TOPEX/Poseidon MGDR
Quality Assessment Report

Cycle 383

05-02-2003 15-02-2003

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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

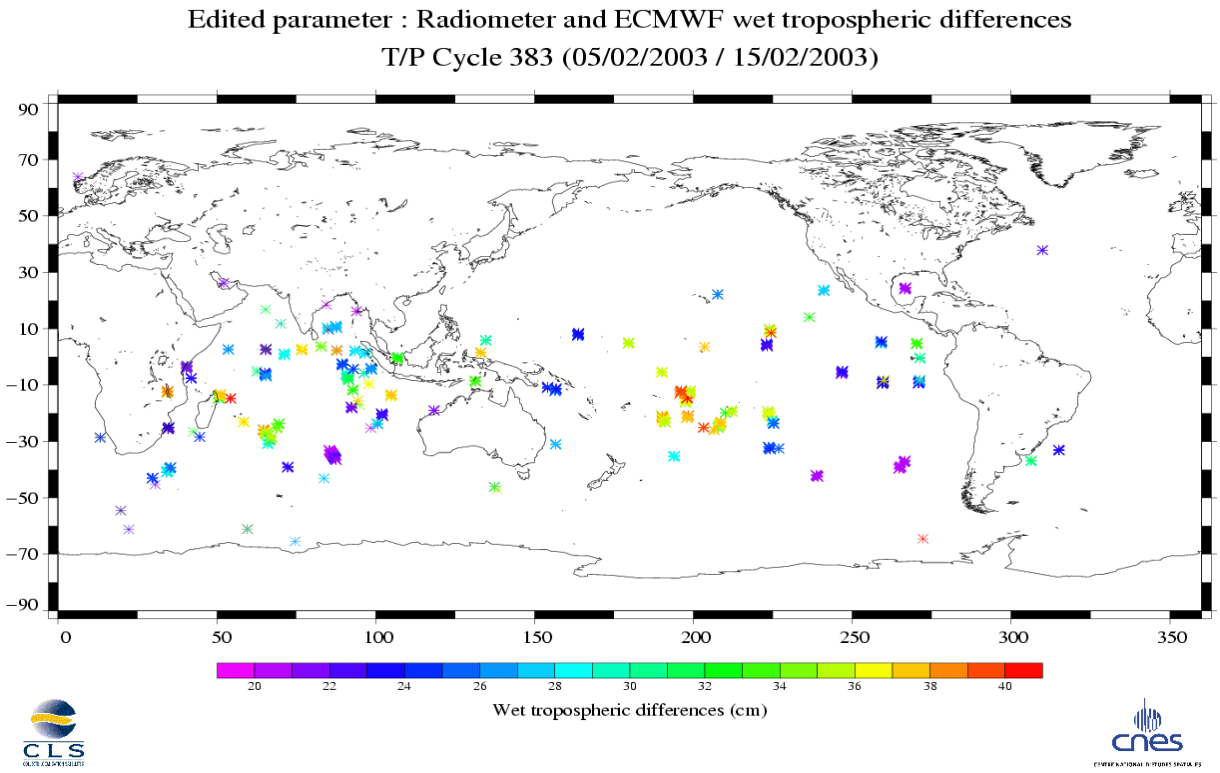
2 Cycle overview

2.1 Cycle quality and performances

Data quality for this cycle appears to be nominal. For this cycle, the crossover standard deviation is 5.88 cm rms, and the standard deviation of Sea Level Anomalies (SLA) relative to a Mean Sea Surface is 10.94 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 4.51% 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 mesurements removed by this criterion for the current cycle are plotted on the following figure.



3 CALVAL main results

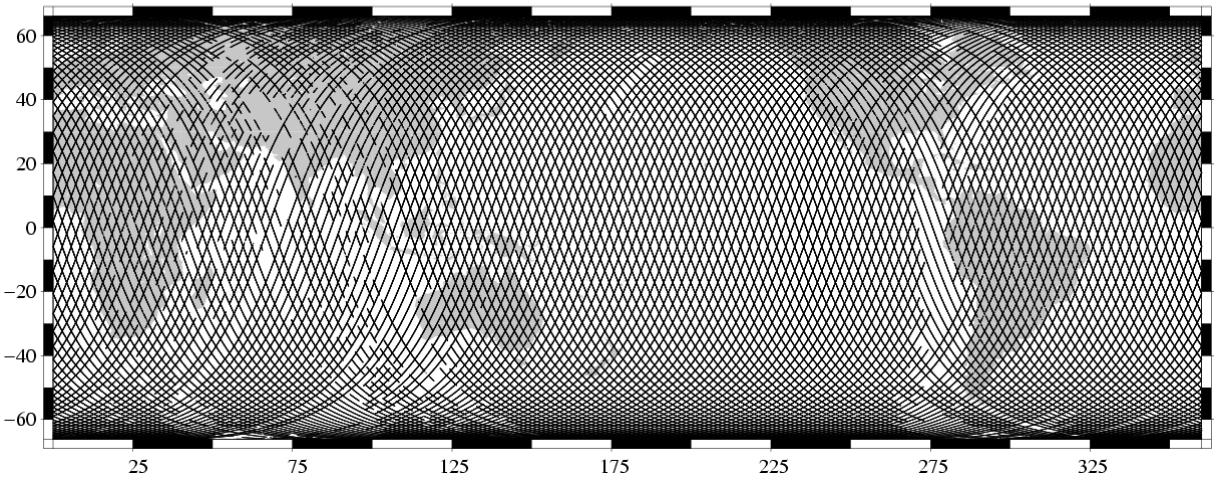
This section presents results that illustrate data quality during this cycle. These verification products are produced operationally so that they allow systematic monitoring of the main relevant parameters.

3.1 Missing measurements

705790 altimeter measurements are present, and 88682 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.

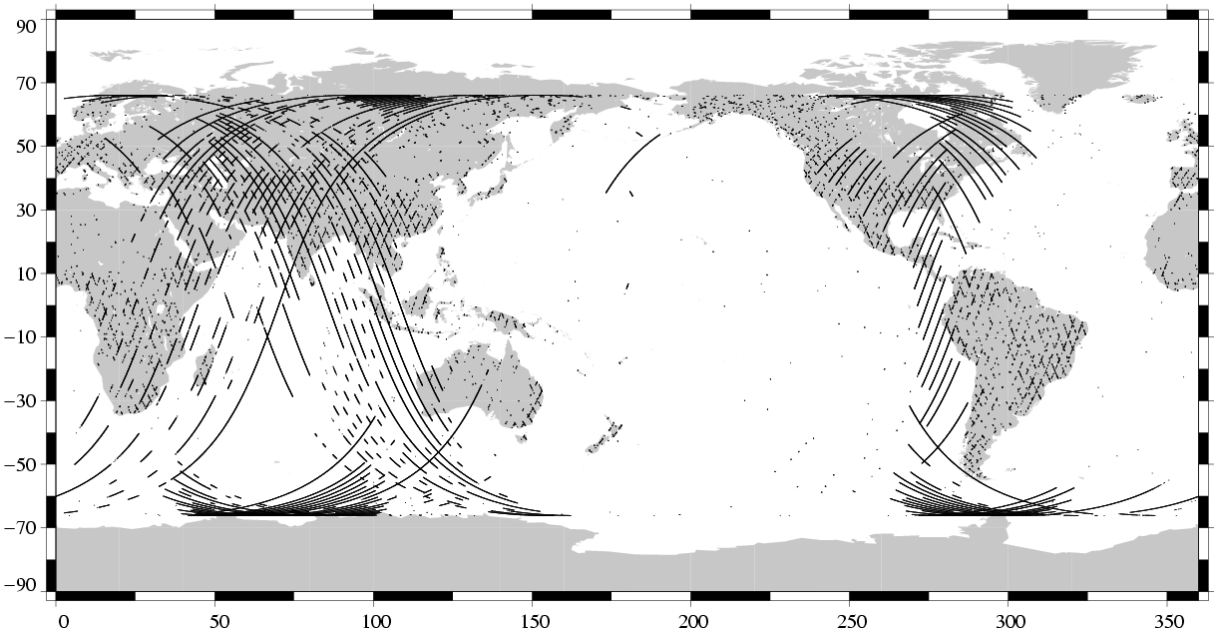
Available measurements

TOPEX Cycle 383 (05/02/2003 / 15/02/2003)



Missing measurements

TOPEX/Poseidon Cycle 383 (05/02/2003 / 15/02/2003)

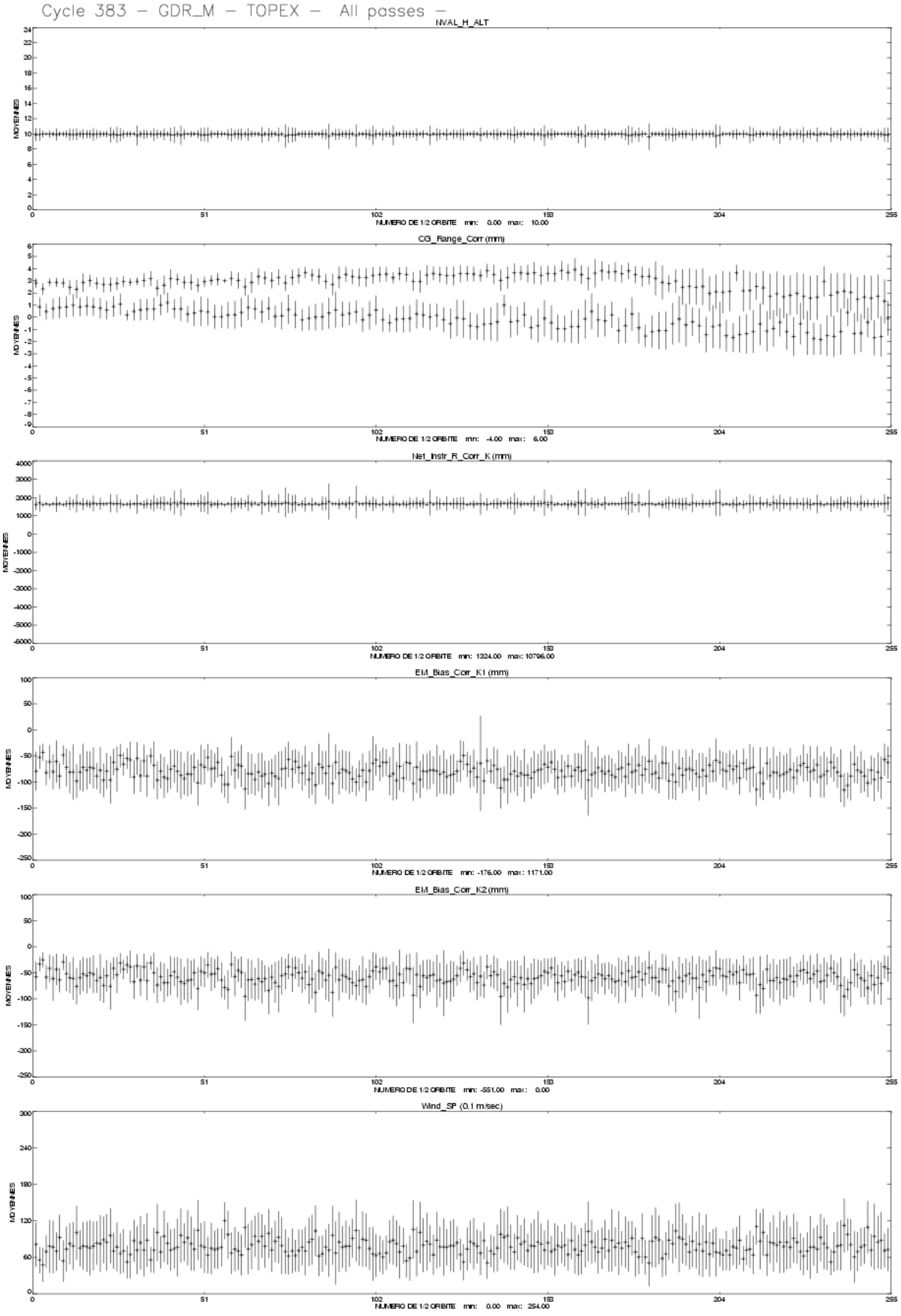


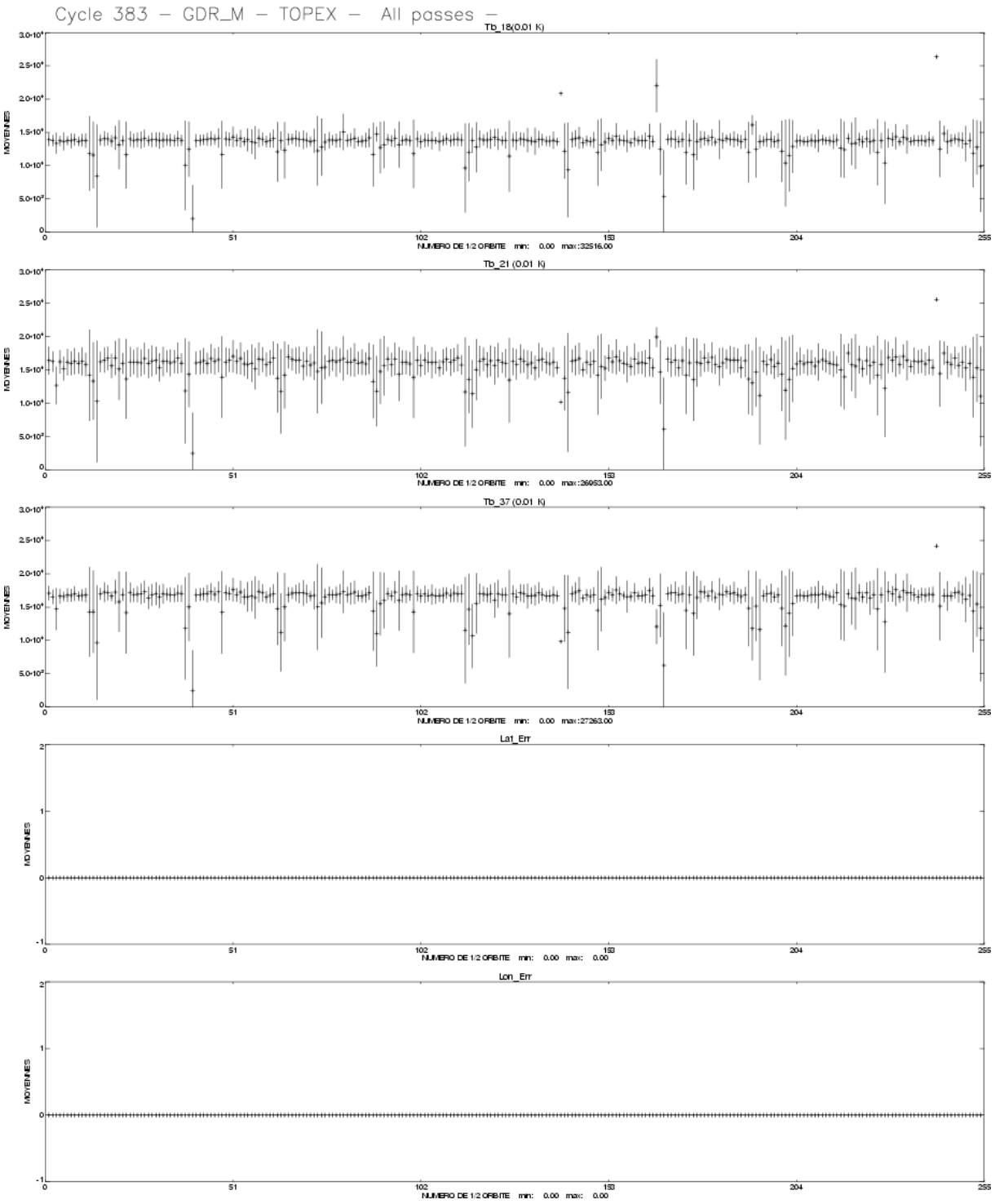
3.2 M-GDR quality flags

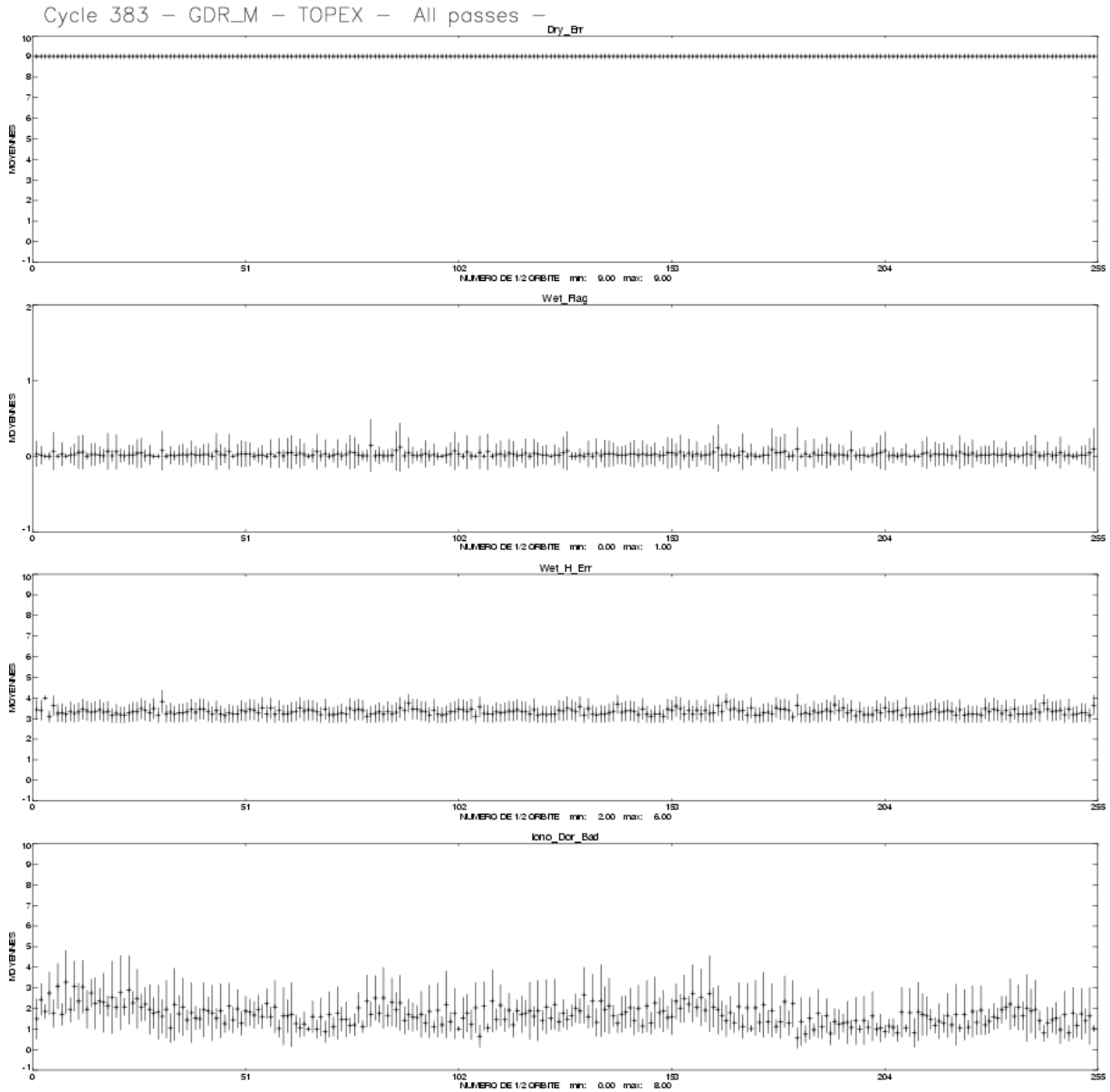
The following table indicates the percentage of measurements for which those flags are set.

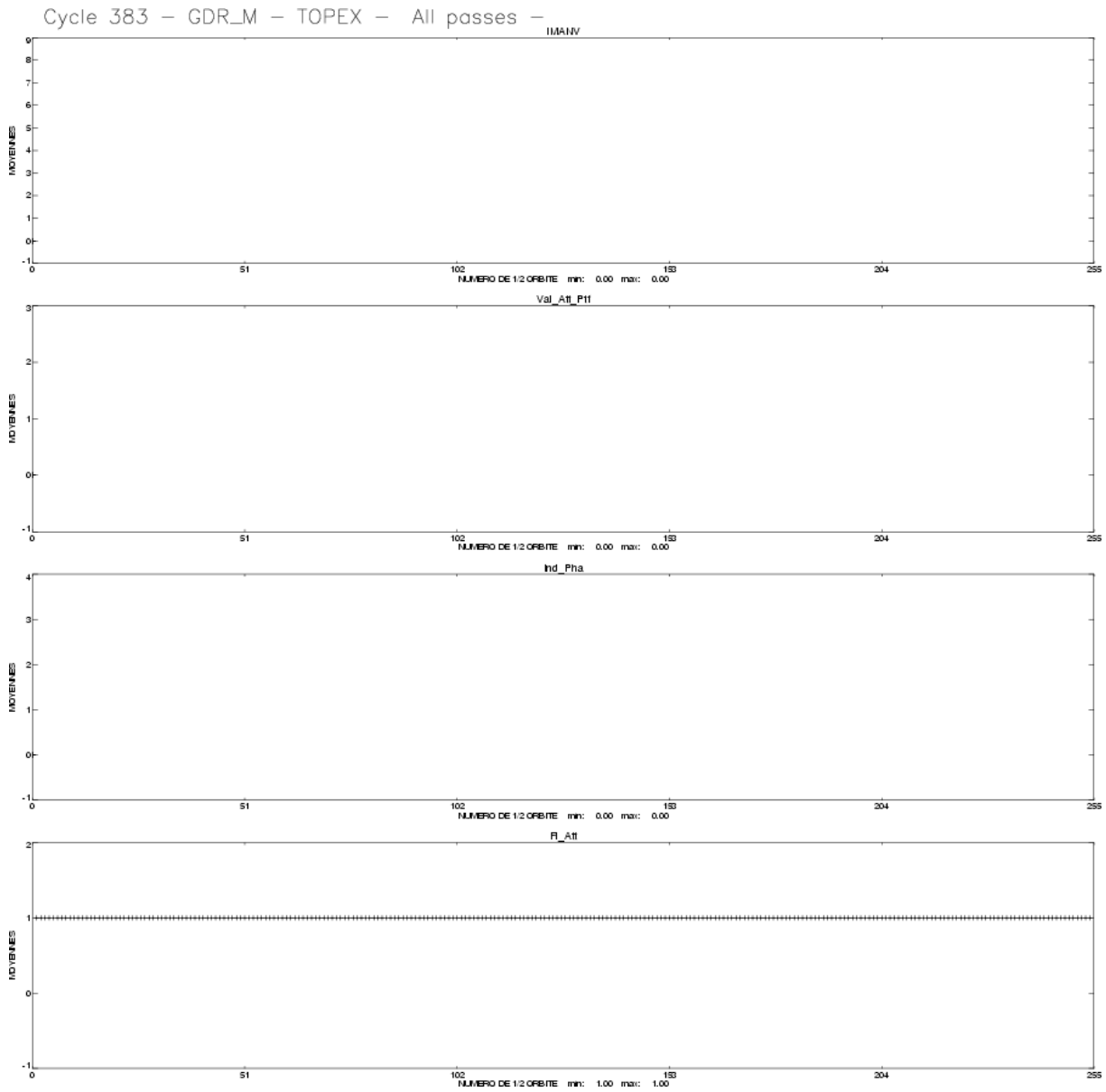
Name	Descrition	% bad
Geo_Bad_1	altimeter land flag	26.72
Geo_Bad_1	ice flag	3.00
Geo_Bad_1	radiometer land flag	28.81
Alt_Bad_1	conditions 1 altimeter	4.06
Alt_Bad_2	conditions 2 altimeter	3.95
Geo_Bad_2	rain (liquid water in excess)	7.07
Geo_Bad_2	less than 4 points for CSR3.0 tide calculation	0.35
Geo_Bad_2	less than 4 points for FES95.2.1 tide calculation	2.26
TOPEX	TOPEX not valid	0.00
TMR	TMR not valid	0.00
TMR_Bad	Brightness temperatures not valid	5.23
DORIS	DORIS not valid	0.00

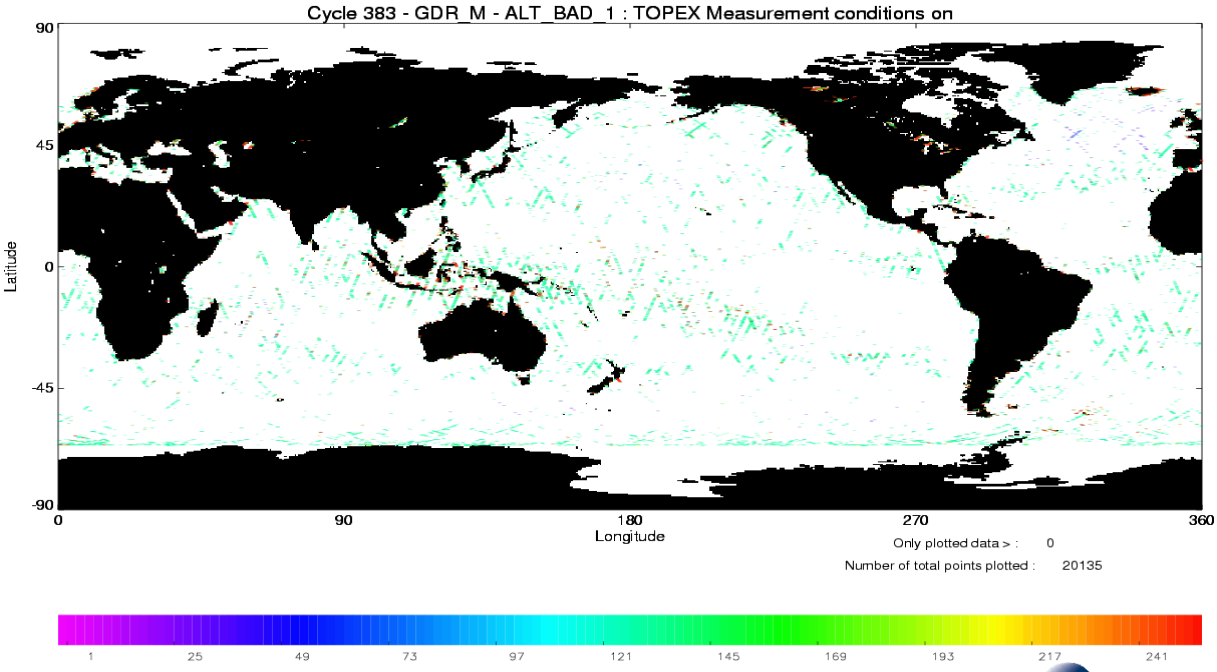
3.3 M-GDR parameter plots

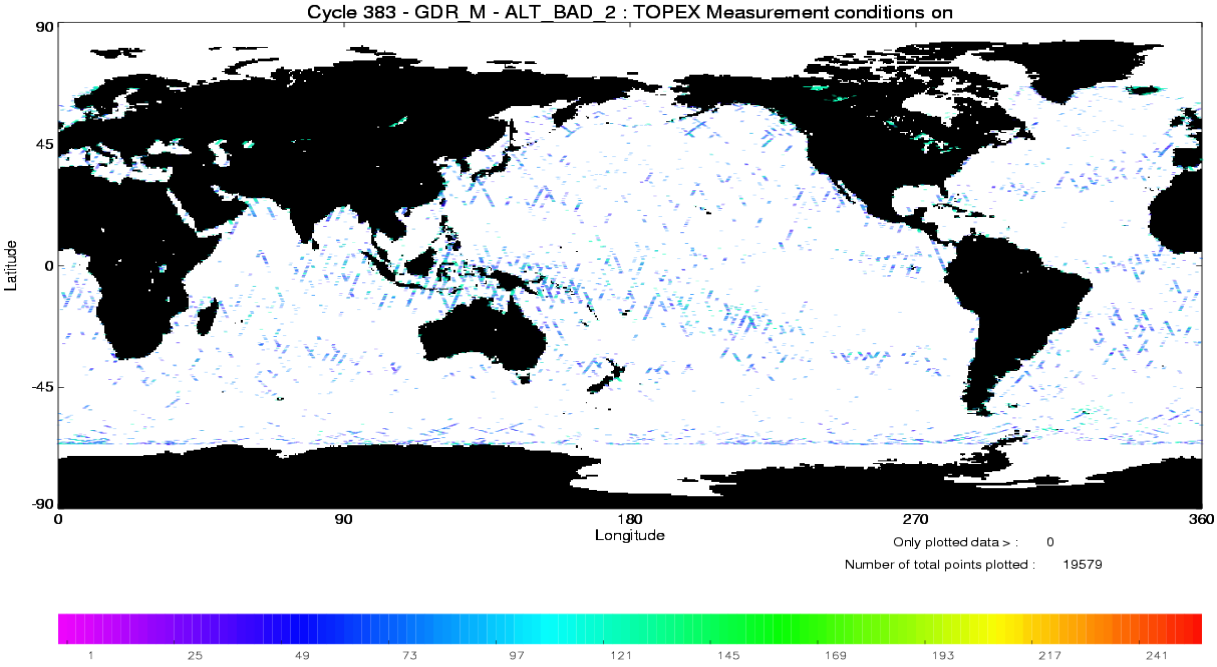


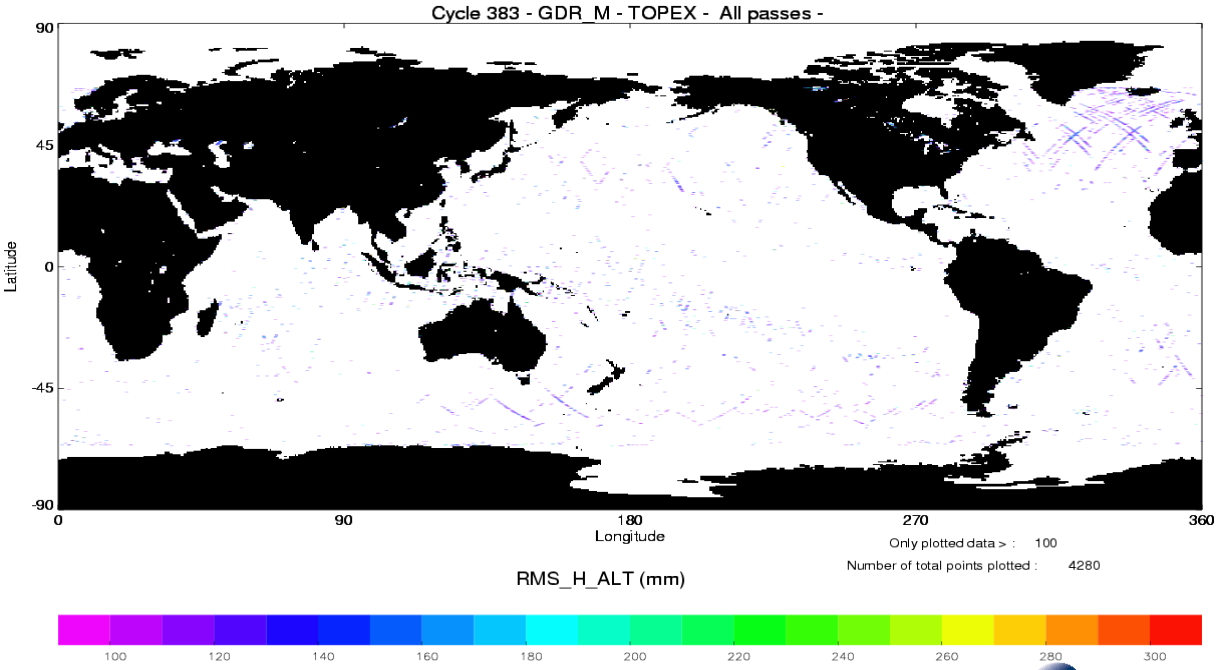

Cycle 383 – GDR_M – TOPEX – All passes –
Tb_18(0.01 K)
Tb_21 (0.01 K)
Tb_37 (0.01 K)
Lat_Err
Lon_Err
MOYENNES
NUMERO DE 1/2 ORBITE

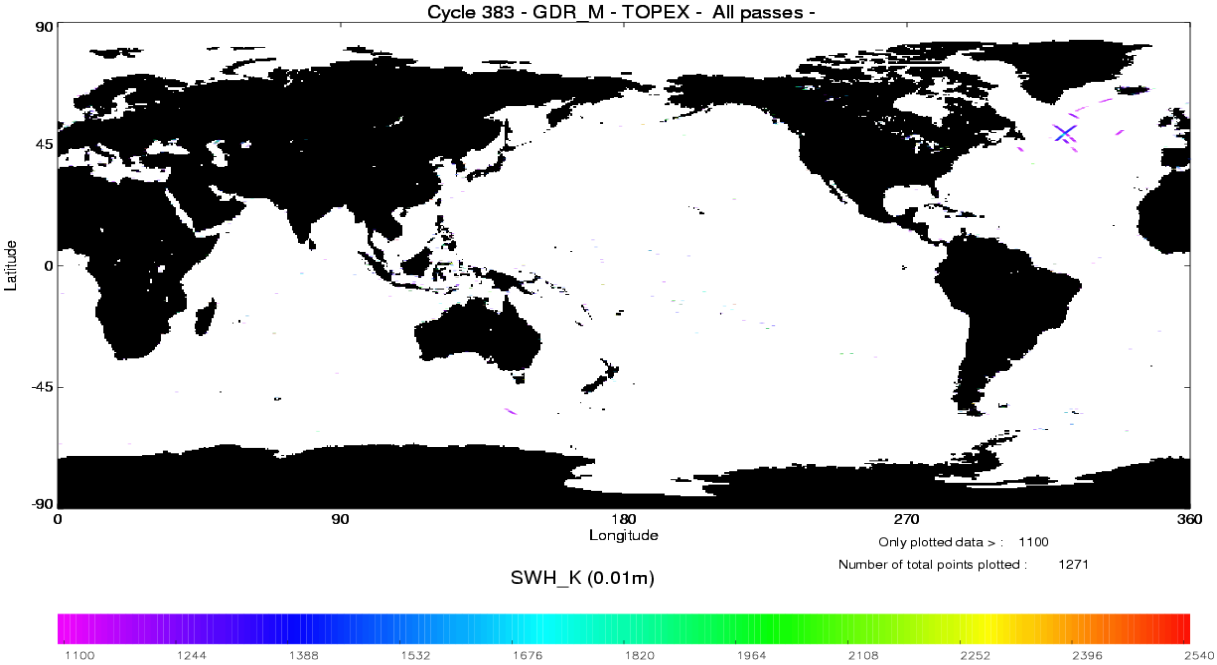

Cycle 383 – GDR_M – TOPEX – All passes –
Dry_Err
MOYENNES
NUMERO DE 1/2 ORBITE min: 9.00 max: 9.00
Wet_Flag
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 1.00
Wet_H_Err
MOYENNES
NUMERO DE 1/2 ORBITE min: 2.00 max: 6.00
Iono_Dor_Bad
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 8.00

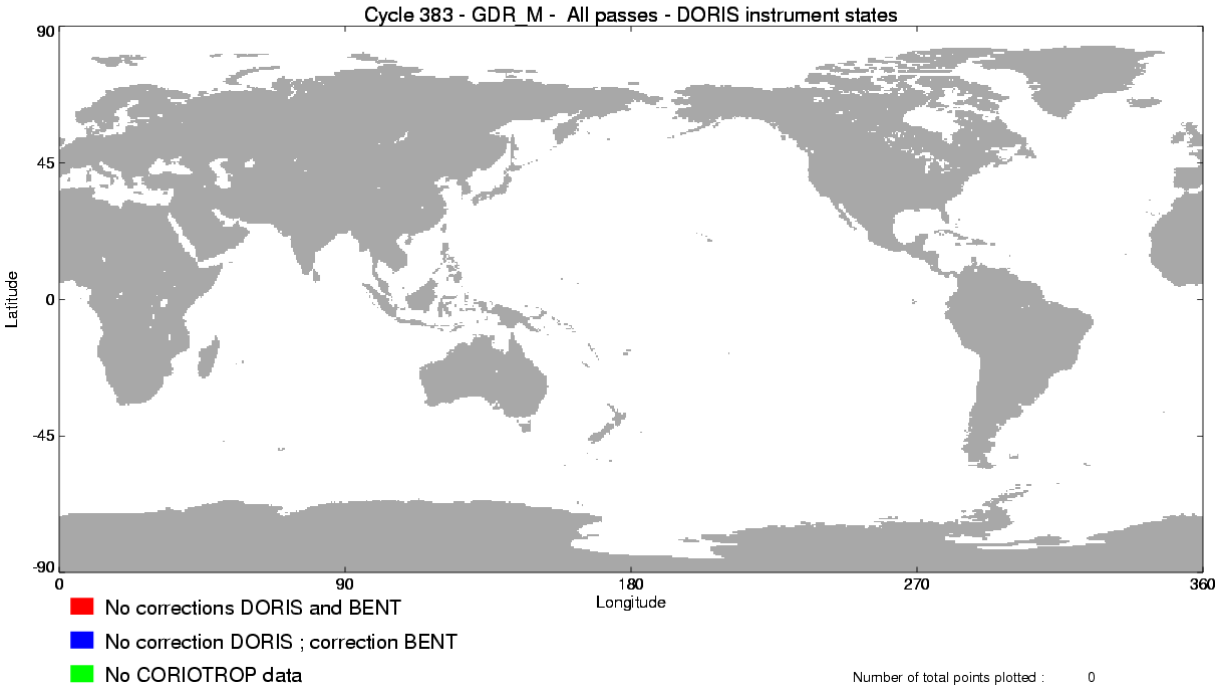

Cycle 383 – GDR_M – TOPEX – All passes –
IMANV
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Val_Att_P1f
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Ind_Pha
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Fl_Att
MOYENNES
NUMERO DE 1/2 ORBITE min: 1.00 max: 1.00


Cycle 383 - 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 : 20135
1
25
49
73
97
121
145
169
193
217
241


Cycle 383 - 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 : 19579
1
25
49
73
97
121
145
169
193
217
241


Cycle 383 - GDR_M - TOPEX - All passes -
Latitude
Longitude
Only plotted data > : 100
Number of total points plotted : 4280
RMS_H_ALT (mm)


Cycle 383 - GDR_M - TOPEX - All passes -
Latitude
Longitude
Only plotted data > : 1100
Number of total points plotted : 1271
SWH_K (0.01m)


Cycle 383 - 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.

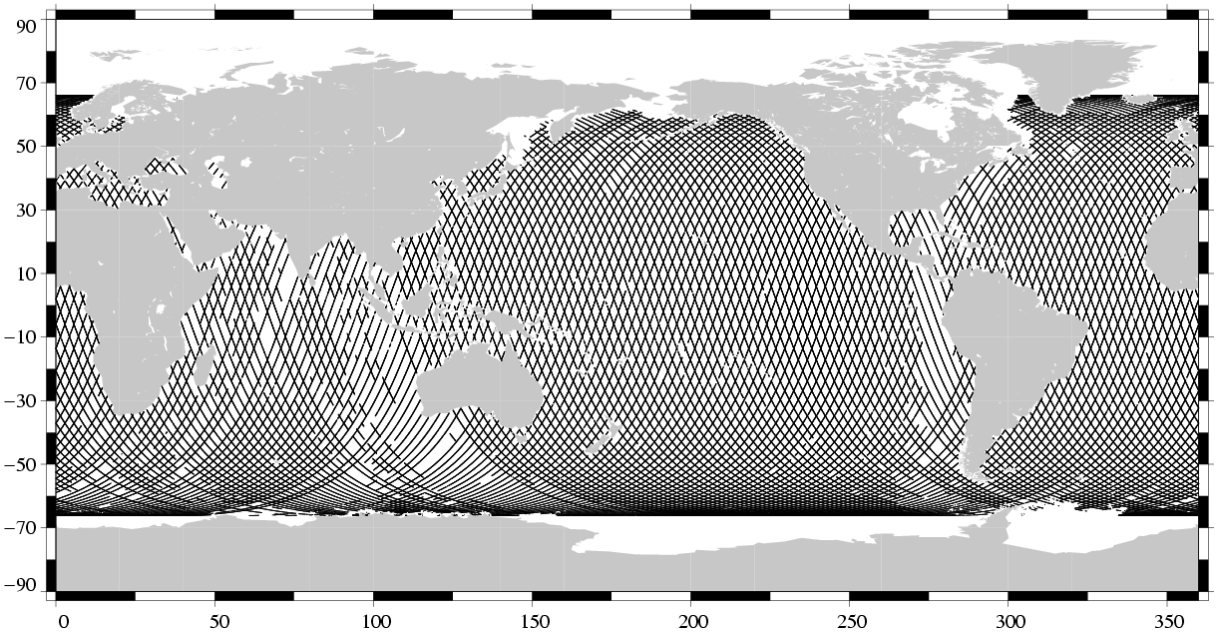
There are problems in the interpolation of the TMR parameters since cycle 371 when there are missing measurements (tape recorder failures). These bad measurements are removed by the TMR correction criterion but some of them have been kept. Thus a new criterion has been added in the editing procedure since cycle 376 to remove all measurements for which the difference between the TMR and the ECMWF wet tropospheric corrections is greater than 20 cm. Even after applying this editing procedure, some anomalous TMR correction values remain (See **wet tropo correction section**).

Parameters	Min Thres.	Max Thres.	Unit	Mean % removed in 1997	% removed
Sea surface height	-130.000	100.000	m	1.37	0.38
Number of 20/10Hz valid points Poseidon/TOPEX	5.000	-		1.37	0.55
Std. deviation of range	0.000	0.100	m	1.85	1.31
Off nadir angle from waveform	0.000	0.400	deg	1.36	3.56
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	4.51
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	0.33
Sea state Bias	-0.500	0.000	m	1.39	0.42
Backscatter coefficient	7.000	30.000	dB	1.44	0.39
Ocean tide height	-5.000	5.000	m	0.01	0.47
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	0.57
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.

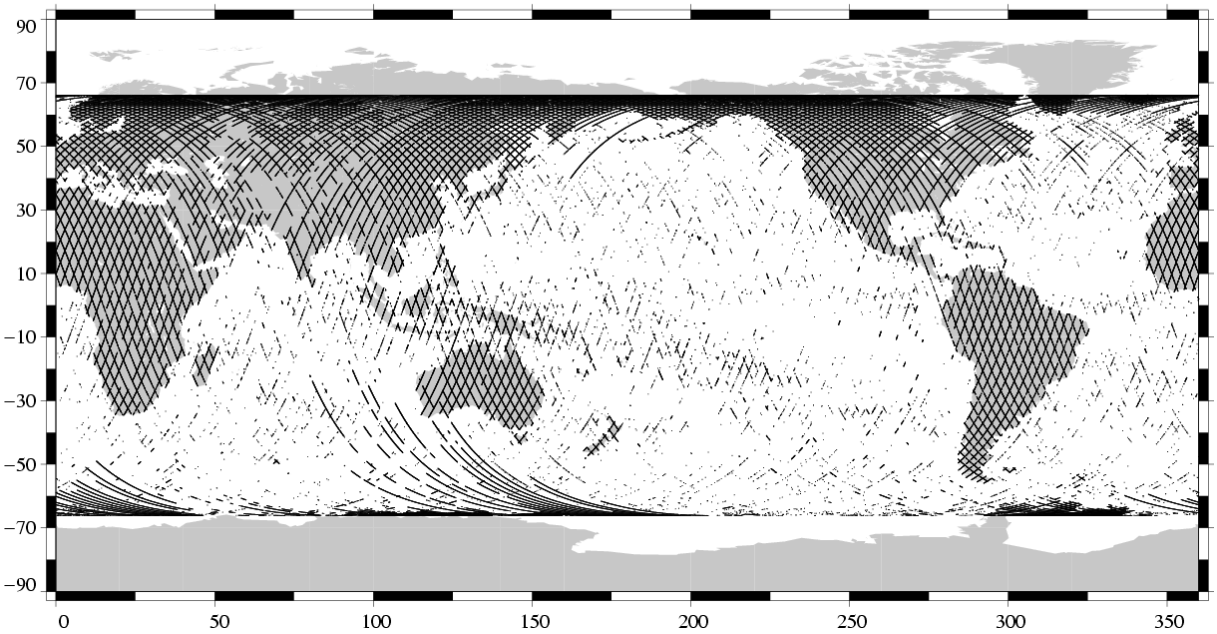
Valid data

TOPEX/Poseidon Cycle 383 (05/02/2003 / 15/02/2003)

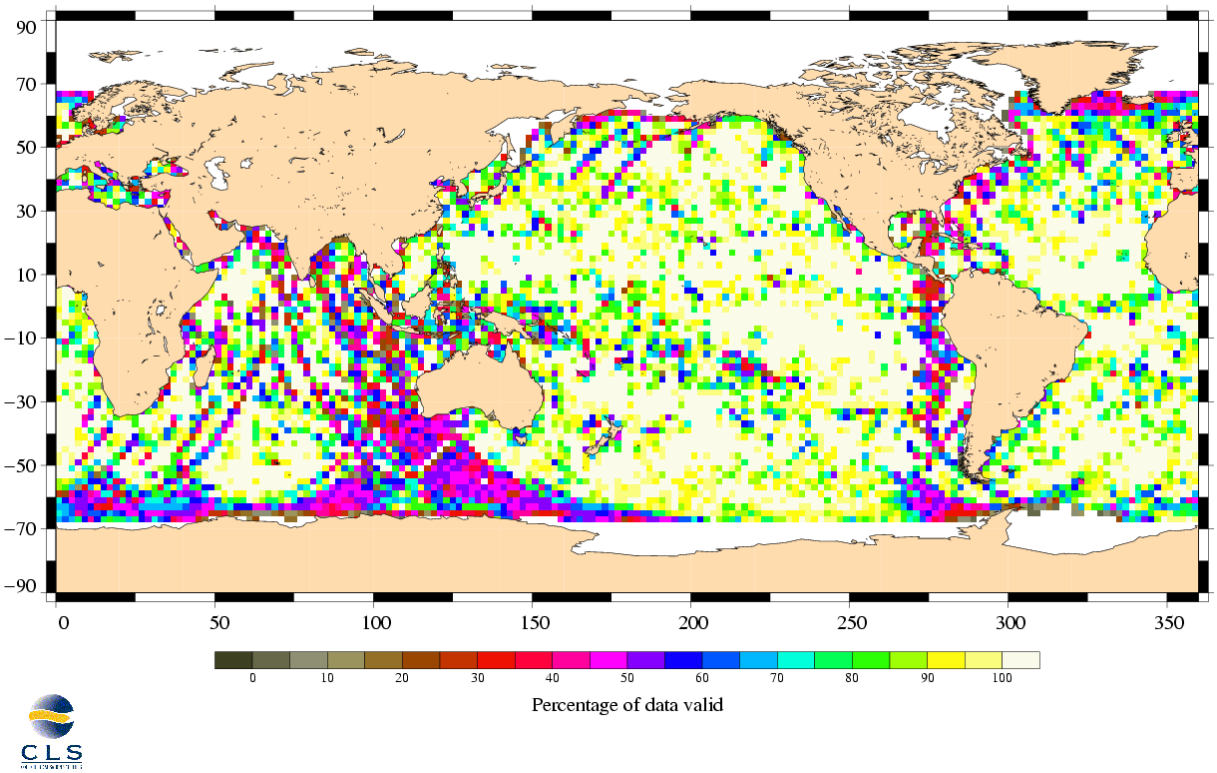


Edited measurements

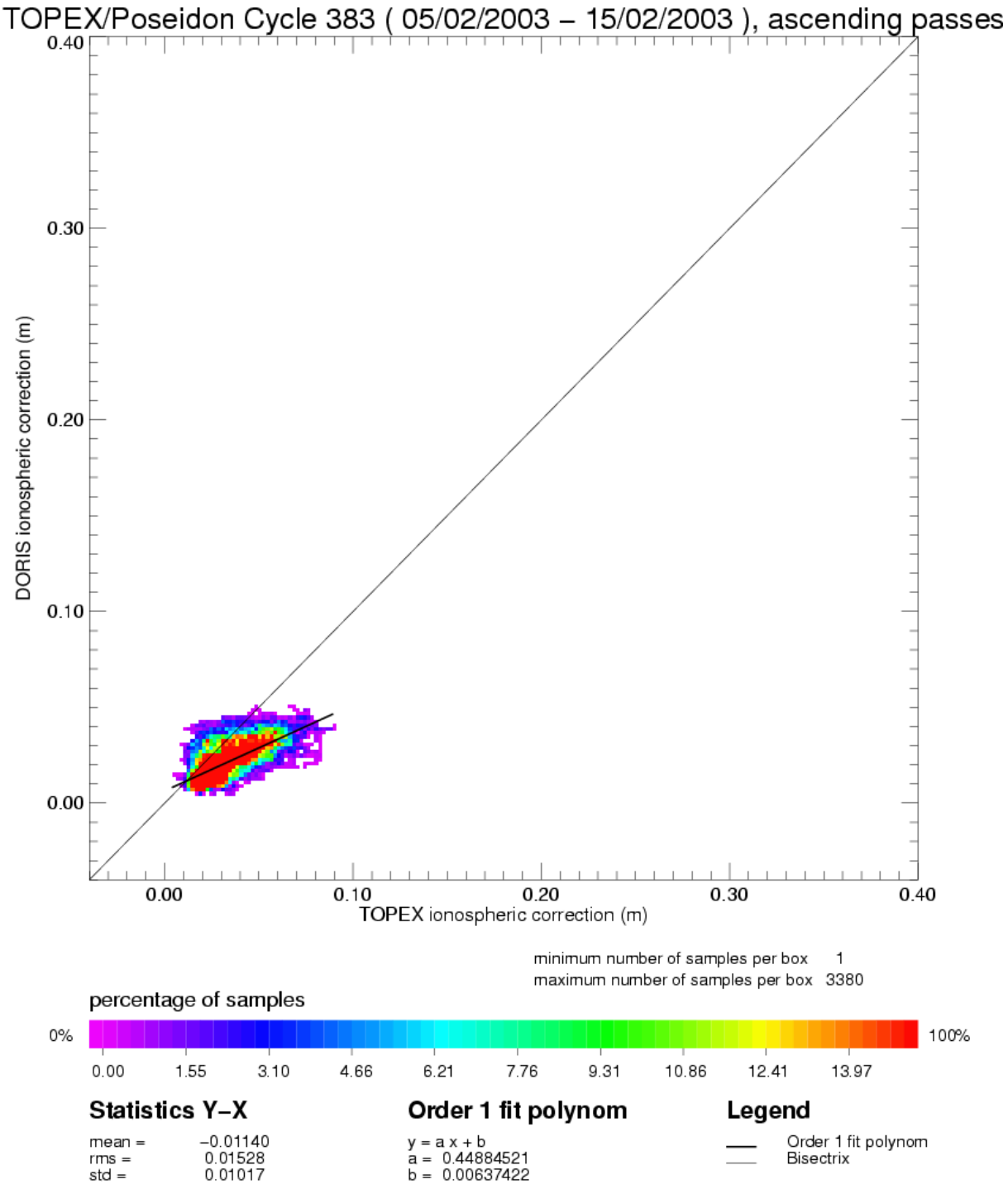
TOPEX Cycle 383 (05/02/2003 / 15/02/2003)

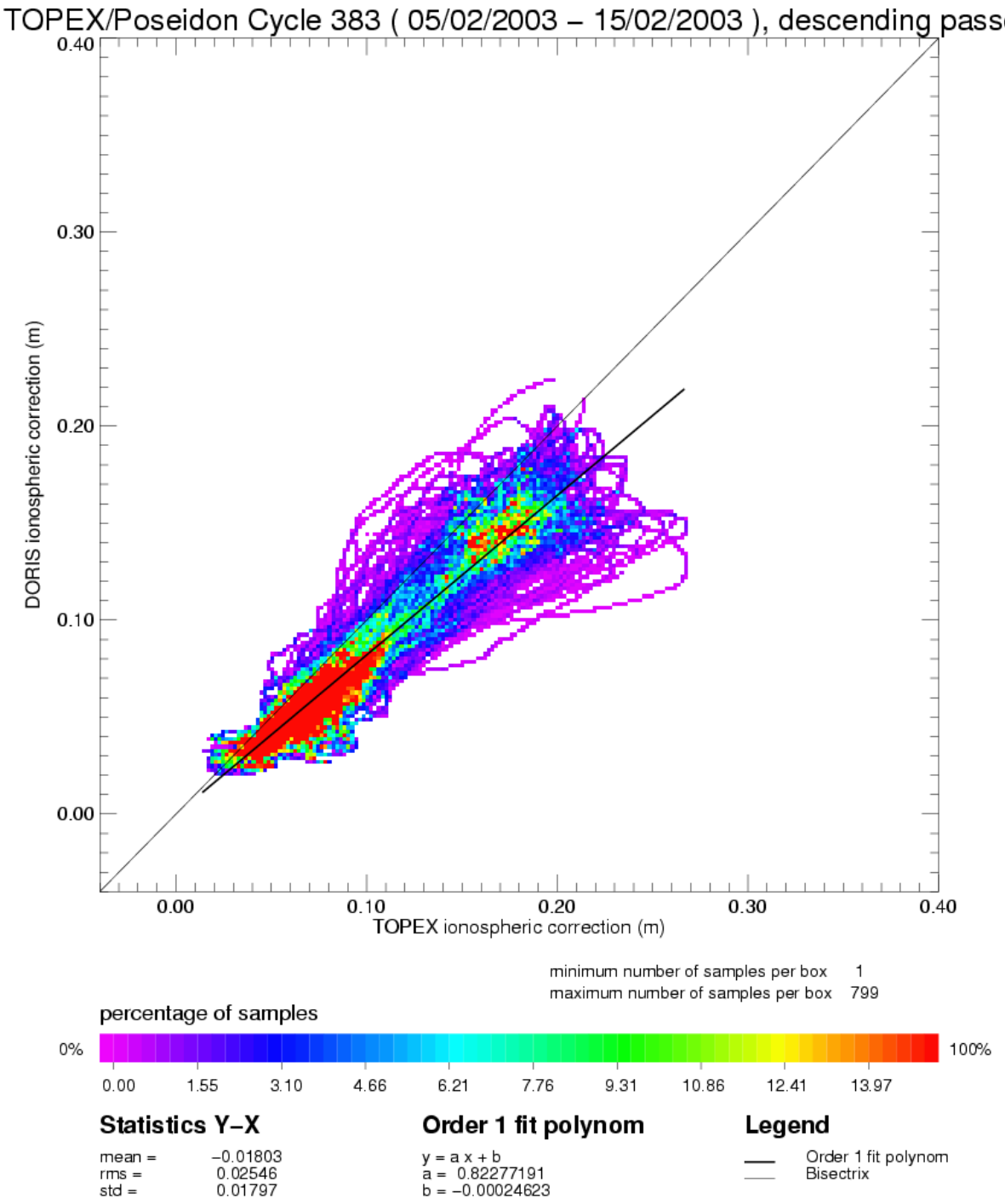


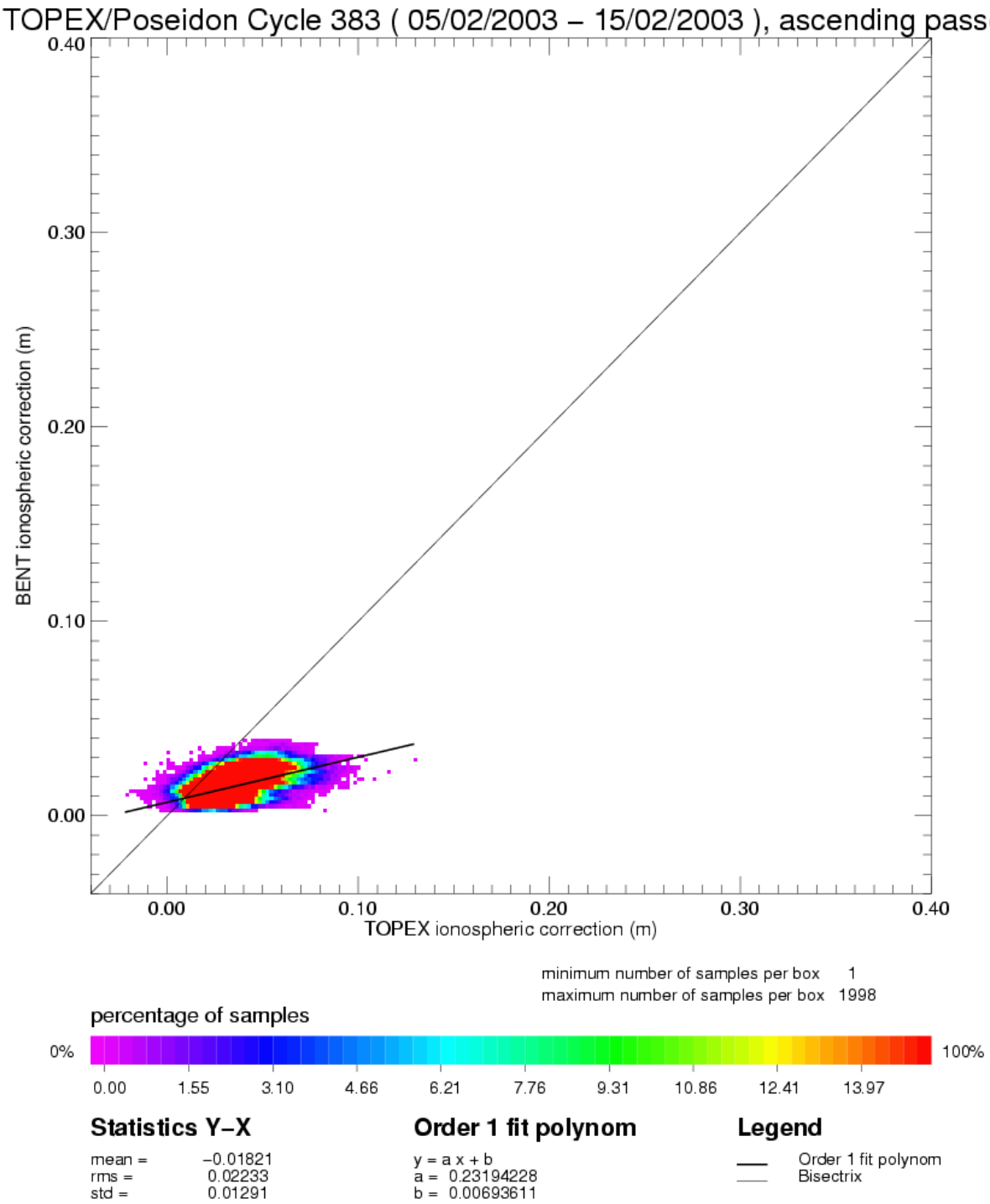
Percentage of valid data relative to the nominal pass
TOPEX/Poseidon Cycle 383 (05/02/2003 / 15/02/2003)

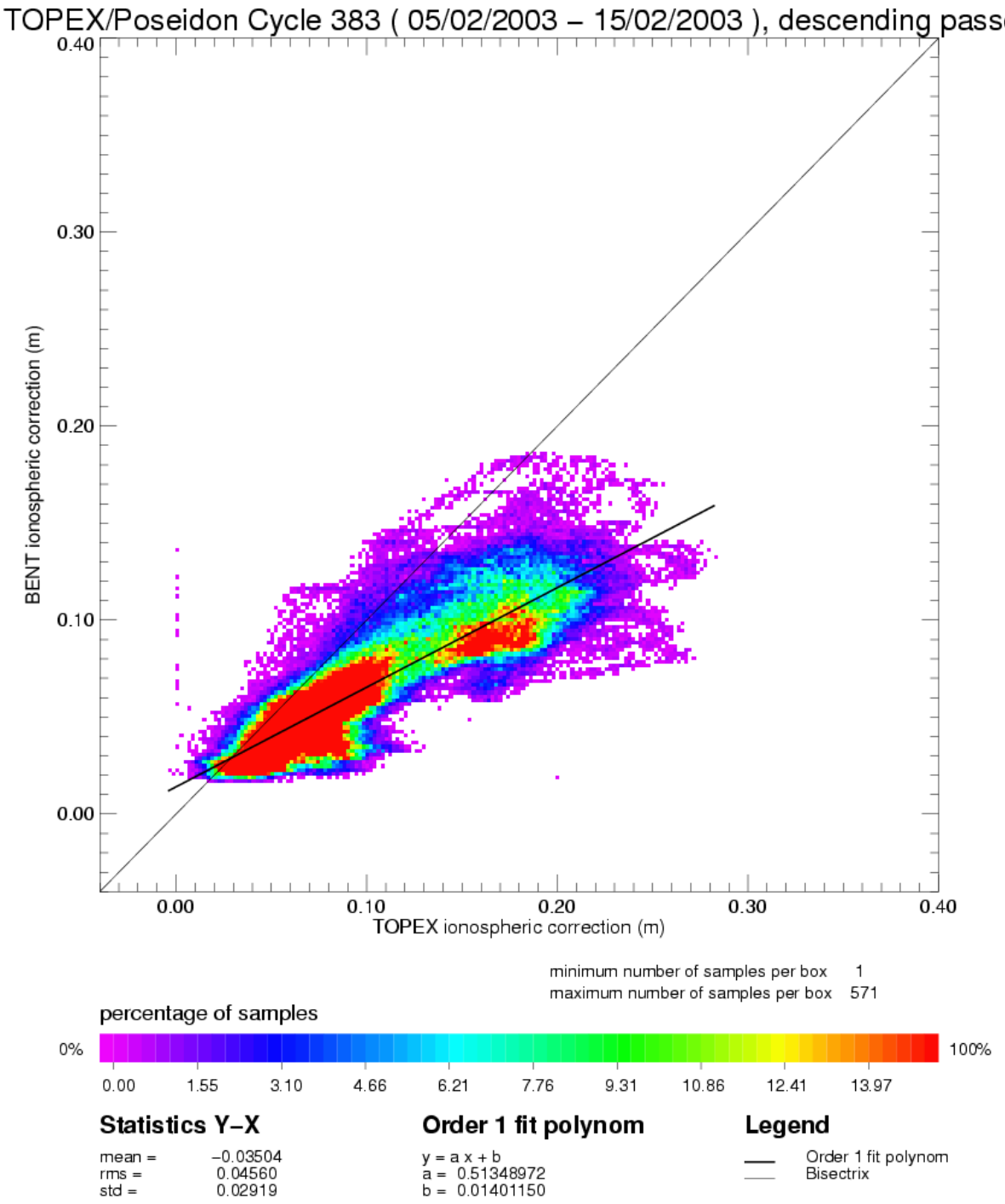


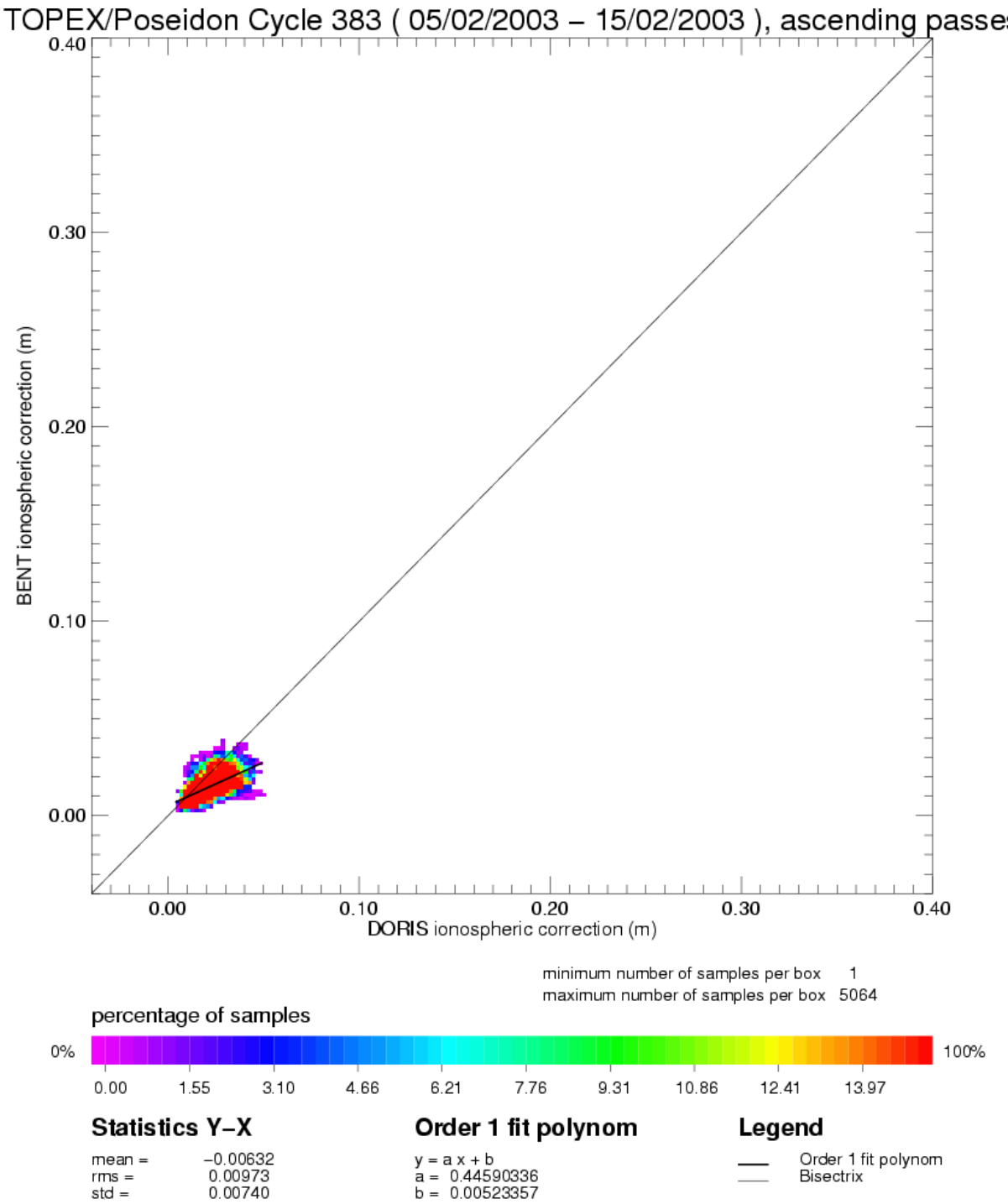
3.5 Ionospheric correction

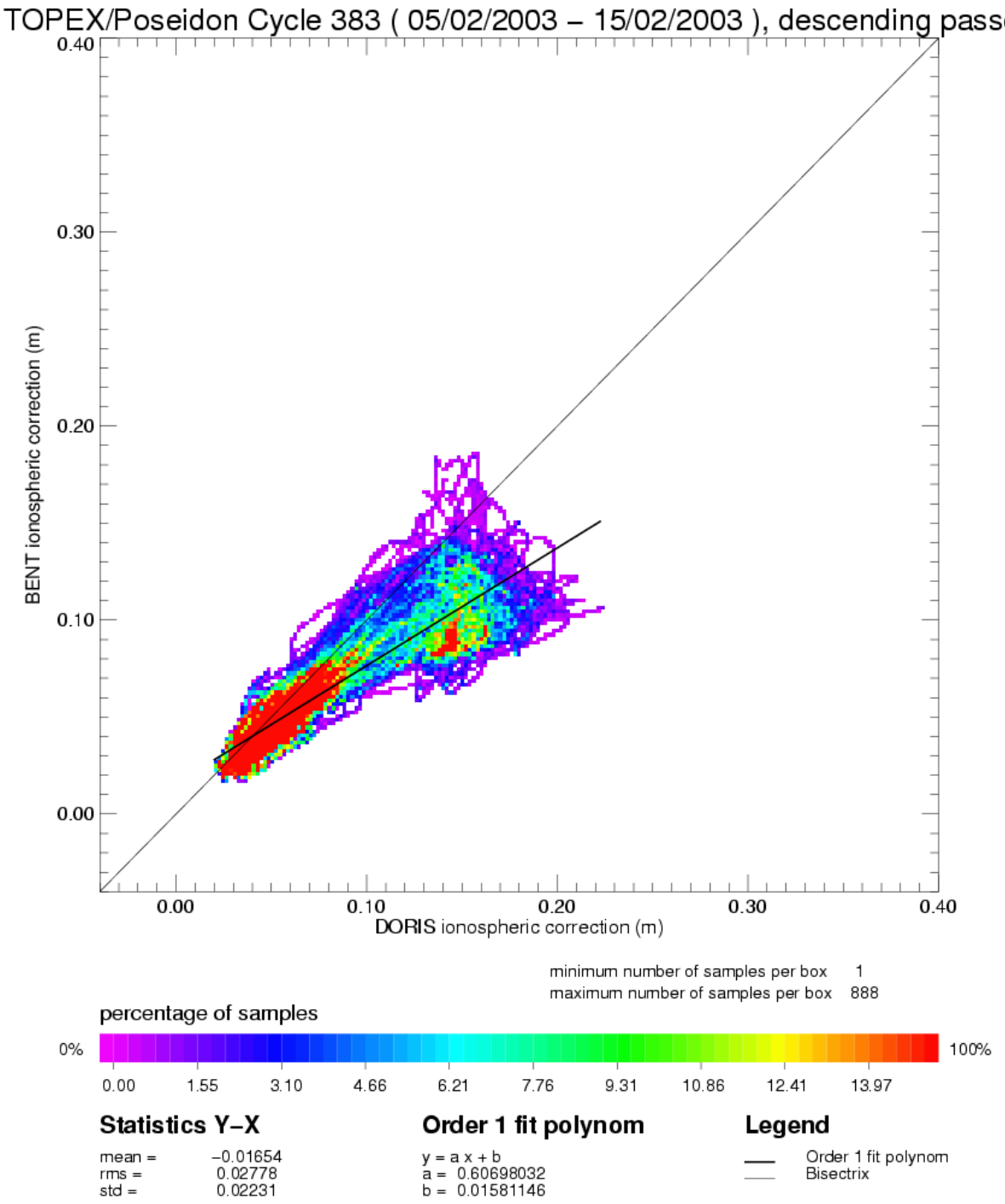



TOPEX/Poseidon Cycle 383 (05/02/2003 – 15/02/2003), descending passes
DORIS ionospheric correction (m)
TOPEX ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 799
percentage of samples
0%
100%
0.00 1.55 3.10 4.66 6.21 7.76 9.31 10.86 12.41 13.97
Statistics Y–X
mean = −0.01803
rms = 0.02546
std = 0.01797
Order 1 fit polynom
y = a x + b
a = 0.82277191
b = −0.00024623
Legend
Order 1 fit polynom
Bisectrix

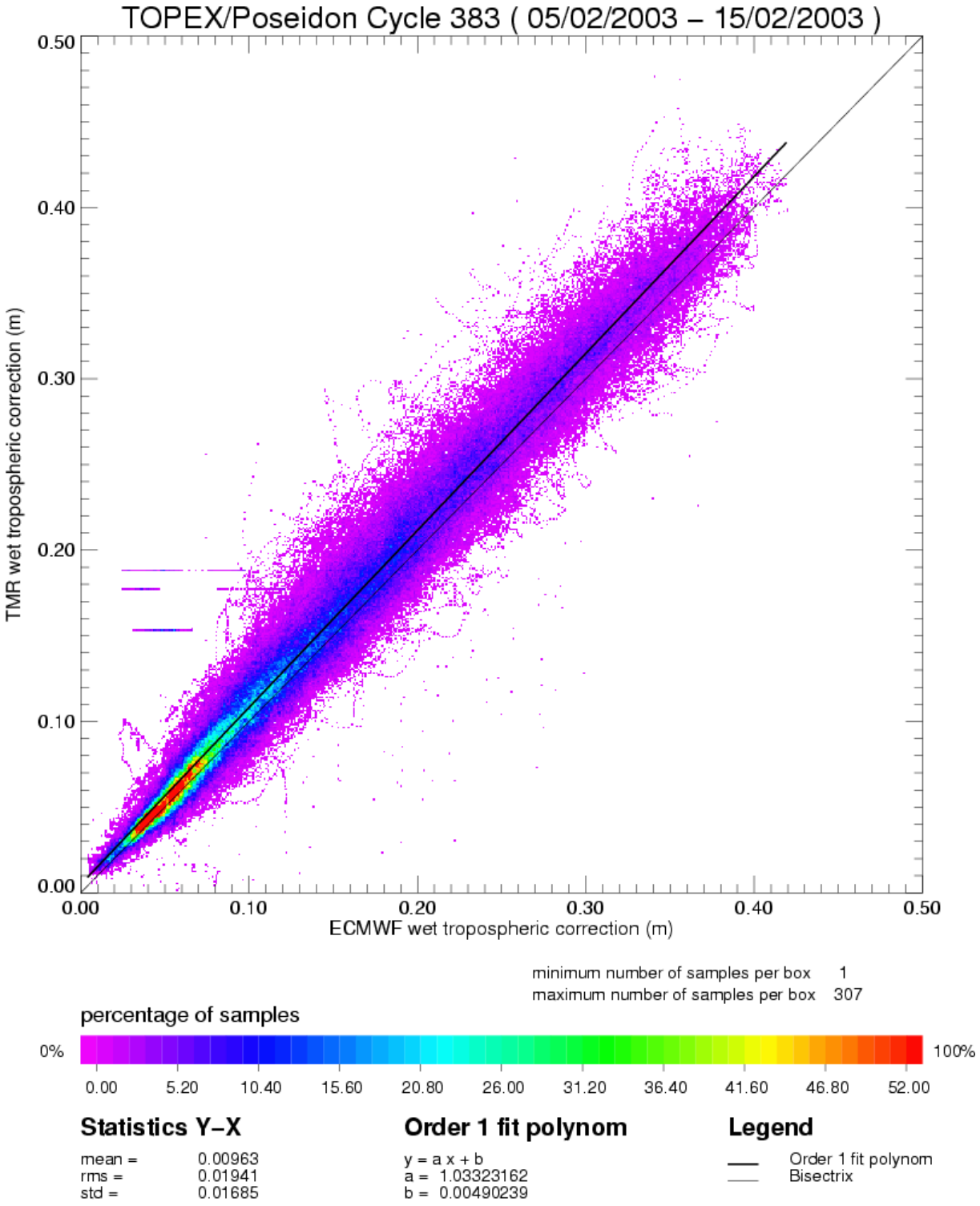

TOPEX/Poseidon Cycle 383 (05/02/2003 – 15/02/2003), ascending passes
BENT ionospheric correction (m)
TOPEX ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 1998
percentage of samples
0%
100%
0.00
1.55
3.10
4.66
6.21
7.76
9.31
10.86
12.41
13.97
Statistics Y–X
mean = −0.01821
rms = 0.02233
std = 0.01291
Order 1 fit polynom
y = a x + b
a = 0.23194228
b = 0.00693611
Legend
Order 1 fit polynom
Bisectrix


TOPEX/Poseidon Cycle 383 (05/02/2003 – 15/02/2003), 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 571
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 = −0.03504
rms = 0.04560
std = 0.02919
Order 1 fit polynom
y = a x + b
a = 0.51348972
b = 0.01401150
Legend
Order 1 fit polynom
Bisectrix

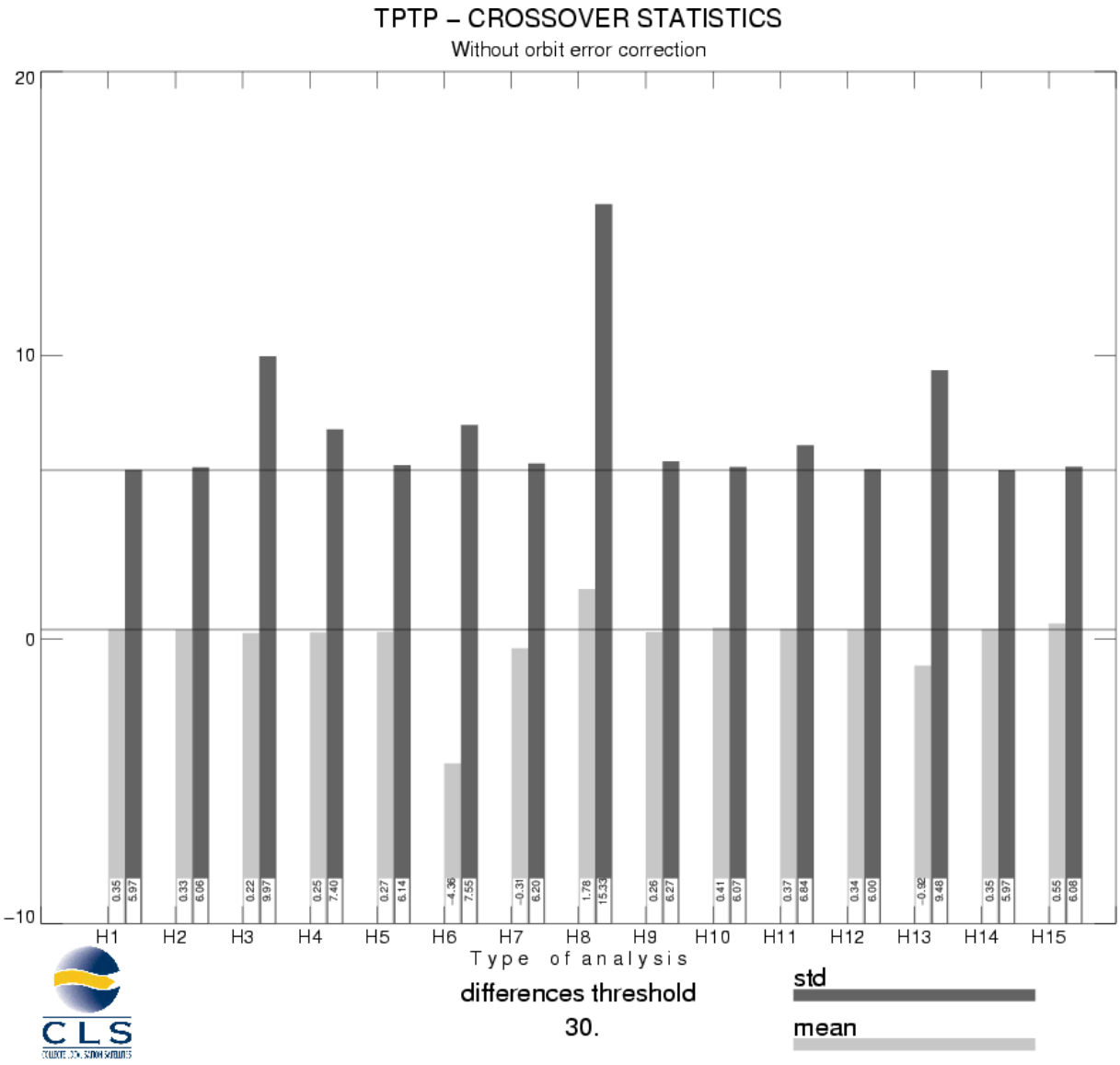

TOPEX/Poseidon Cycle 383 (05/02/2003 – 15/02/2003), ascending passes
BENT ionospheric correction (m)
DORIS ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 5064
percentage of samples
0%
100%
0.00
1.55
3.10
4.66
6.21
7.76
9.31
10.86
12.41
13.97
Statistics Y–X
mean = −0.00632
rms = 0.00973
std = 0.00740
Order 1 fit polynom
y = a x + b
a = 0.44590336
b = 0.00523357
Legend
Order 1 fit polynom
Bisectrix


TOPEX/Poseidon Cycle 383 (05/02/2003 – 15/02/2003), 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 888
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 = −0.01654
rms = 0.02778
std = 0.02231
Order 1 fit polynom
y = a x + b
a = 0.60698032
b = 0.01581146
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

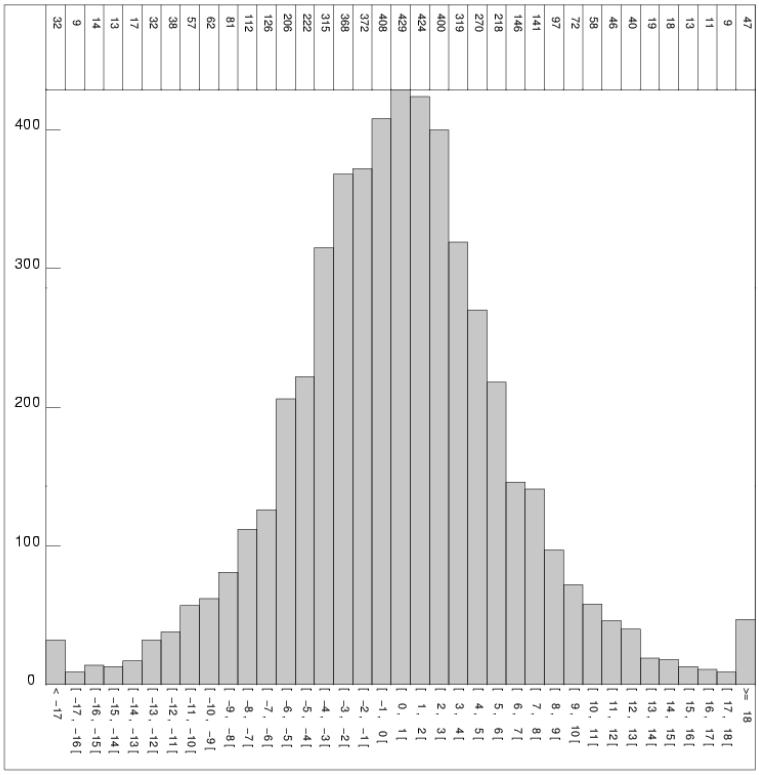
Selection(s) sur les ecarts :

Aucune

RESULTATS STATISTIQUES

Valeur minimale : –29.6200
Valeur maximale : 29.7700
Difference Max – Min: 59.3900
Nombre de points lus: 5366
Nombre de points selectionnes: 5261
Moyenne : 0.354355
Ecart–type : 5.96914
Moyenne Quadratique : 5.97965

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

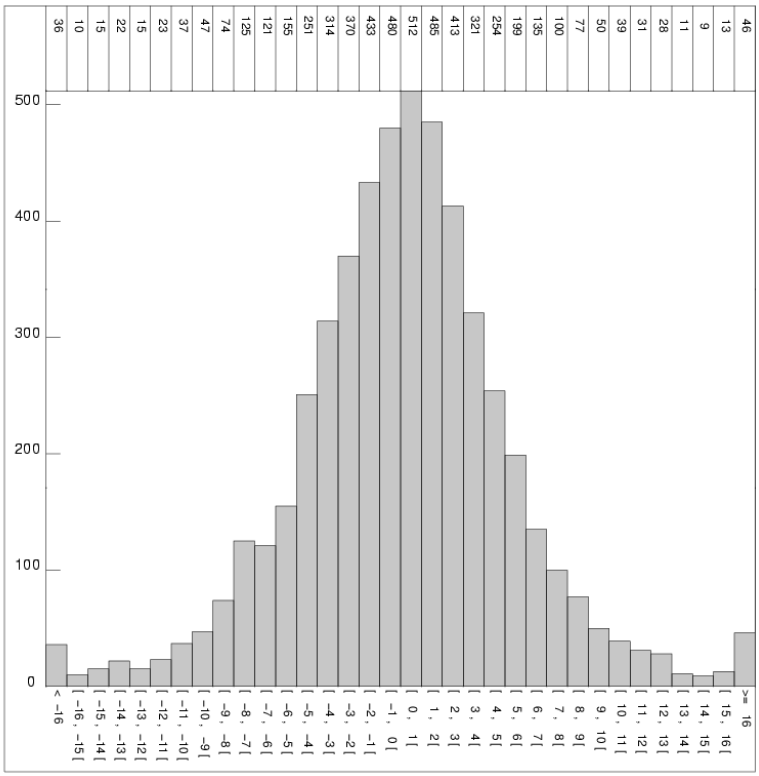
Selection(s) sur les ecarts :

Aucune

RESULTATS STATISTIQUES

Valeur minimale : –29.9900
Valeur maximale : 29.9100
Difference Max – Min: 59.9000
Nombre de points lus: 5366
Nombre de points selectionnes: 5251
Moyenne : 0.138945
Ecart–type : 5.46646
Moyenne Quadratique : 5.46823

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

[...]

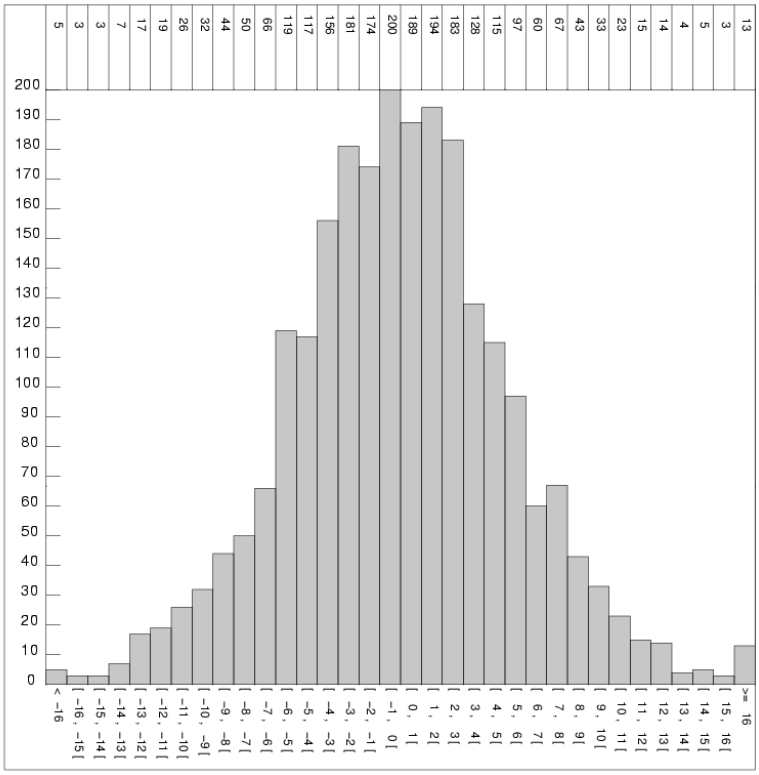
Selection(s) sur les ecarts :

Aucune

RESULTATS STATISTIQUES

Valeur minimale :	–25.0200
Valeur maximale :	37.7300
Difference Max – Min:	62.7500
Nombre de points lus:	2612
Nombre de points selectionnes:	2405
Moyenne :	–0.0148400
Ecart–type :	5.42441
Moyenne Quadratique :	5.42443

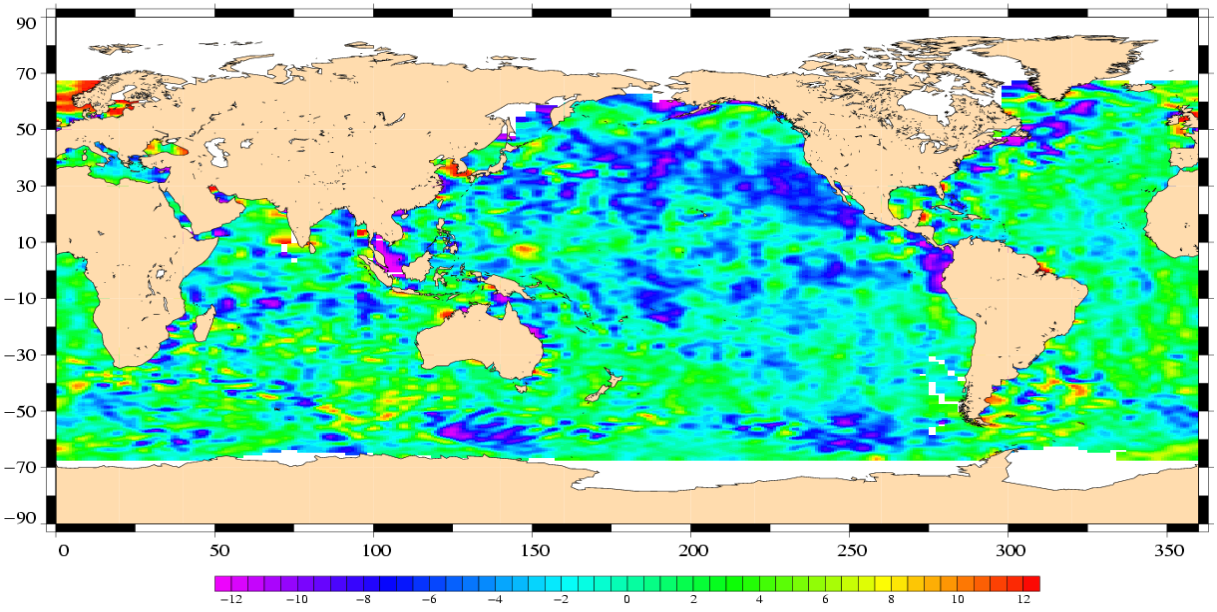
CLS Space Oceanography Division



3.8 SSH variability

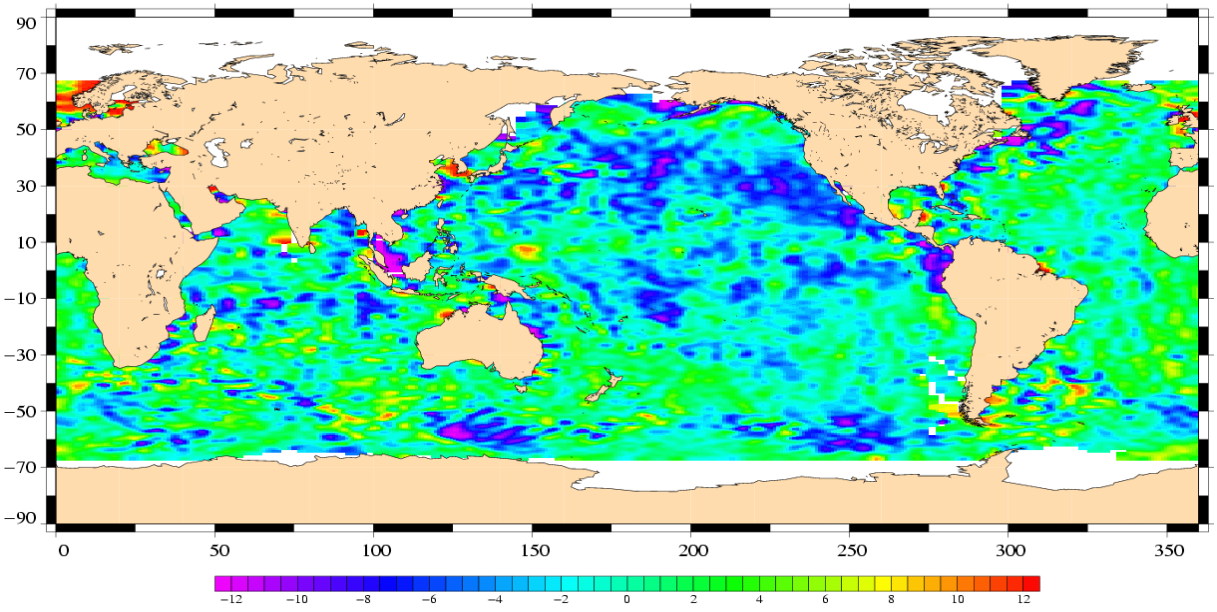
3.8.1 Sea Level Anomaly

TOPEX/Poseidon, cycle 383
Period : 05/02/2003 – 15/02/2003



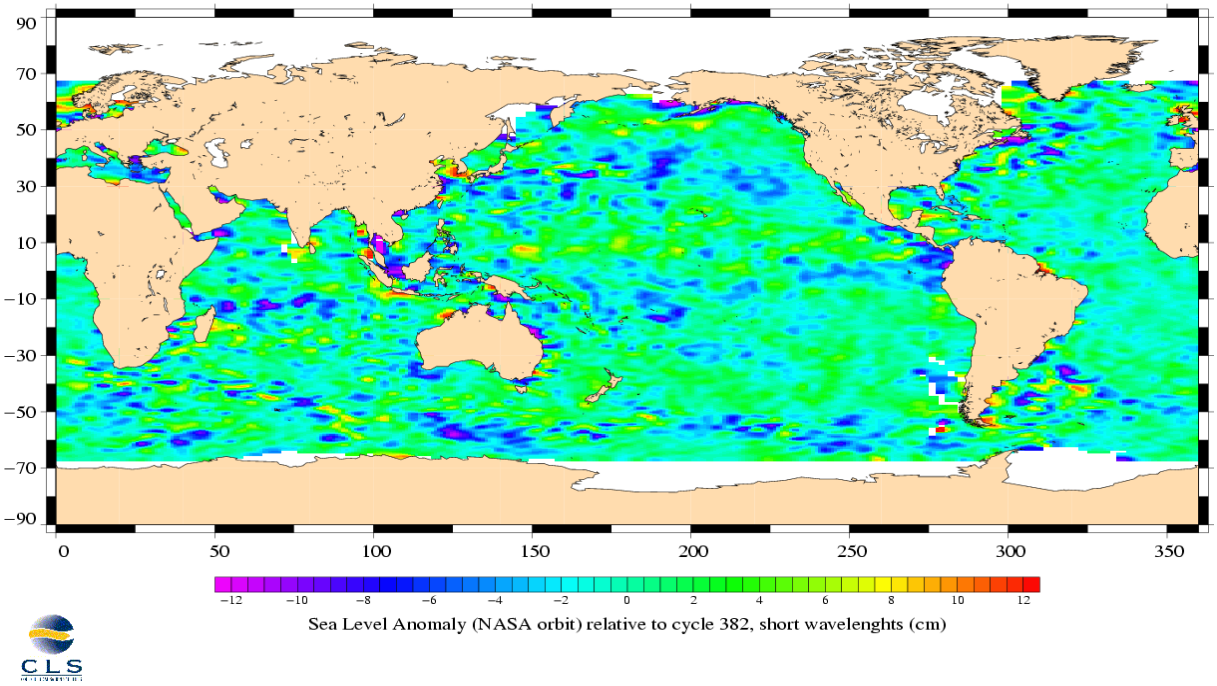
Sea Level Anomaly (NASA orbit) relative to cycle 382 (cm)

TOPEX/Poseidon, cycle 383
Period : 05/02/2003 – 15/02/2003



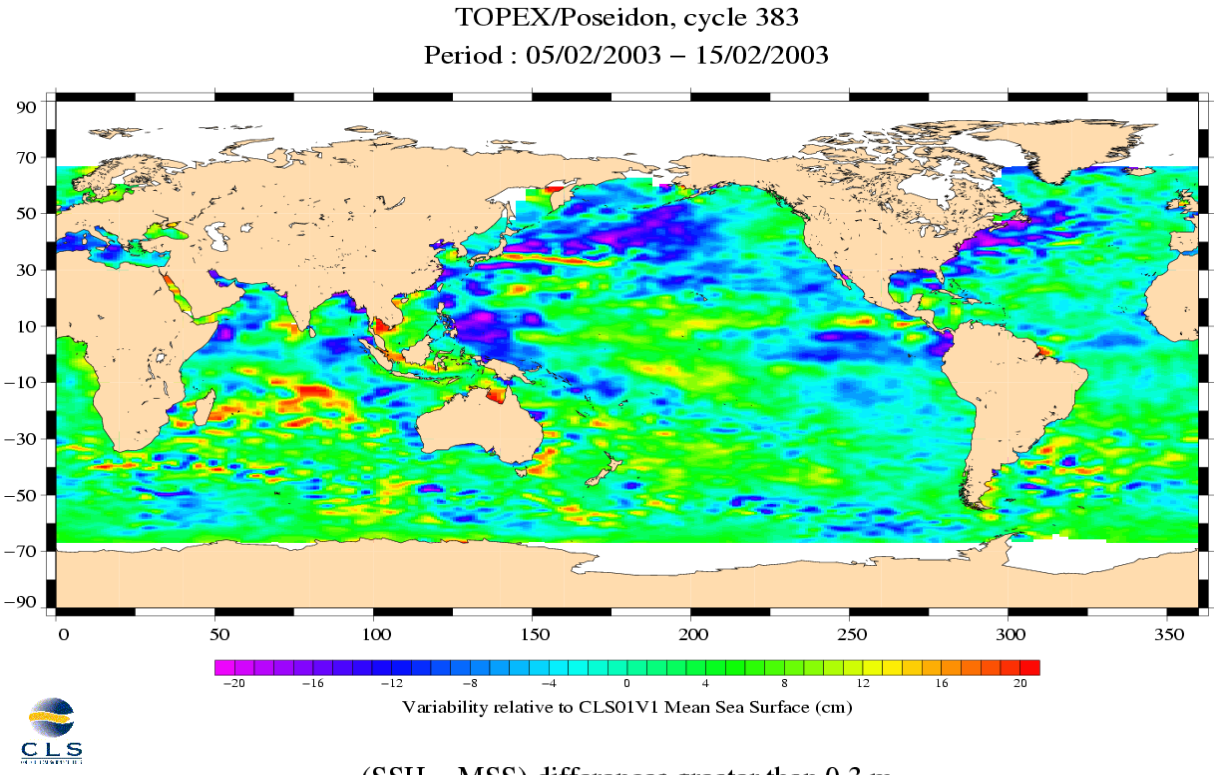
Sea Level Anomaly (Cnes orbit) relative to cycle 382 (cm)

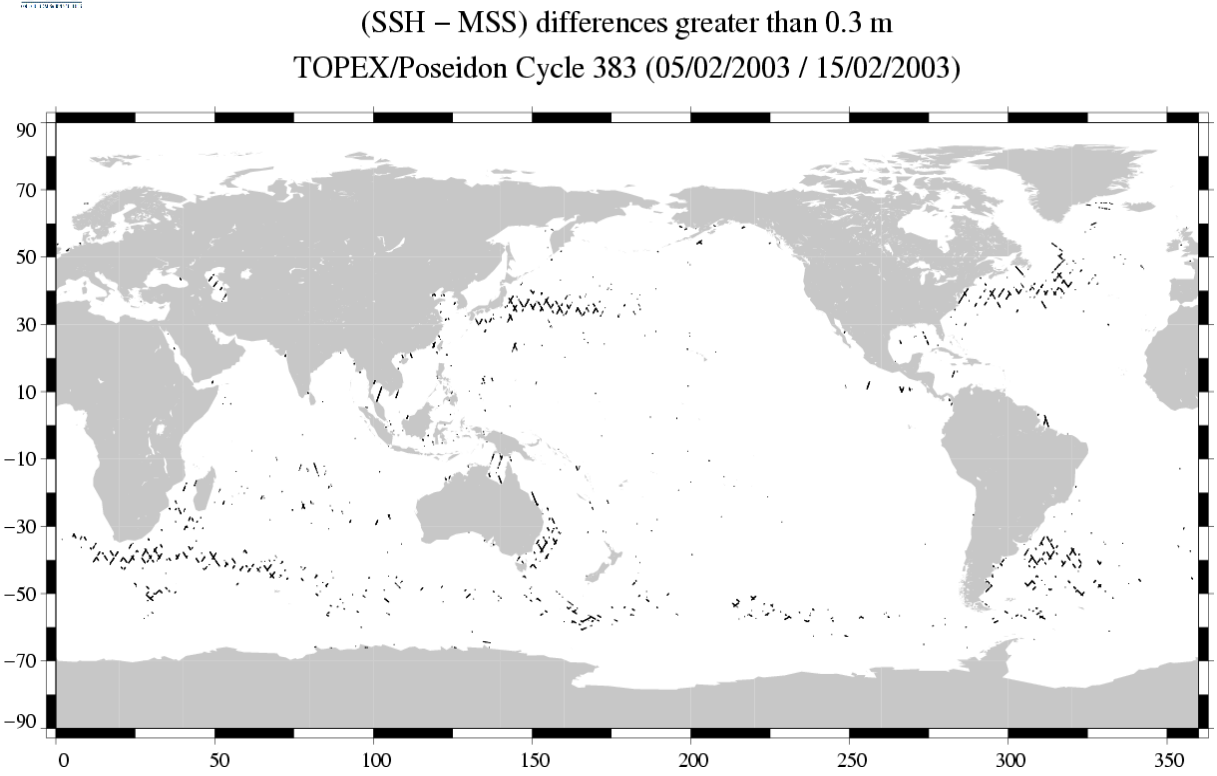
TOPEX/Poseidon, cycle 383
Period : 05/02/2003 – 15/02/2003



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.

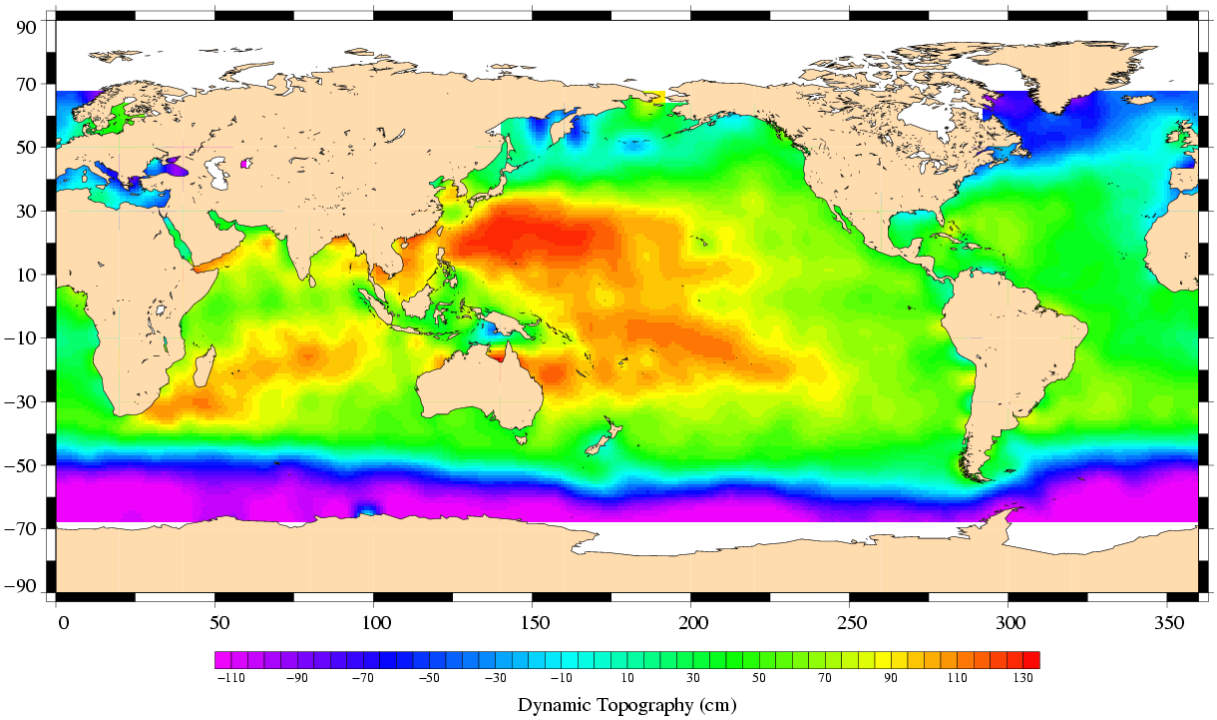




3.9 Dynamic topography

TOPEX/Poseidon, cycle 383

Period : 05/02/2003 – 15/02/2003

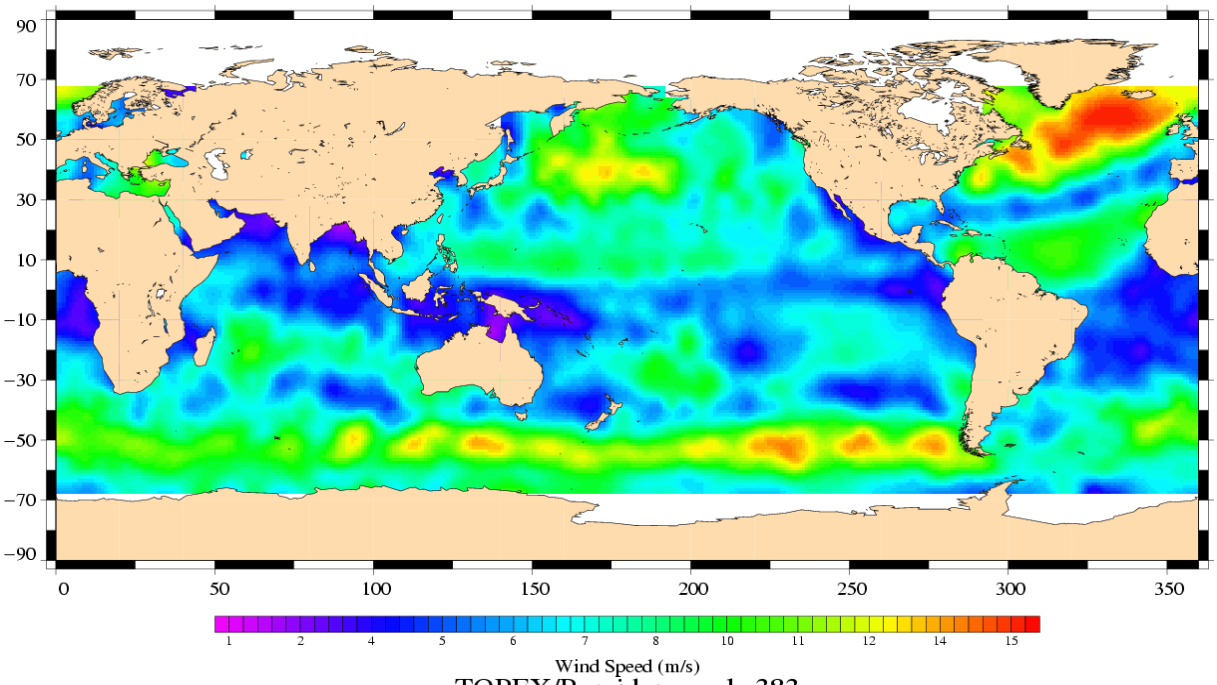


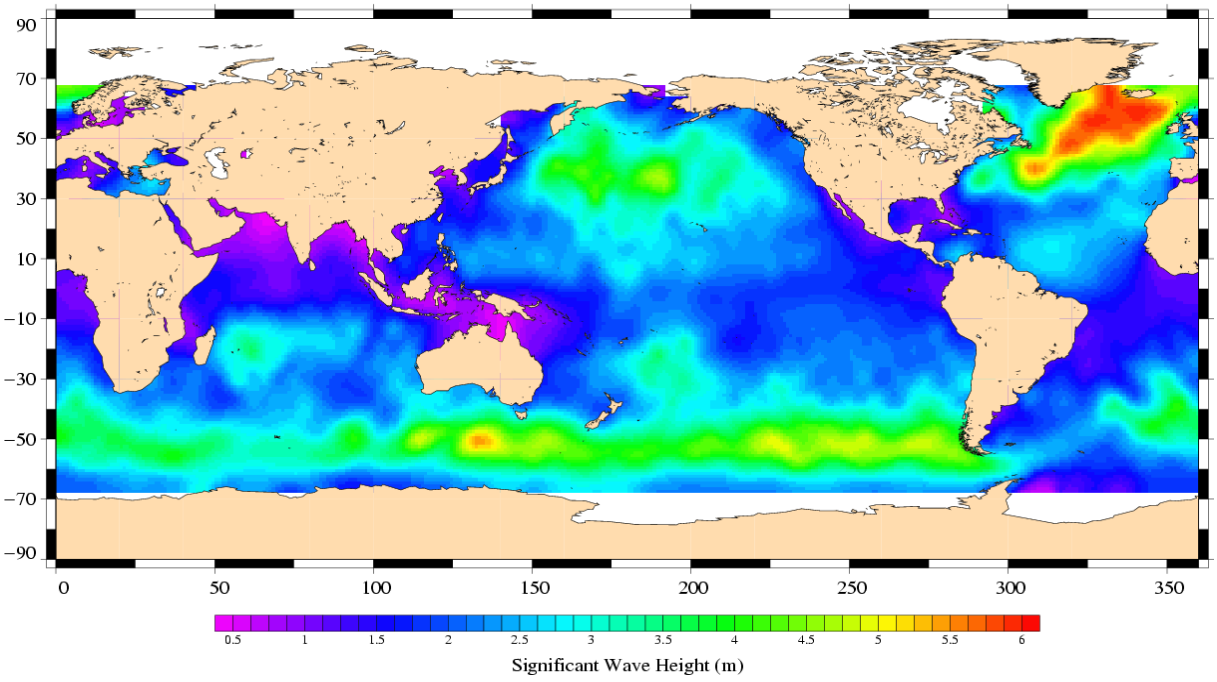
3.10 Wind and wave maps

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

TOPEX/Poseidon, cycle 383

Period : 05/02/2003 – 15/02/2003



TOPEX/Poseidon, cycle 383

Period : 05/02/2003 – 15/02/2003