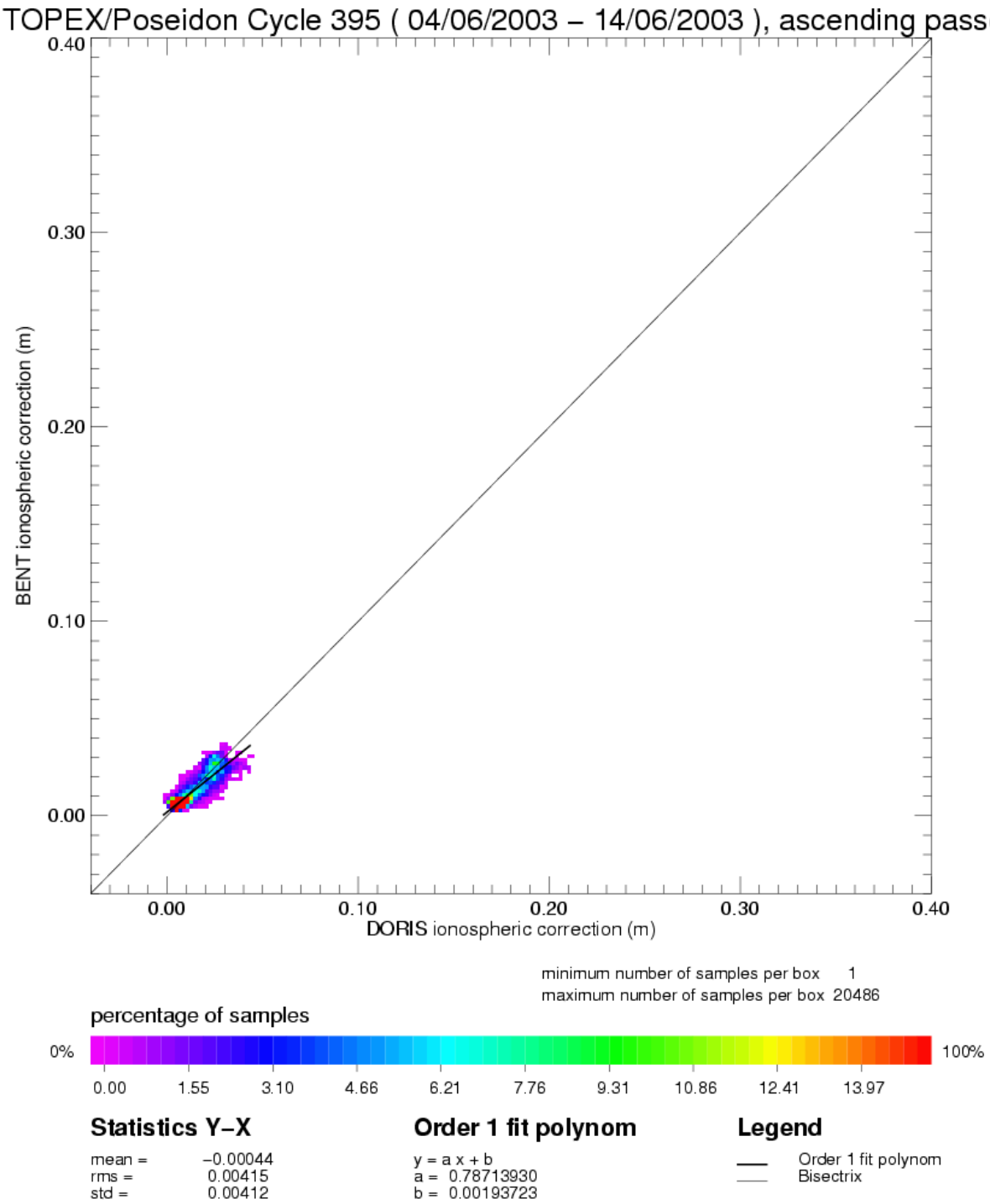
3.5 Ionospheric correction

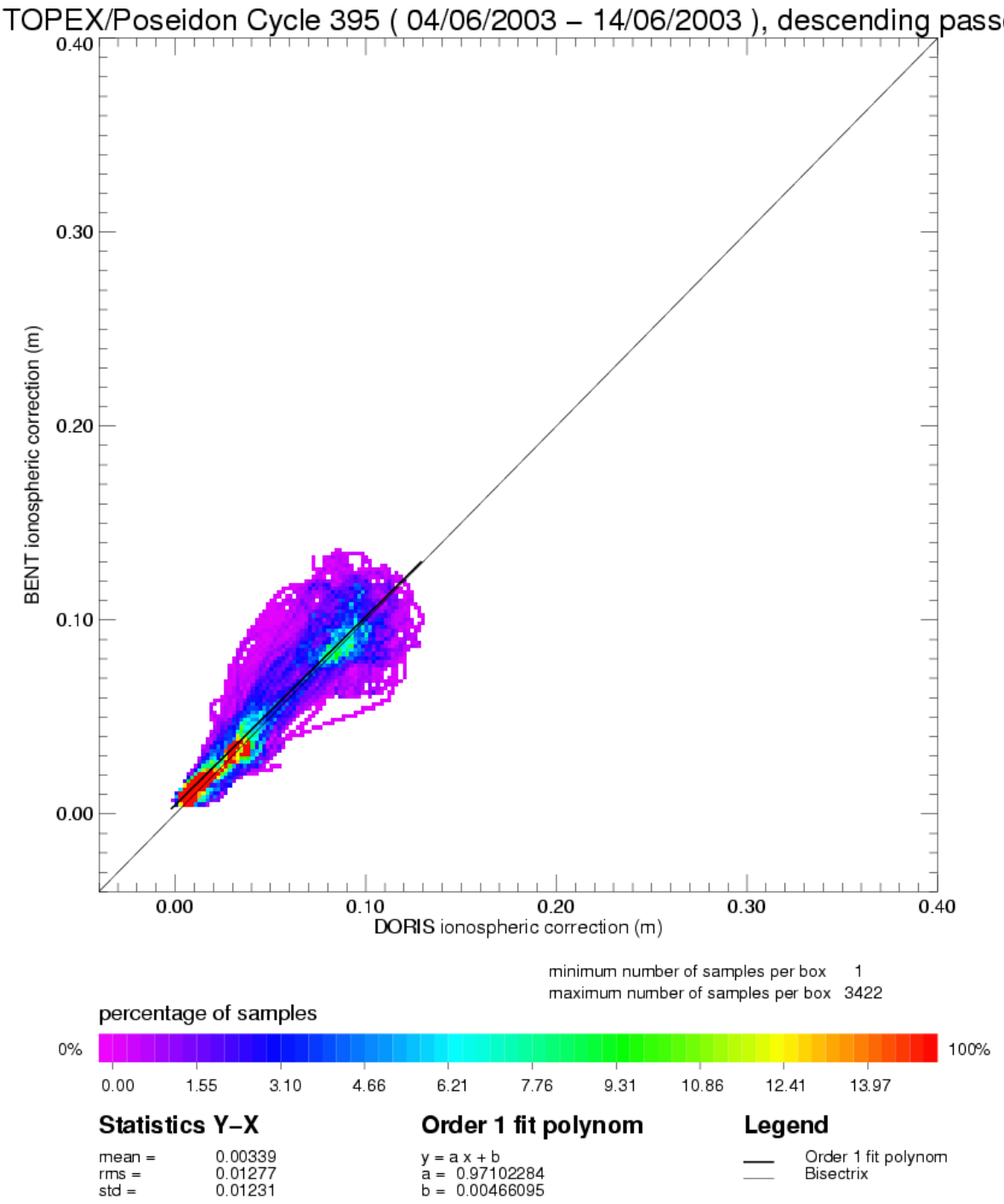



TOPEX/Poseidon Cycle 395 (04/06/2003 – 14/06/2003), descending passes
DORIS ionospheric correction (m)
TOPEX ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 2456
percentage of samples
0%
100%
0.00
1.55
3.10
4.66
6.21
7.76
9.31
10.86
12.41
13.97
Statistics Y–X
mean = −0.01280
rms = 0.01747
std = 0.01190
Order 1 fit polynom
y = a x + b
a = 0.88529855
b = −0.00631323
Legend
Order 1 fit polynom
Bisectrix

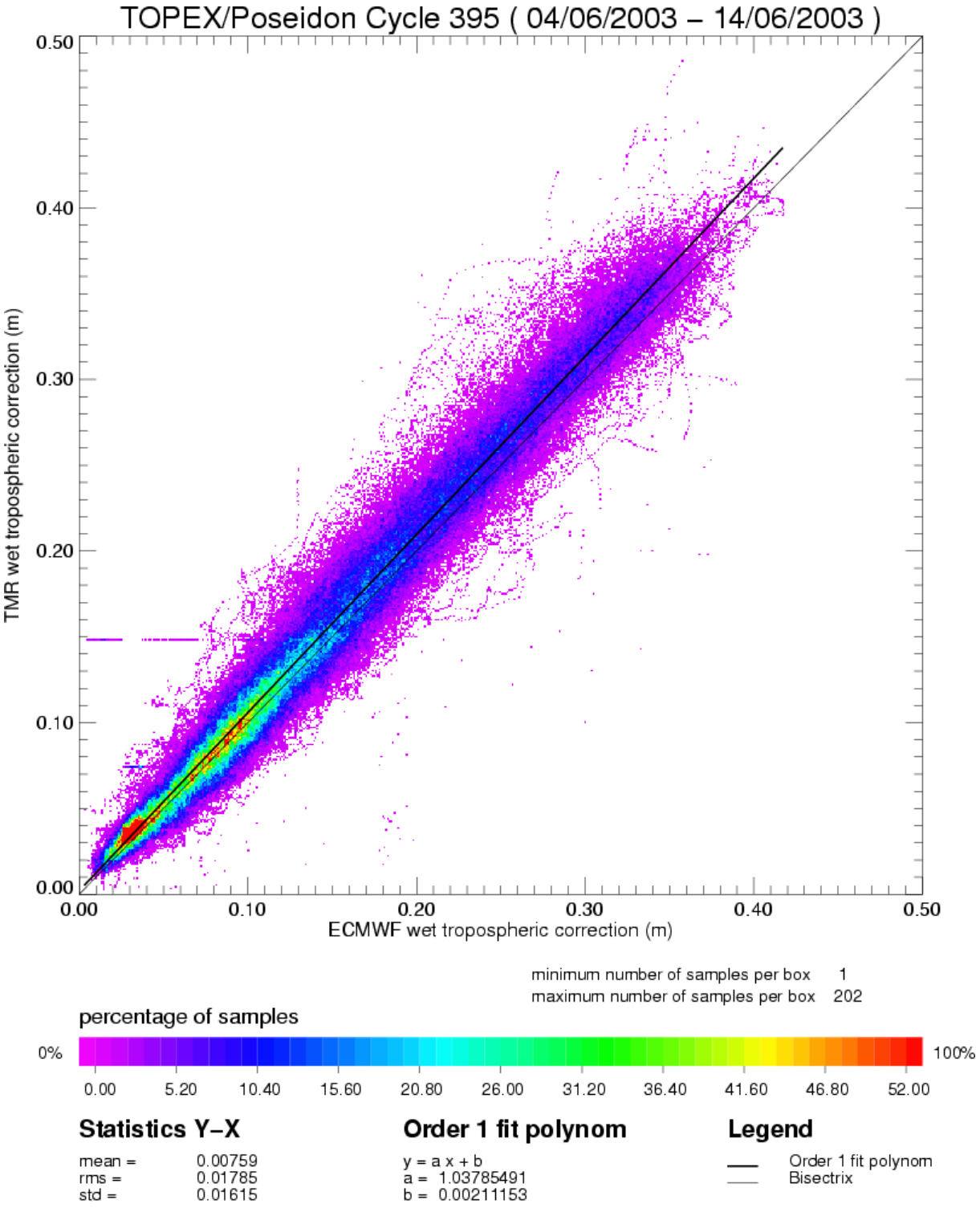

TOPEX/Poseidon Cycle 395 (04/06/2003 – 14/06/2003), ascending passes
BENT ionospheric correction (m)
TOPEX ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 5305
percentage of samples
0%
100%
0.00
1.55
3.10
4.66
6.21
7.76
9.31
10.86
12.41
13.97
Statistics Y–X
mean = −0.01407
rms = 0.01647
std = 0.00856
Order 1 fit polynom
y = a x + b
a = 0.46255800
b = −0.00074420
Legend
Order 1 fit polynom
Bisectrix


TOPEX/Poseidon Cycle 395 (04/06/2003 – 14/06/2003), 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 1123
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 = −0.00988
rms = 0.01869
std = 0.01586
Order 1 fit polynom
y = a x + b
a = 0.86569035
b = −0.00222707
Legend
Order 1 fit polynom
Bisectrix

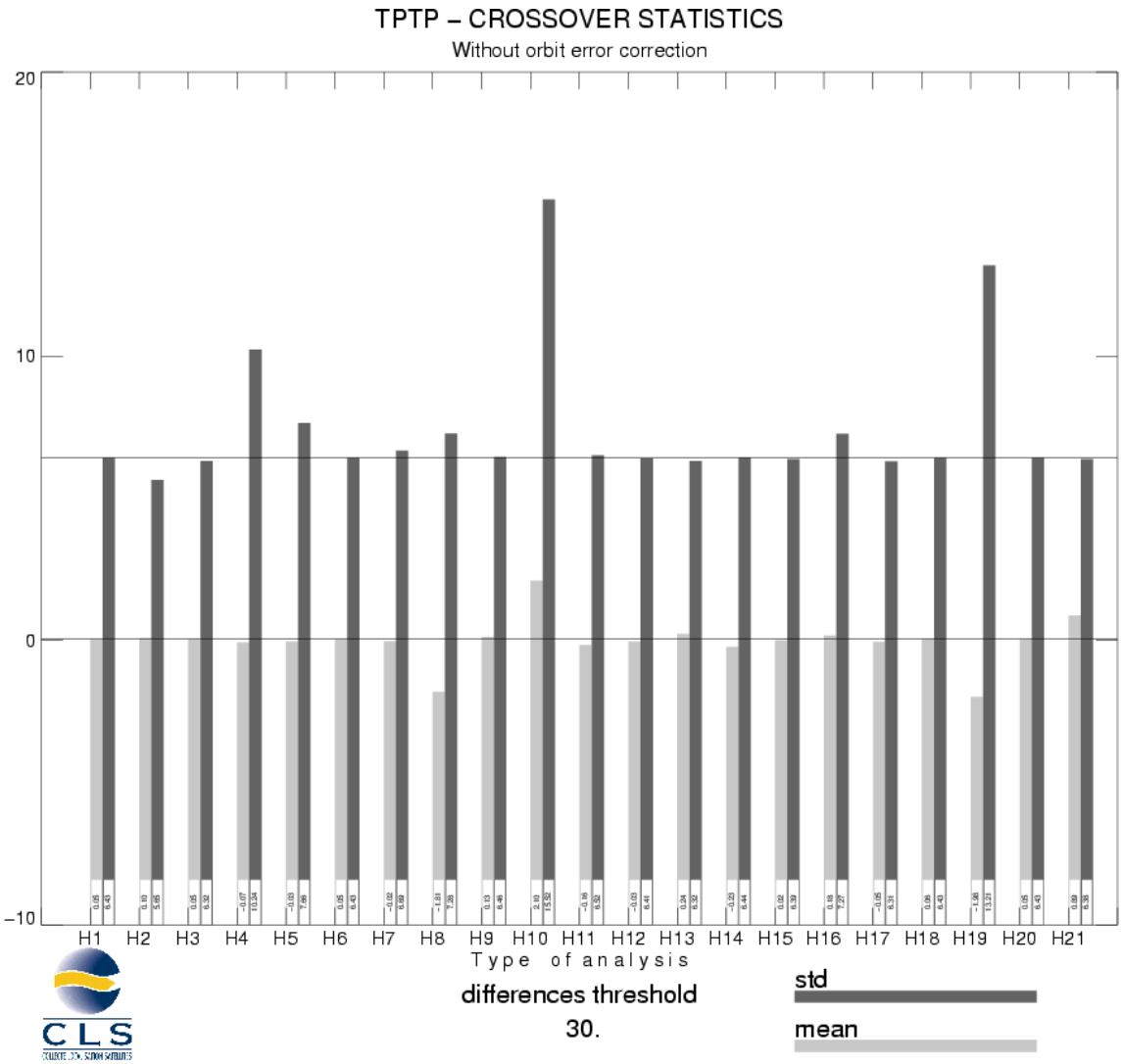

TOPEX/Poseidon Cycle 395 (04/06/2003 – 14/06/2003), ascending passes
BENT ionospheric correction (m)
DORIS ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 20486
percentage of samples
0%
100%
0.00
1.55
3.10
4.66
6.21
7.76
9.31
10.86
12.41
13.97
Statistics Y–X
mean = −0.00044
rms = 0.00415
std = 0.00412
Order 1 fit polynom
y = a x + b
a = 0.78713930
b = 0.00193723
Legend
Order 1 fit polynom
Bisectrix


TOPEX/Poseidon Cycle 395 (04/06/2003 – 14/06/2003), 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 3422
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 = 0.00339
rms = 0.01277
std = 0.01231
Order 1 fit polynom
y = a x + b
a = 0.97102284
b = 0.00466095
Legend
Order 1 fit polynom
Bisectrix

3.6 Wet tropospheric corection



3.7 Crossover statistics



SSH = Corrected sea surface height	SSH with FES99 tide model instead of GOT99
SSH = Corrected sea surface height with orbit error	SSH with FES02 tide model instead of GOT99
SSH without dry thopospheric correction	SSH with CSR3 tide model instead of GOT99
SSH without inverse barometer correction	SSH with GOT002 tide model instead of GOT99
SSH without wet tropospheric correction	SSH without BM4 SSB correction
SSH with corrected tropo instead of TMR tropo	SSH with no–parametric SSB correction instead of BM4 SSB correction
SSH with ECMWF tropo instead of TMR tropo	SSH with BM3 SSB correction instead of BM4 SSB correction
SSH without ionospheric correction filtered	SSH without solid earth tide correction
SSH with DORIS iono correction instead of iono filtered	SSH without polar tide correction
SSH without GOT99 tide model	SSH = Corrected sea surface height with CNES orbit
SSH with FES95 tide model instead of GOT99	

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 : –28.8200

Valeur maximale : 28.4000

Difference Max – Min: 57.2200

Nombre de points lus: 4818

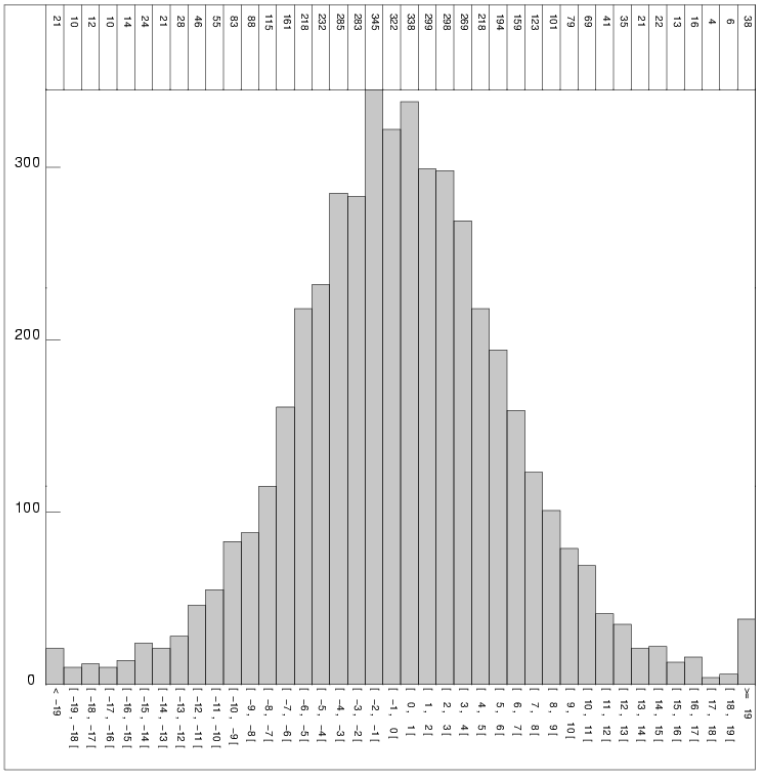
Nombre de points selectionnes: 4716

Moyenne : 0.0480580

Ecart–type : 6.43266

Moyenne Quadratique : 6.43284

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 : –28.6000

Valeur maximale : 29.5900

Difference Max – Min: 58.1900

Nombre de points lus: 4818

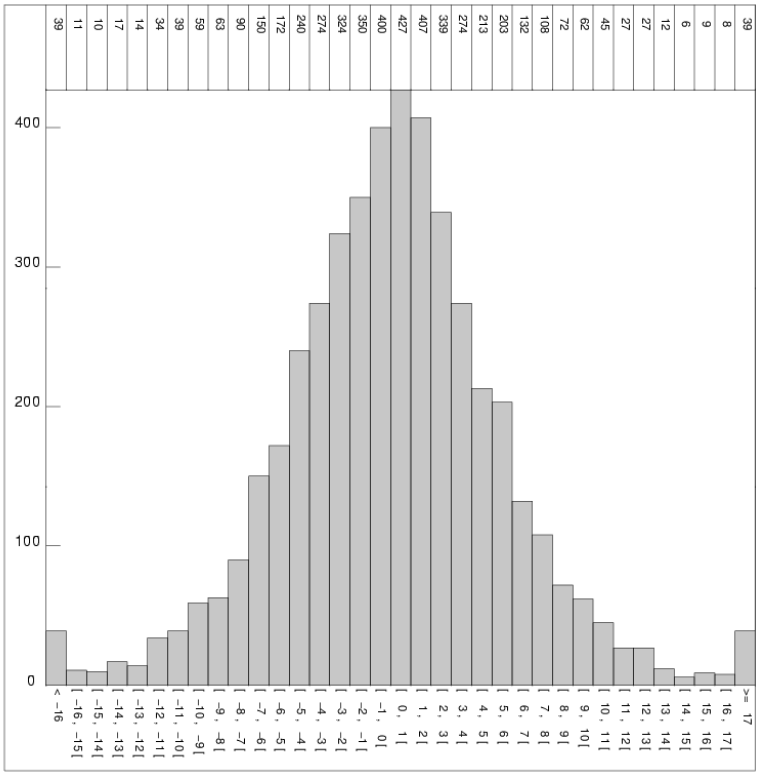
Nombre de points selectionnes: 4696

Moyenne : 0.0964540

Ecart–type : 5.65322

Moyenne Quadratique : 5.65405

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 :	–22.0500
Valeur maximale :	41.9600
Difference Max – Min:	64.0100
Nombre de points lus:	2590
Nombre de points selectionnes:	2368
Moyenne :	–0.645781
Ecart–type :	5.91762
Moyenne Quadratique :	5.95276

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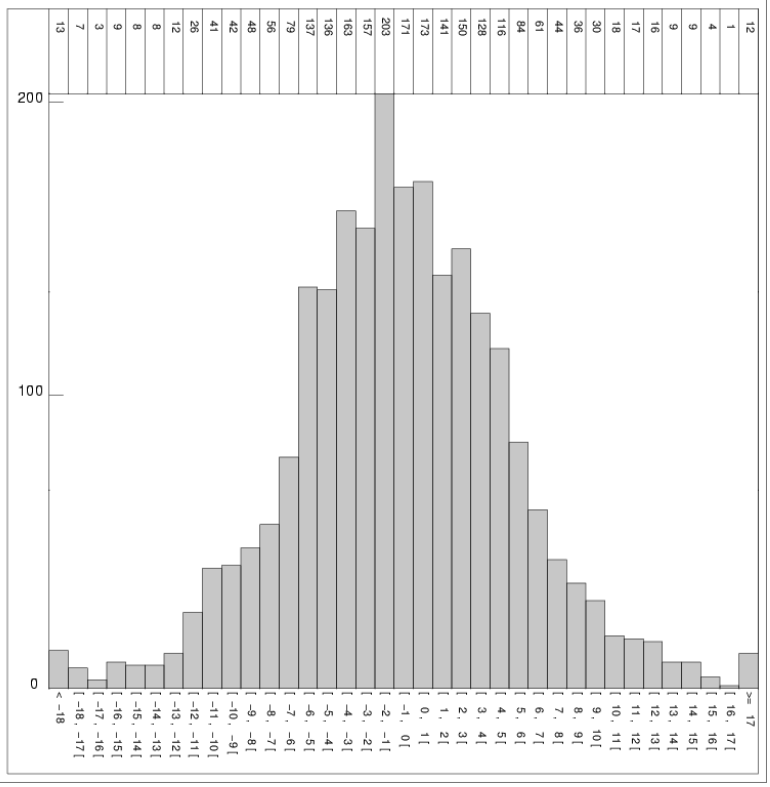
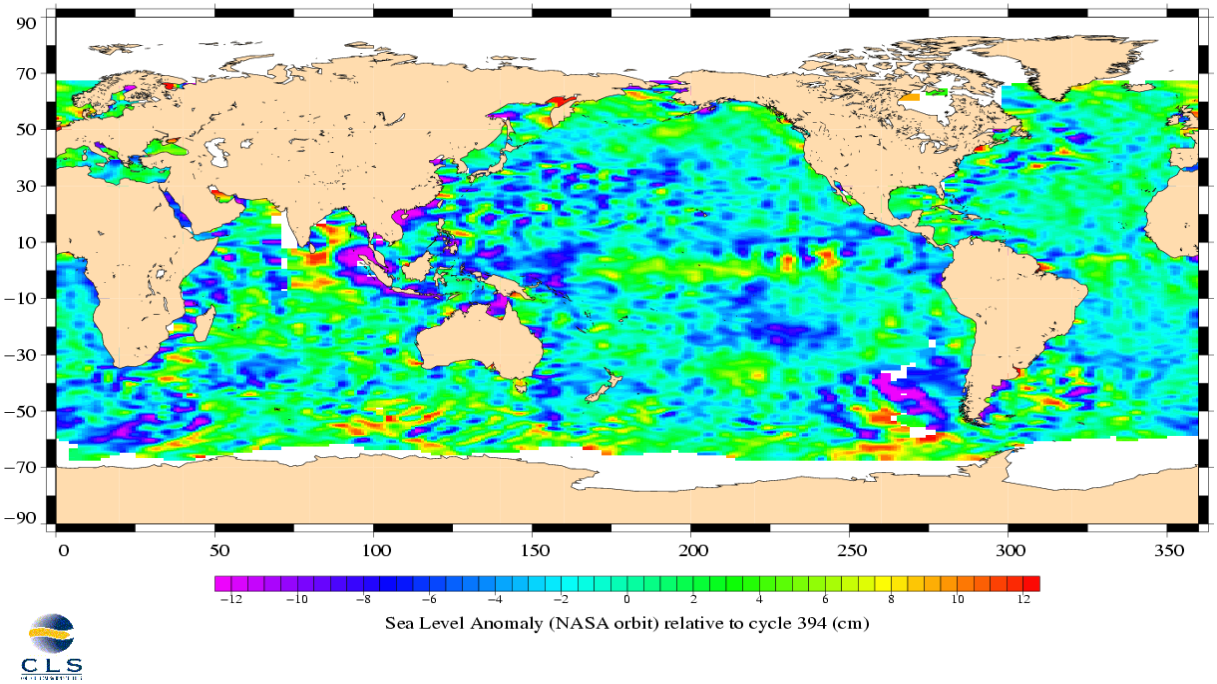


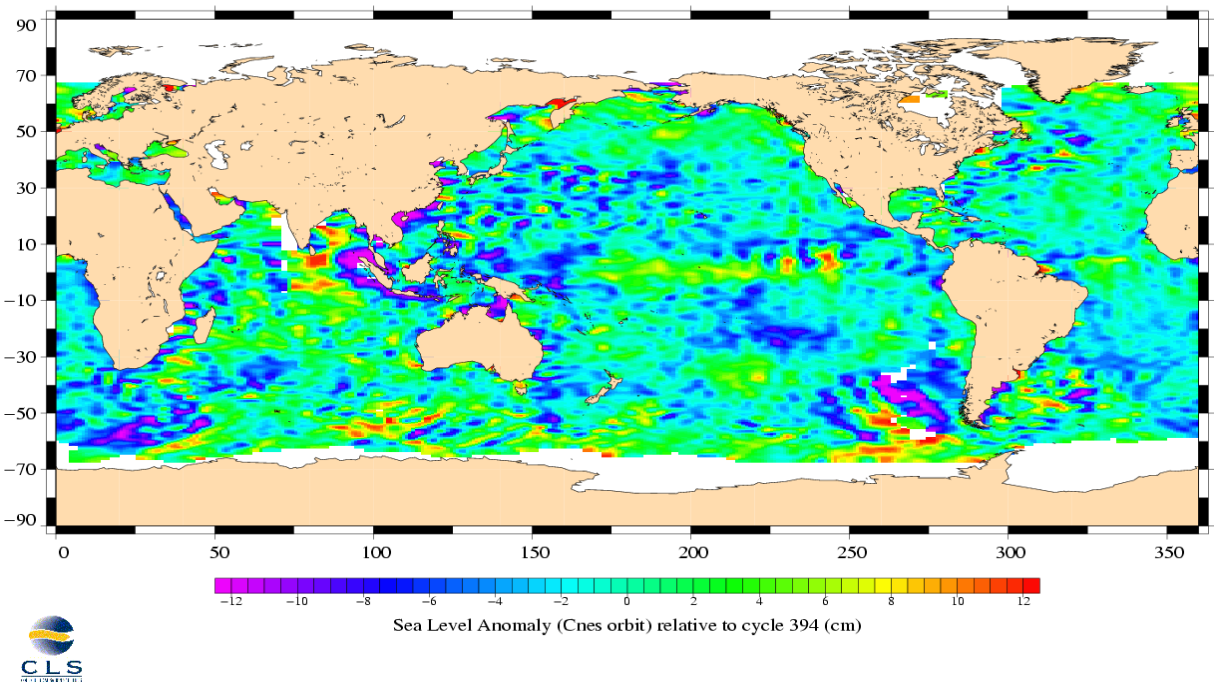
3.8 SSH variability

3.8.1 Sea Level Anomaly

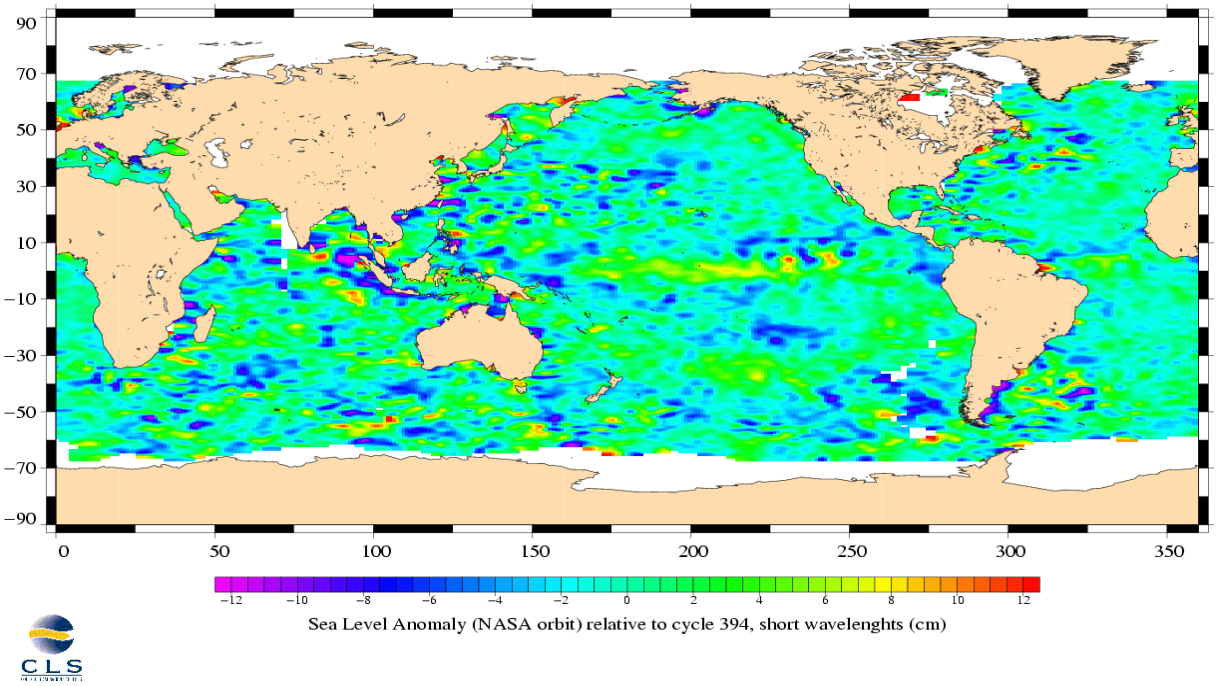
TOPEX/Poseidon, cycle 395
Period : 04/06/2003 – 14/06/2003



TOPEX/Poseidon, cycle 395
Period : 04/06/2003 – 14/06/2003

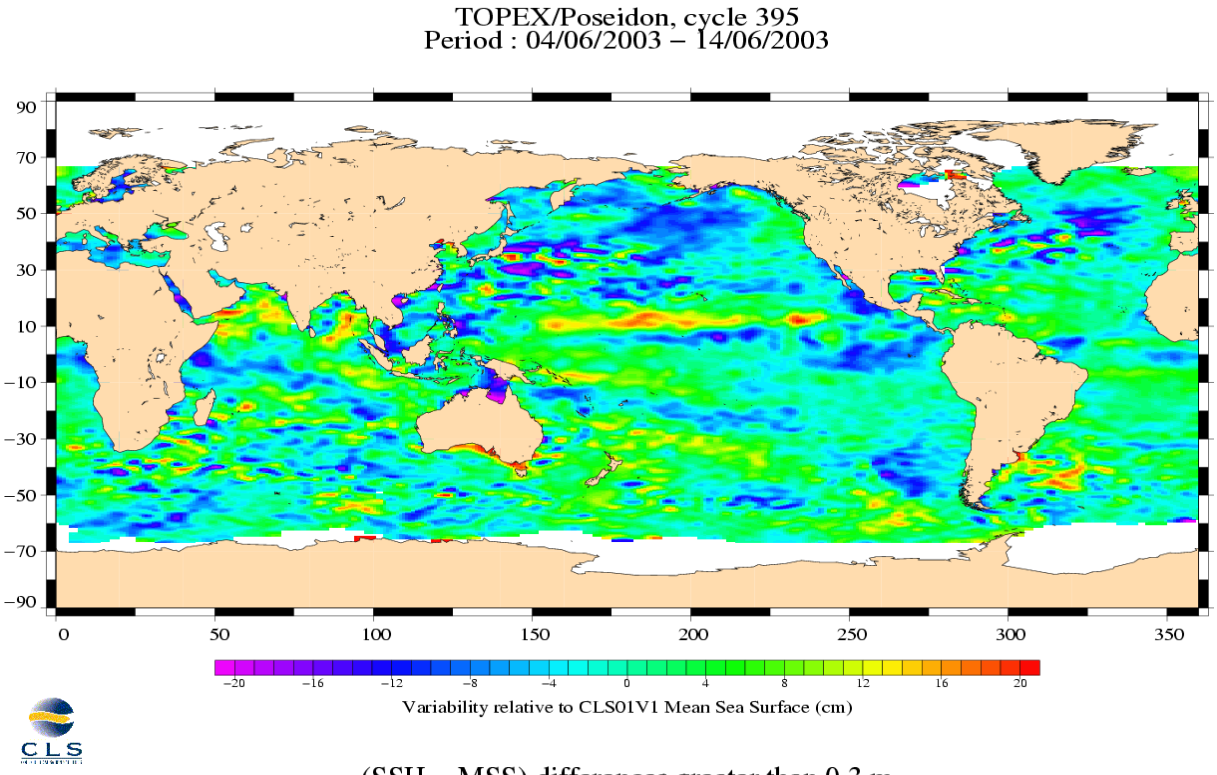


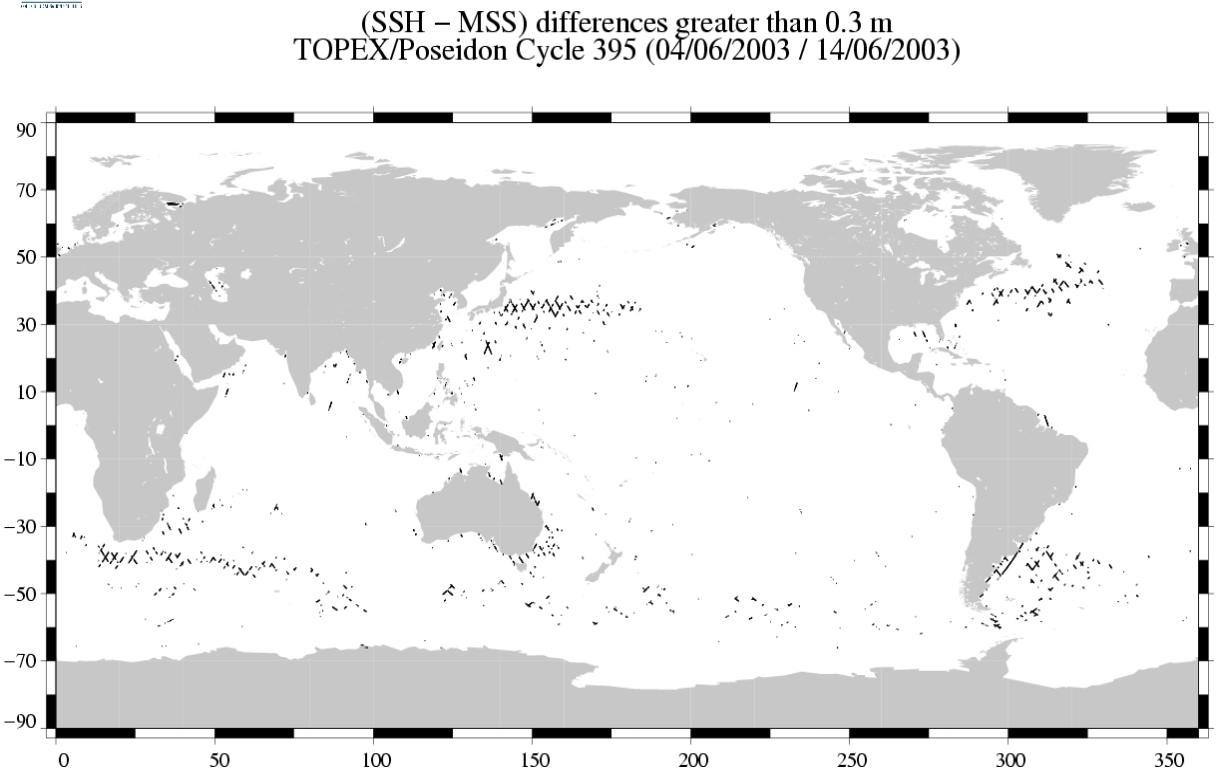
TOPEX/Poseidon, cycle 395
Period : 04/06/2003 – 14/06/2003



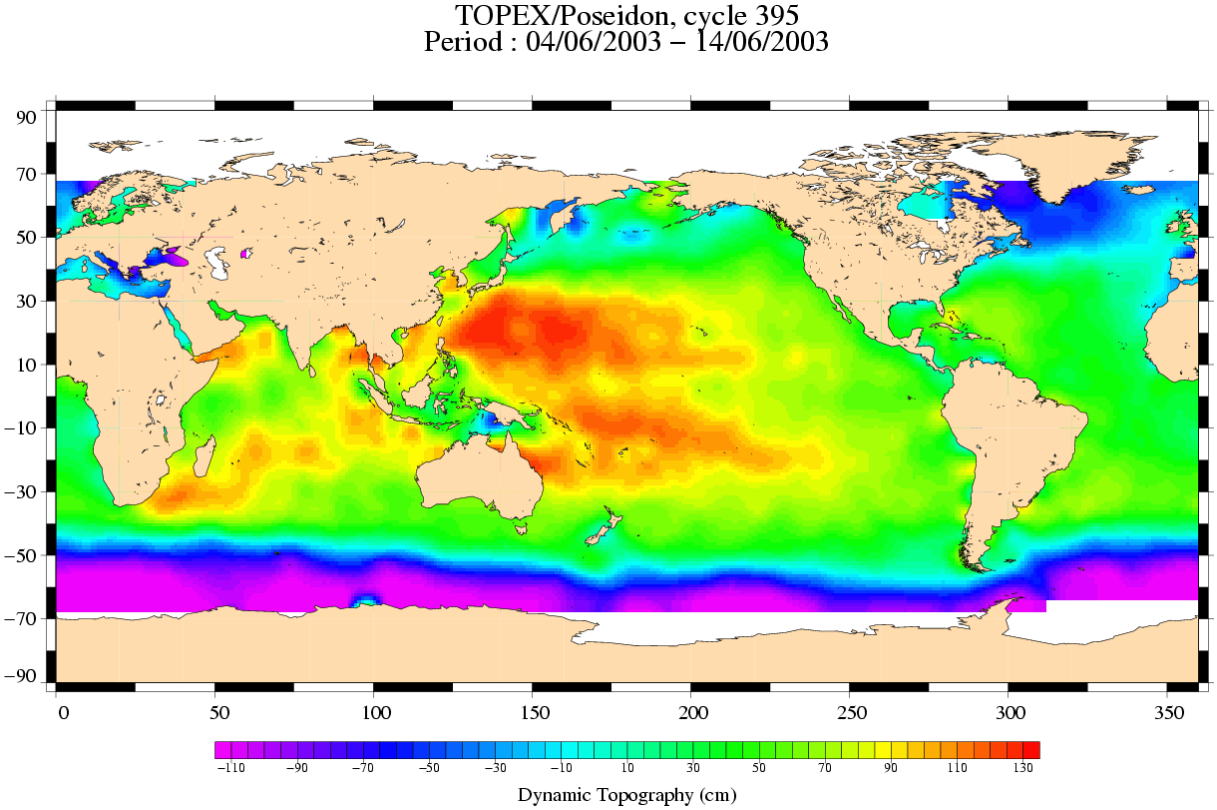
3.8.2 Comparison to a precise Mean Sea Surface

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.





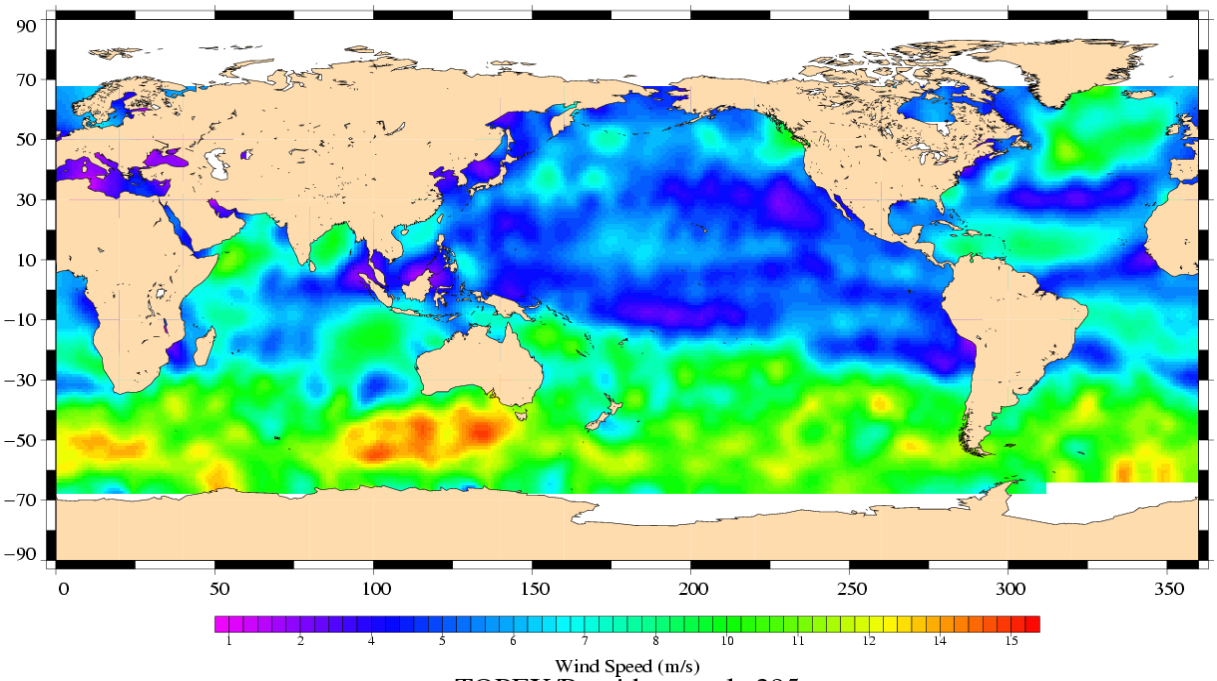
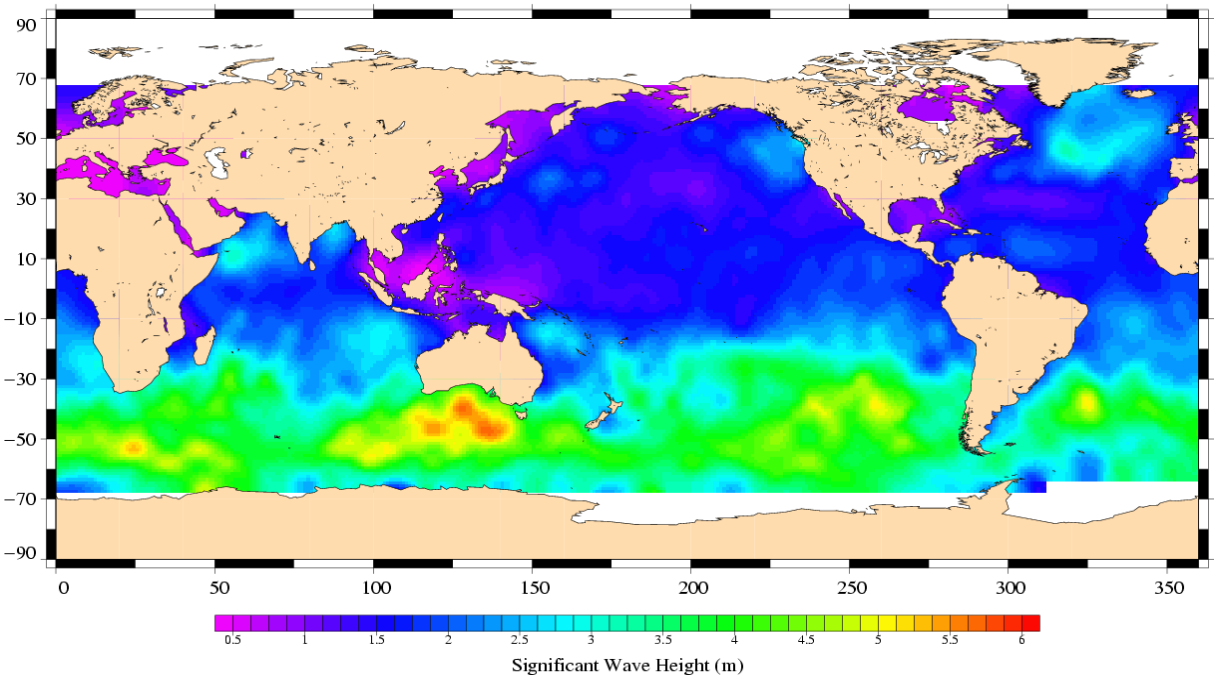
3.9 Dynamic topography



3.10 Wind and wave maps

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

TOPEX/Poseidon, cycle 395
Period : 04/06/2003 – 14/06/2003



TOPEX/Poseidon, cycle 395
Period : 04/06/2003 – 14/06/2003