
# TOPEX/Poseidon MGDR
# Quality Assessment Report

## Cycle 372

## *19-10-2002  29-10-2002*

| | | |
|---|---|---|
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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**

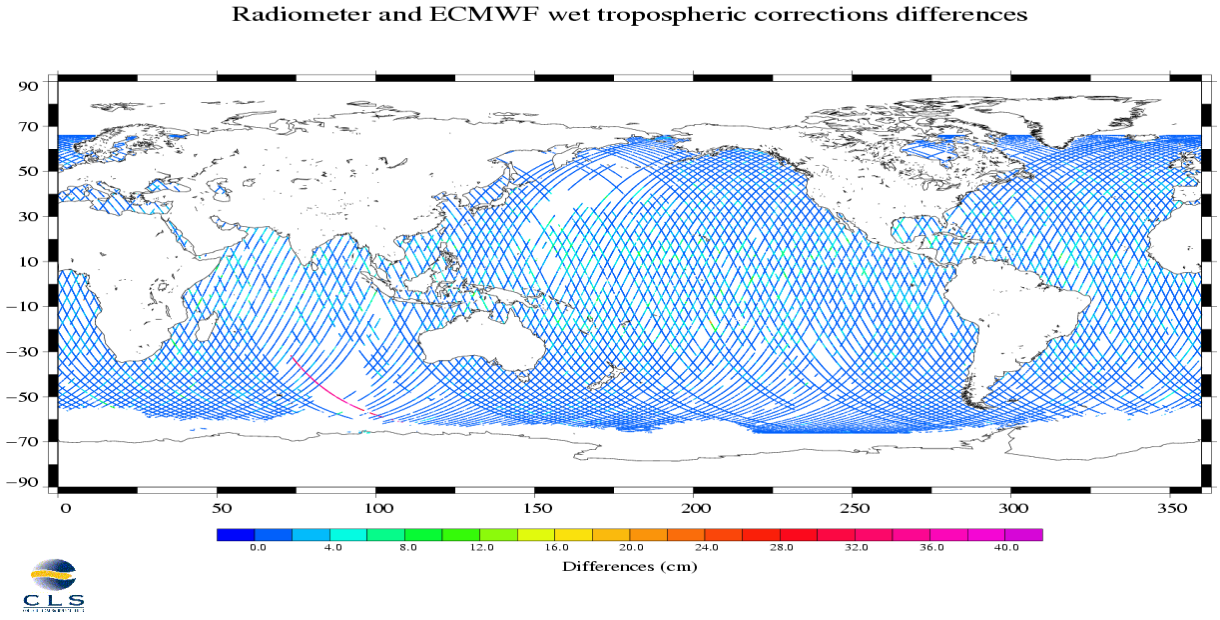
# 2 Cycle overview

## 2.1 Cycle quality and performances

Data quality for this cycle appears to be nominal. For this cycle, the crossover standard deviation is 6.38 cm rms, and the standard deviation of Sea Level Anomalies (SLA) relative to a Mean Sea Surface is 10.22 cm.

## 2.2 Warnings and recommendations

- Missing measurements :
  6 Passes are missing probably due to tape recorder problems.
- Tape recorder failures :
  There is a lot of data gaps due to tape recorder anomalies. Real time data fills have been utilized to compensate for recorder data gaps.
- Editing measurements (a) :
  Problems in the interpolation of the TMR parameters occur when there are missing measurements (tape recorder failures). As a result 7.93% of the measurements are removed by the TMR correction criterion.
- Editing measurements (b) :
  The difference between the TMR correction and the ECMWF model wet tropospheric correction (ploted on the following figure) shows a large bias on the pass 118. This abnormal values are probably due to a problem in the interpolation of the TMR parameters. Thus, it is recommended to remove the pass 118 in addition to the edidting procedure to compute the SSH. The results in this report have been performed without the pass 118.



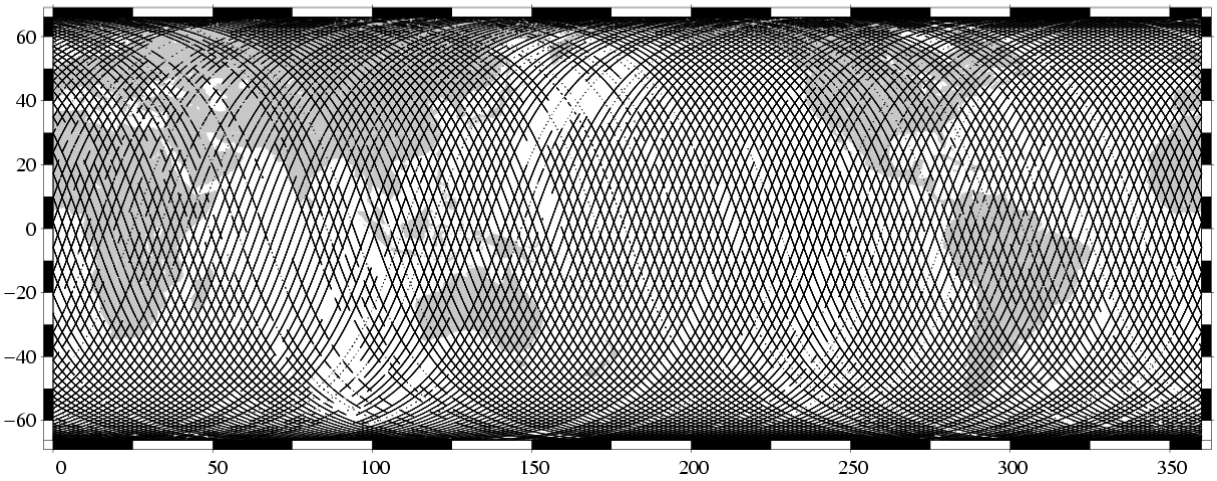
# 3 CALVAL main results

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.

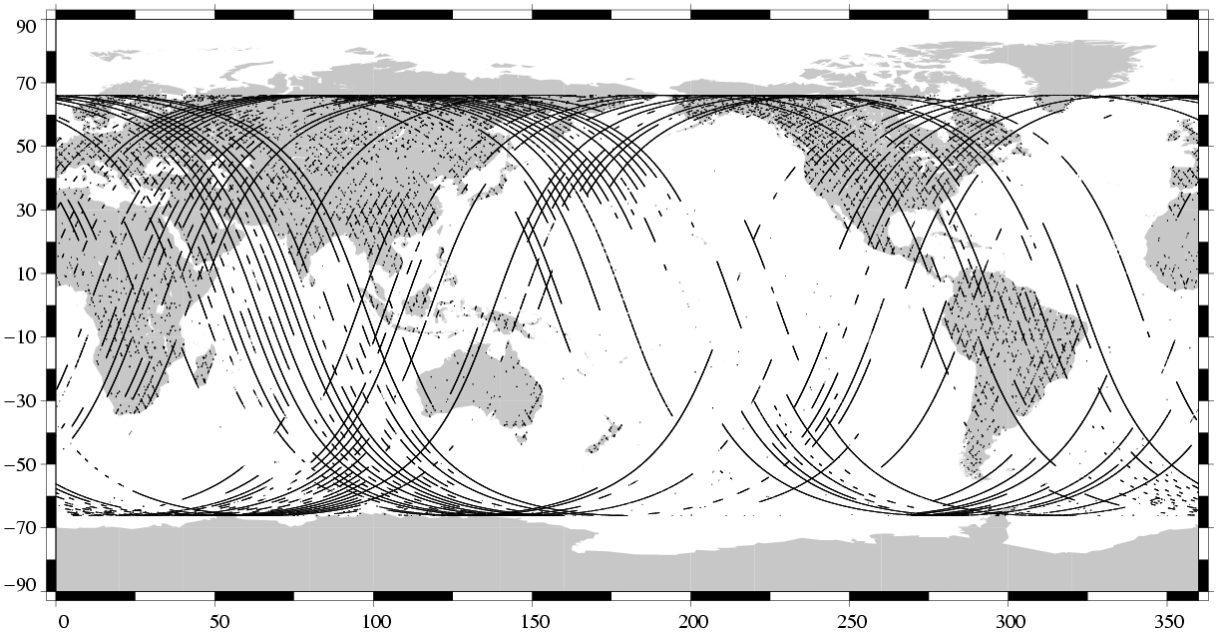
## 3.1 Missing measurements

644626 altimeter measurements are present, and 149931 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 372 (19/10/2002 / 29/10/2002)




Missing measurements
TOPEX/Poseidon Cycle 372 (19/10/2002 / 29/10/2002)

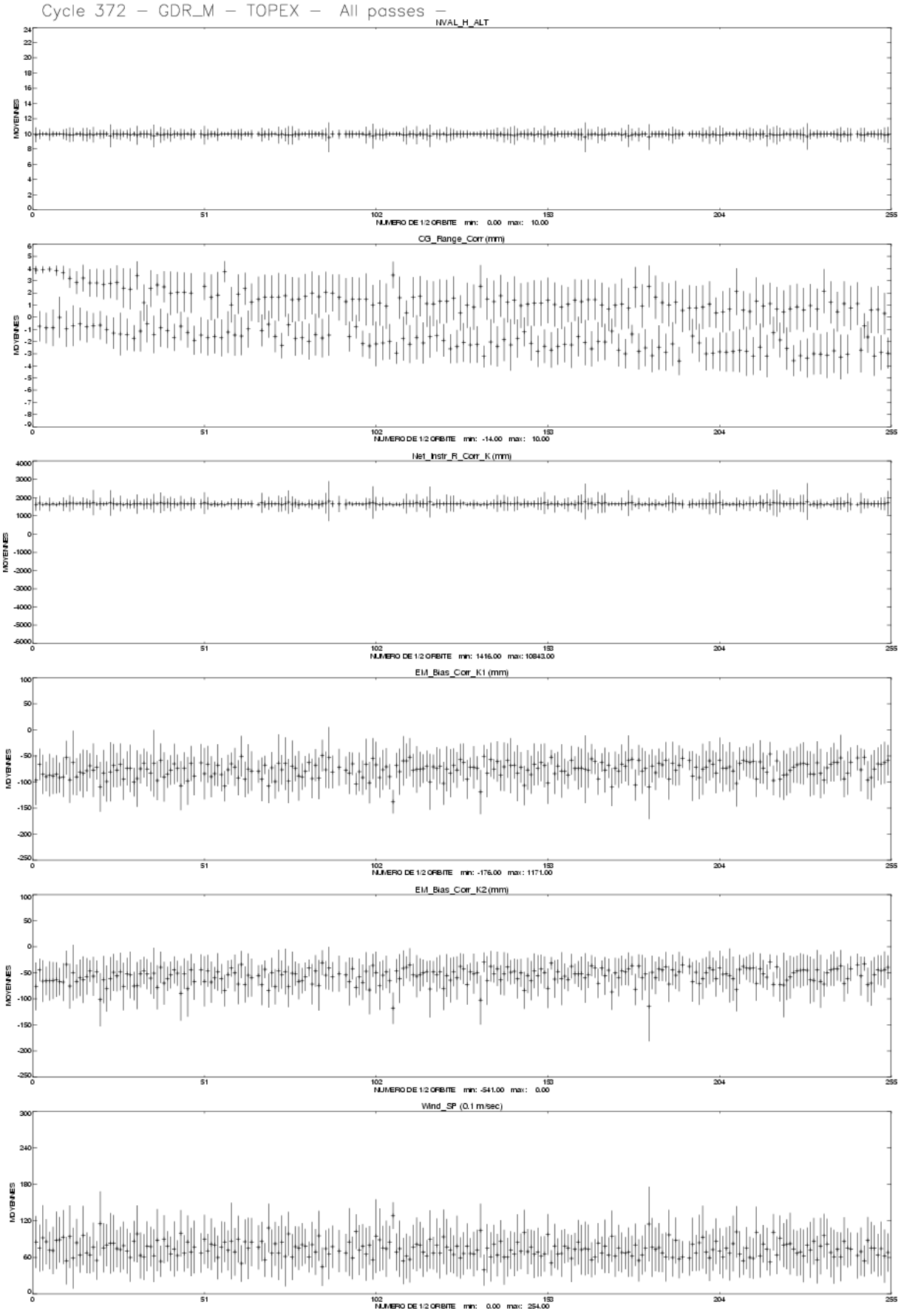


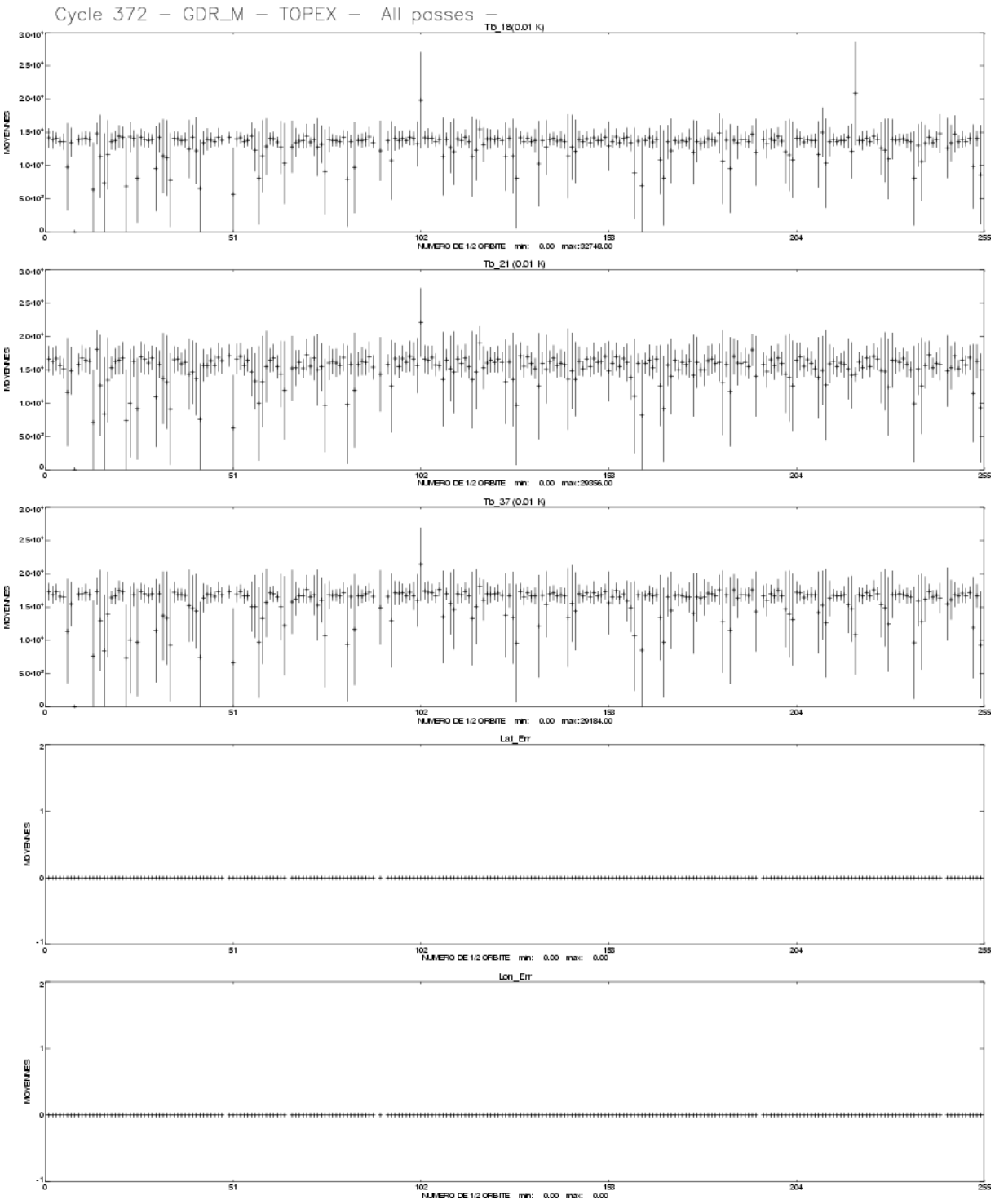
### 3.2 M-GDR quality flags

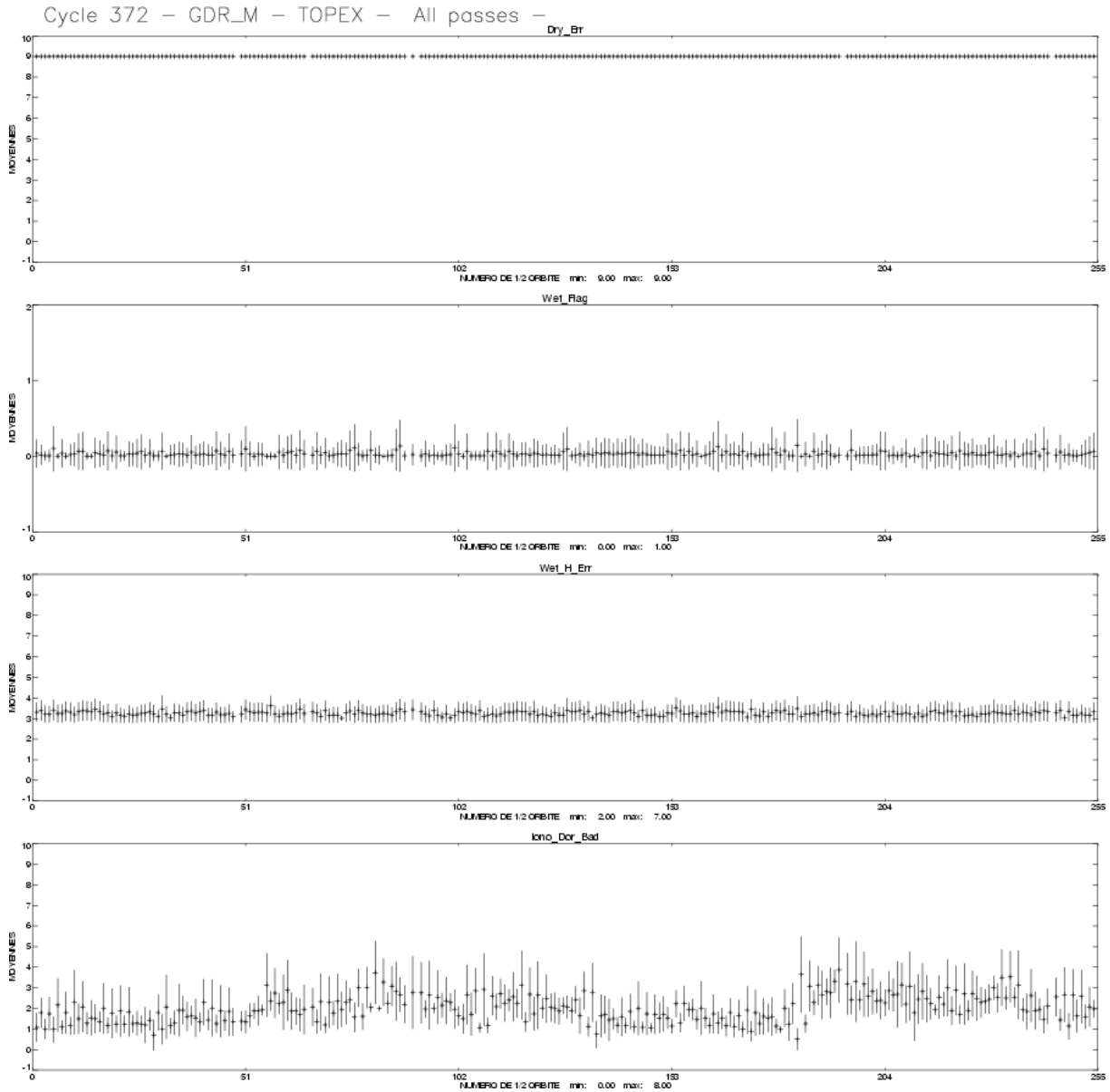
The following table indicates the percentage of measurements for which those flags are set.

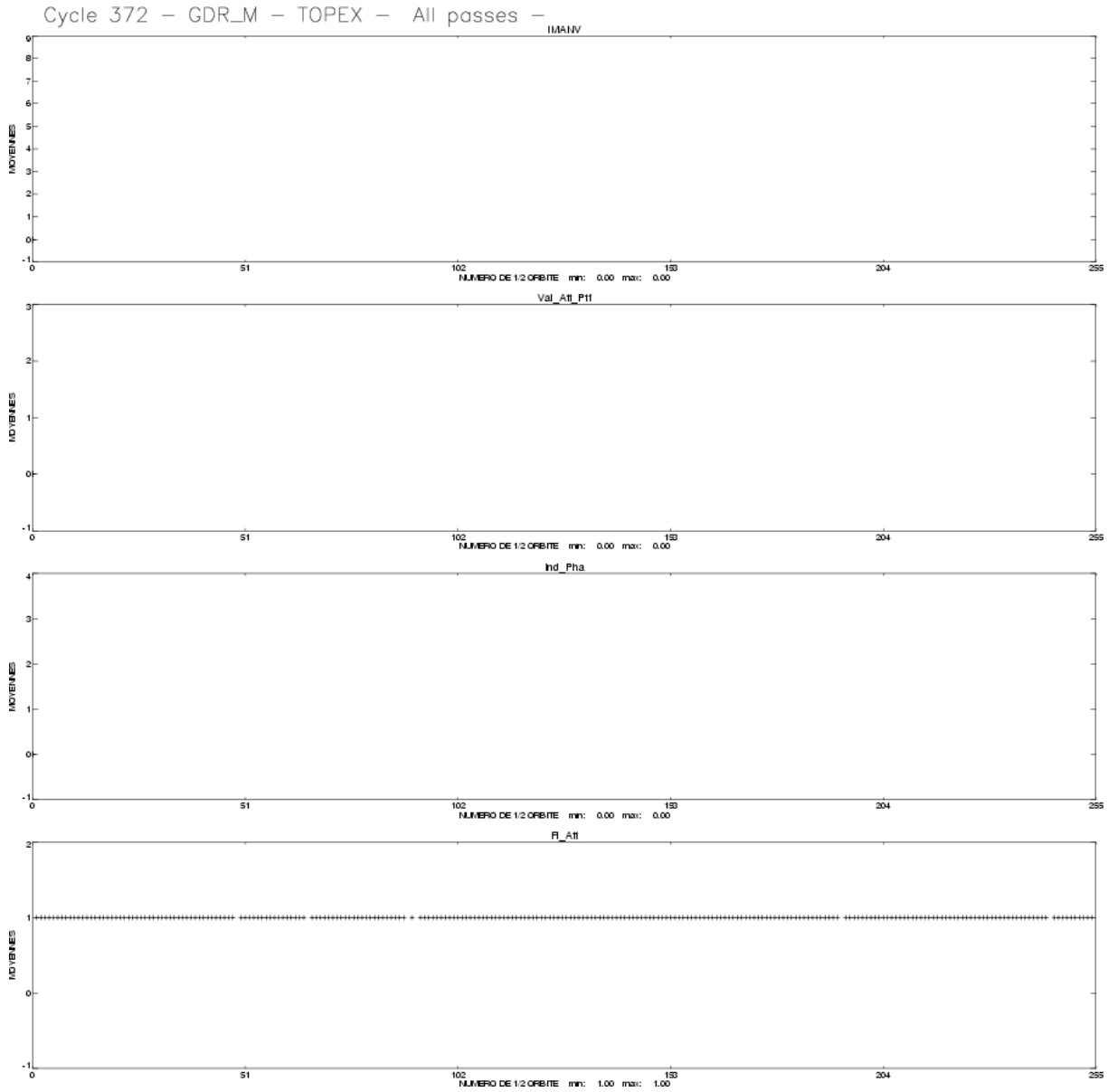
| Name | Descrition | % bad |
|---|---|---|
| Geo_Bad_1 | altimeter land flag | 25.97 |
| Geo_Bad_1 | ice flag | 8.26 |
| Geo_Bad_1 | radiometer land flag | 28.76 |
| Alt_Bad_1 | conditions 1 altimeter | 5.55 |
| Alt_Bad_2 | conditions 2 altimeter | 5.37 |
| Geo_Bad_2 | rain (liquid water in excess) | 9.84 |
| Geo_Bad_2 | less than 4 points for CSR3.0 tide calculation | 0.43 |
| Geo_Bad_2 | less than 4 points for FES95.2.1 tide calculation | 3.00 |
| TOPEX | TOPEX not valid | 0.00 |
| TMR | TMR not valid | 0.00 |
| TMR_Bad | Brightness temperatures not valid | 10.12 |
| DORIS | DORIS not valid | 0.00 |

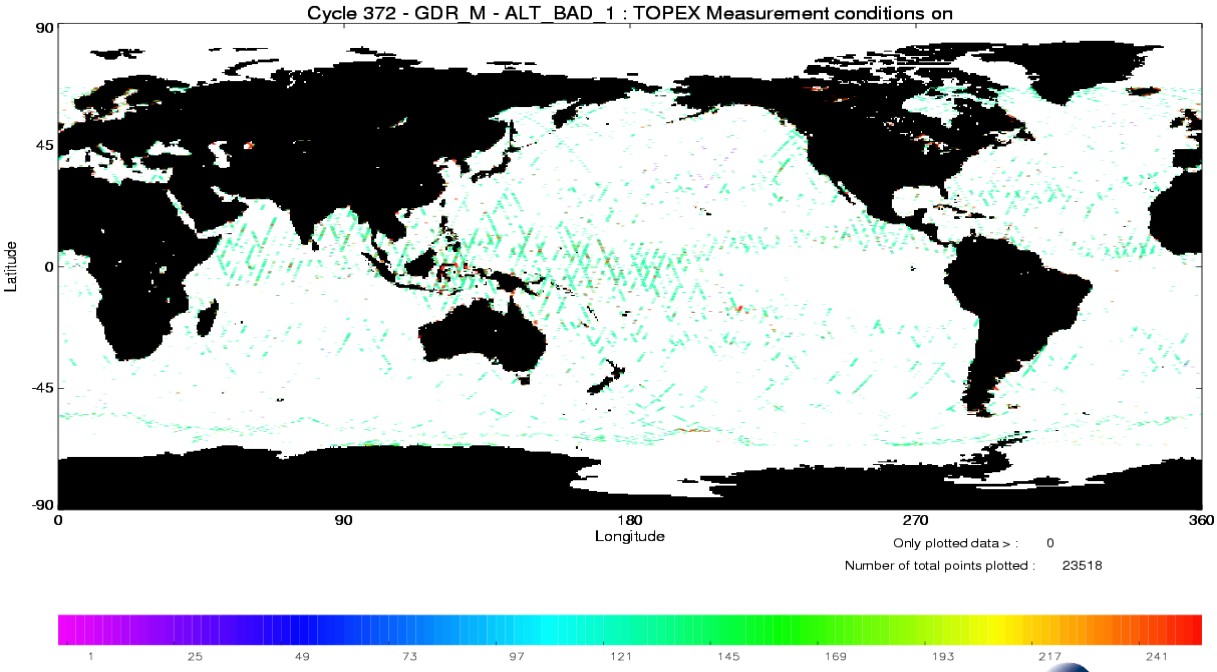
## 3.3 M-GDR parameter plots

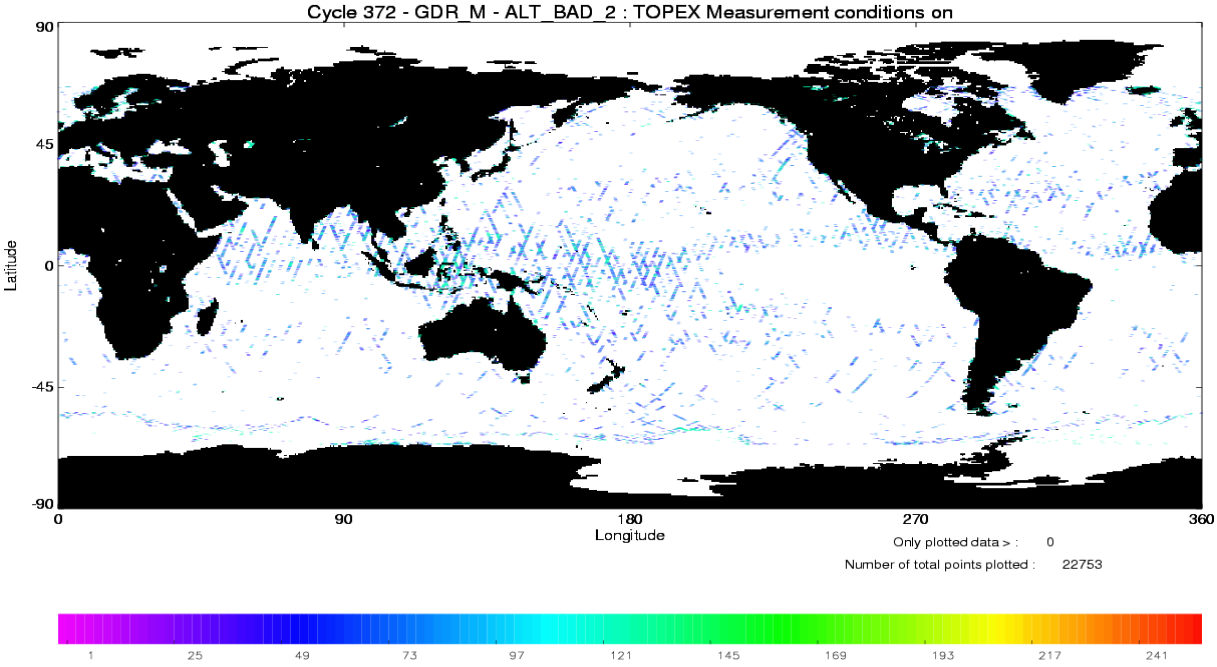


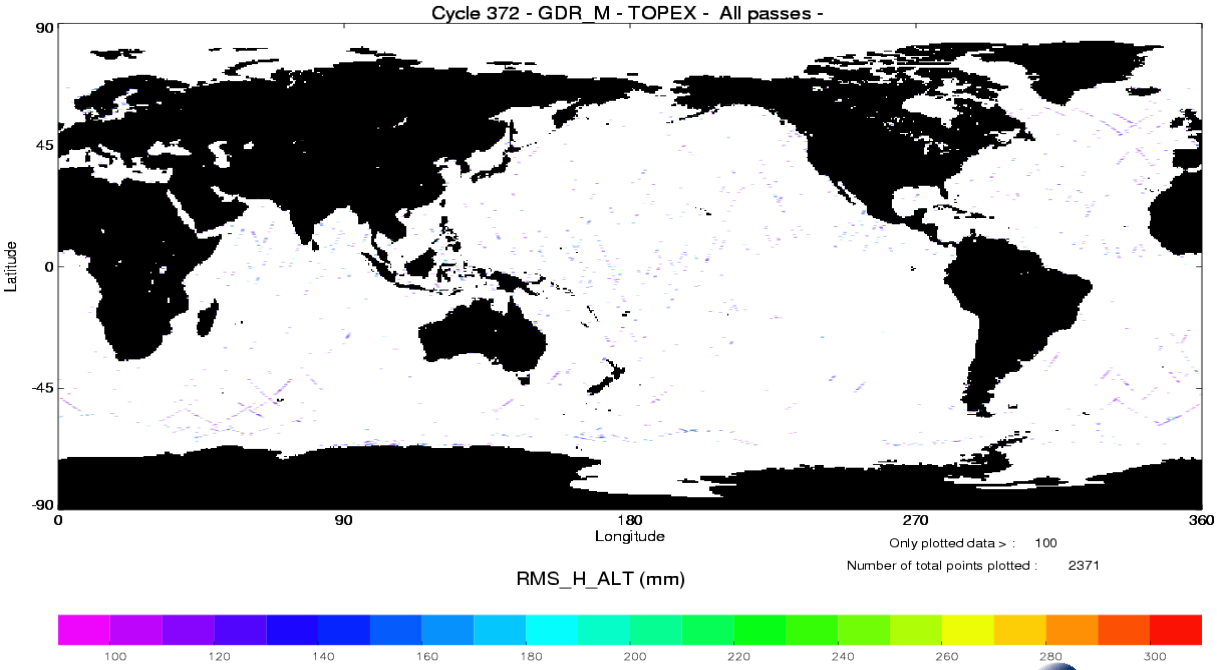

Cycle 372 – GDR_M – TOPEX – All passes –
Tb_18(0.01 K)
Tb_21 (0.01 K)
Tb_37 (0.01 K)
Lat_Err
Lon_Err
MOYENNES
NUMERO DE 1/2 ORBITE

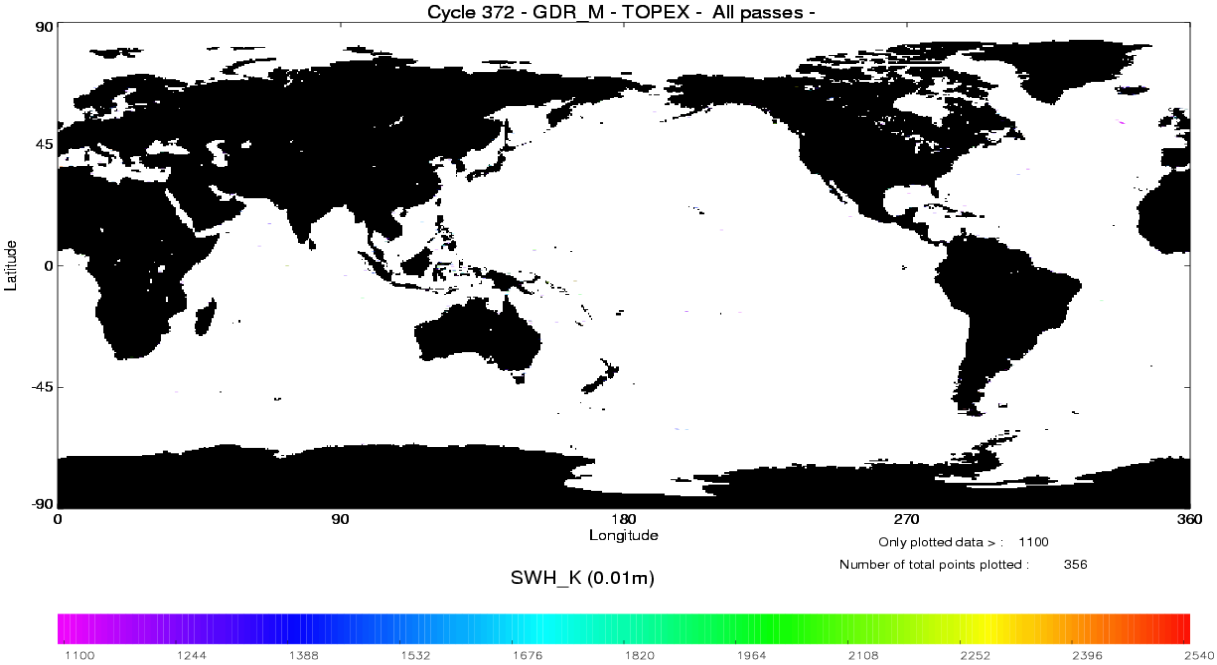

Cycle 372 – GDR_M – TOPEX – All passes –
Dry_Err
MOYENNES
NUMERO DE 1/2 ORBITE min: 9.00 max: 9.00
Wet_Flag
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 1.00
Wet_H_Err
MOYENNES
NUMERO DE 1/2 ORBITE min: 2.00 max: 7.00
Iono_Dor_Bad
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 8.00

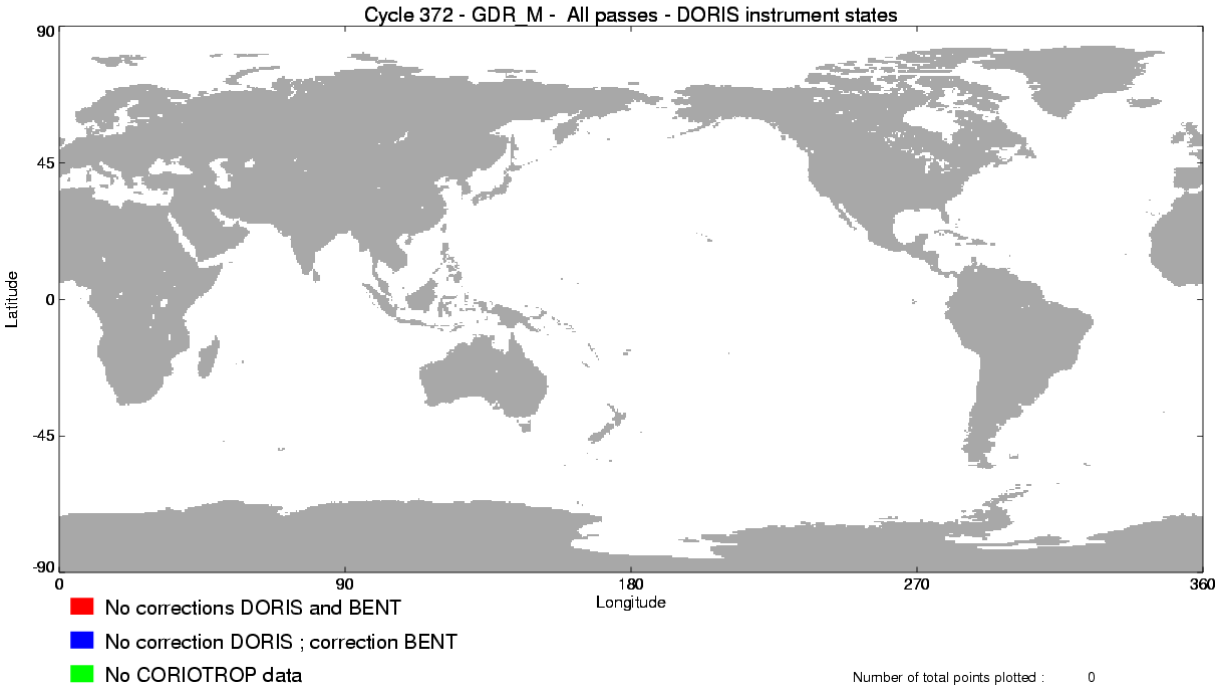

Cycle 372 – GDR_M – TOPEX – All passes –
IMANV
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Val_Att_P1f
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Ind_Pha
MOYENNES
NUMERO DE 1/2 ORBITE min: 0.00 max: 0.00
Fl_Att
MOYENNES
NUMERO DE 1/2 ORBITE min: 1.00 max: 1.00


Cycle 372 - 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 : 23518
1
25
49
73
97
121
145
169
193
217
241


Cycle 372 - 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 : 22753
1
25
49
73
97
121
145
169
193
217
241


Cycle 372 - 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 : 2371
RMS_H_ALT (mm)
100
120
140
160
180
200
220
240
260
280
300


Cycle 372 - 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 : 356
SWH_K (0.01m)
1100
1244
1388
1532
1676
1820
1964
2108
2252
2396
2540


Cycle 372 - 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

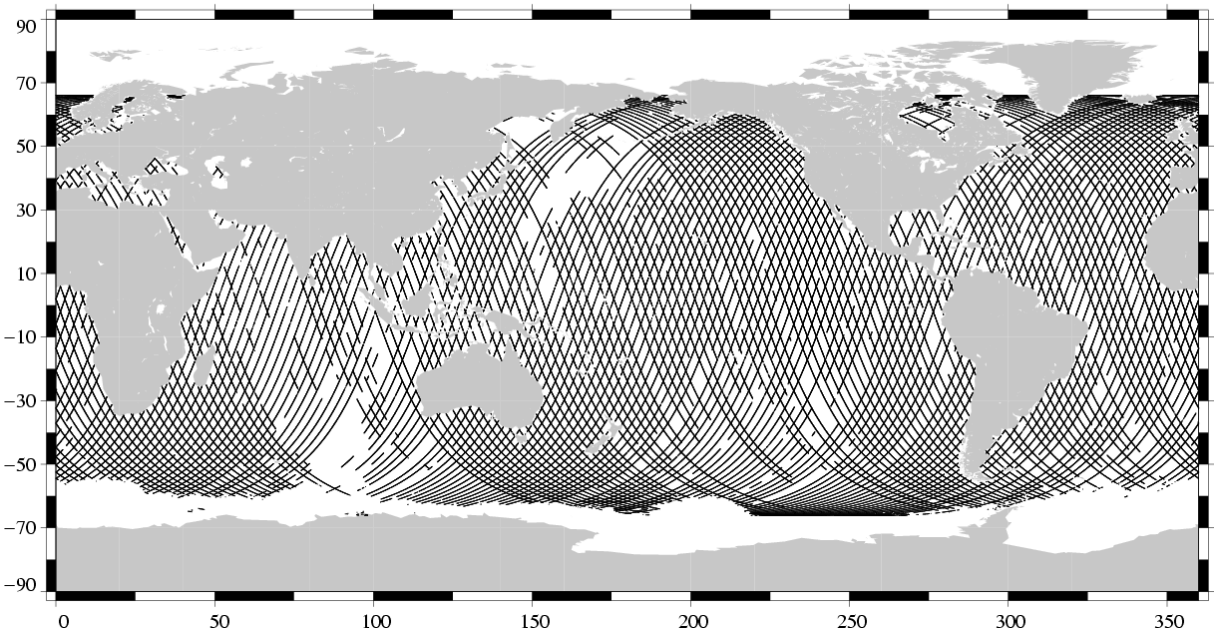
The following table gives for each tested parameter, minimum and maximum thresholds, the number and the percentage of points removed.
As a comparison, the mean percentage over one year (1997) is also given.

| Parameters | Min Thres. | Max Thres. | Unit | Mean % removed in 1997 | % removed |
|---|---|---|---|---|---|
| Sea surface height | -130.000 | 100.000 | m | 1.37 | 0.98 |
| Number of 20/10Hz valid points Poseidon/TOPEX | 5.000 | - | | 1.37 | 1.43 |
| Std. deviation of range | 0.000 | 0.100 | m | 1.85 | 2.30 |
| Off nadir angle from waveform | 0.000 | 0.400 | deg | 1.36 | 5.32 |
| 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 | 7.93 |
| 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 | 0.56 |
| Sea state Bias | -0.500 | 0.000 | m | 1.39 | 0.99 |
| Backscatter coefficient | 7.000 | 30.000 | dB | 1.44 | 0.88 |
| Ocean tide height | -5.000 | 5.000 | m | 0.01 | 1.34 |
| Earth tide | -1.000 | 1.000 | m | 0.00 | 0.00 |
| Pole tide | -15.000 | 15.000 | m | 0.00 | 0.00 |
| Spline fitting | | | | | 0.02 |

The following three maps are complementary: they show respectively the removed, the selected measurements and the percentage of selected measurements in the editing procedure.

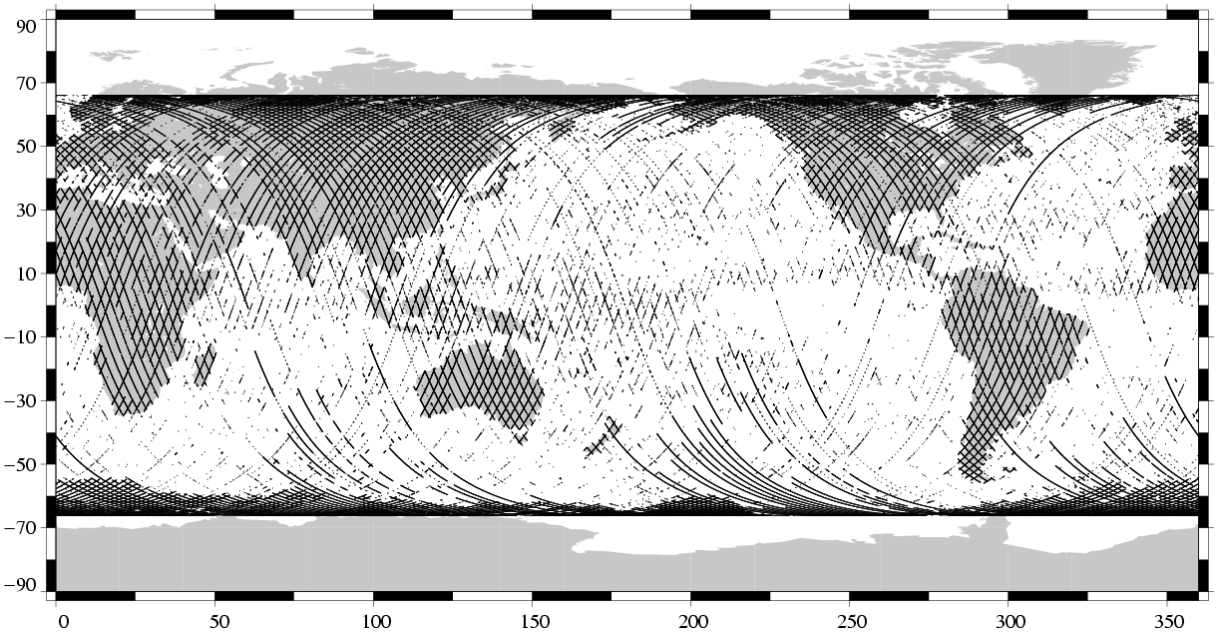
Valid data

TOPEX/Poseidon Cycle 372 (19/10/2002 / 29/10/2002)

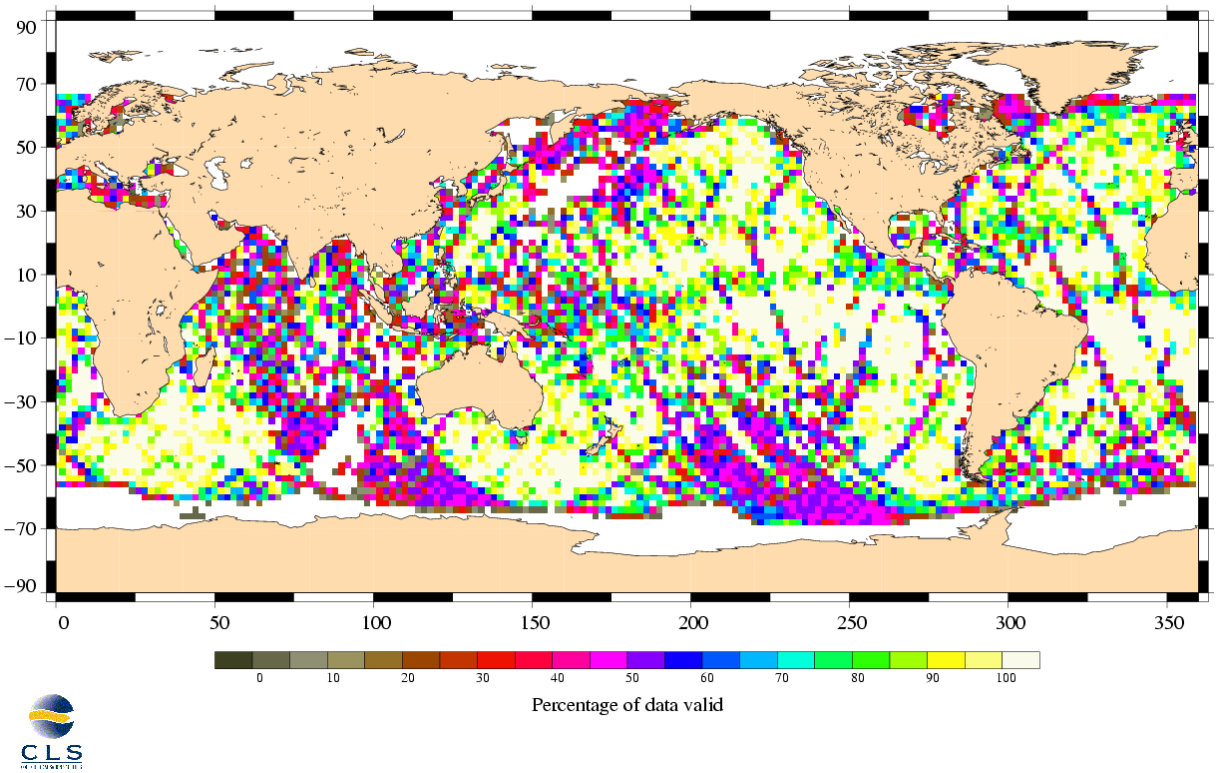



Edited measurements

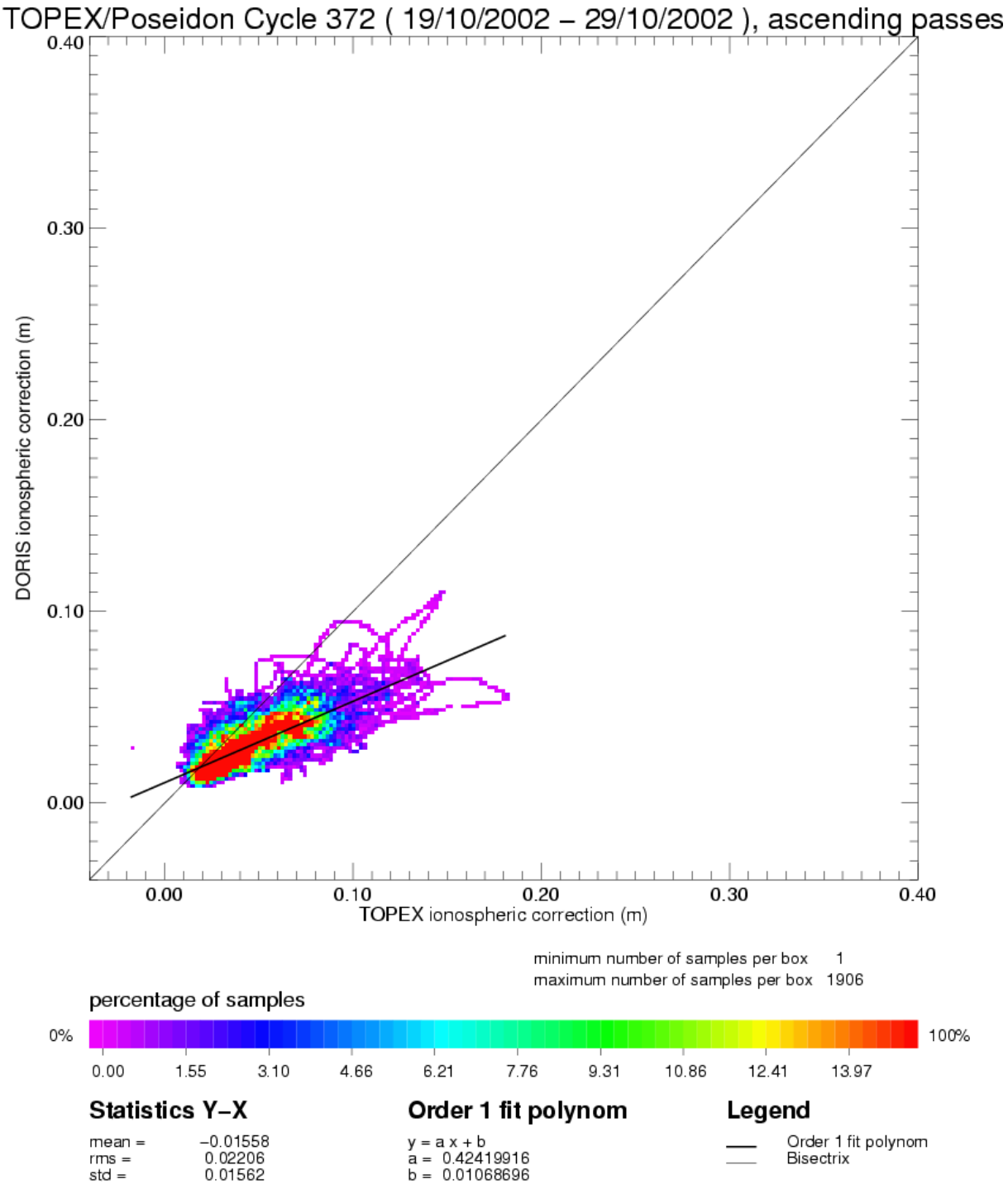
TOPEX Cycle 372 (19/10/2002 / 29/10/2002)

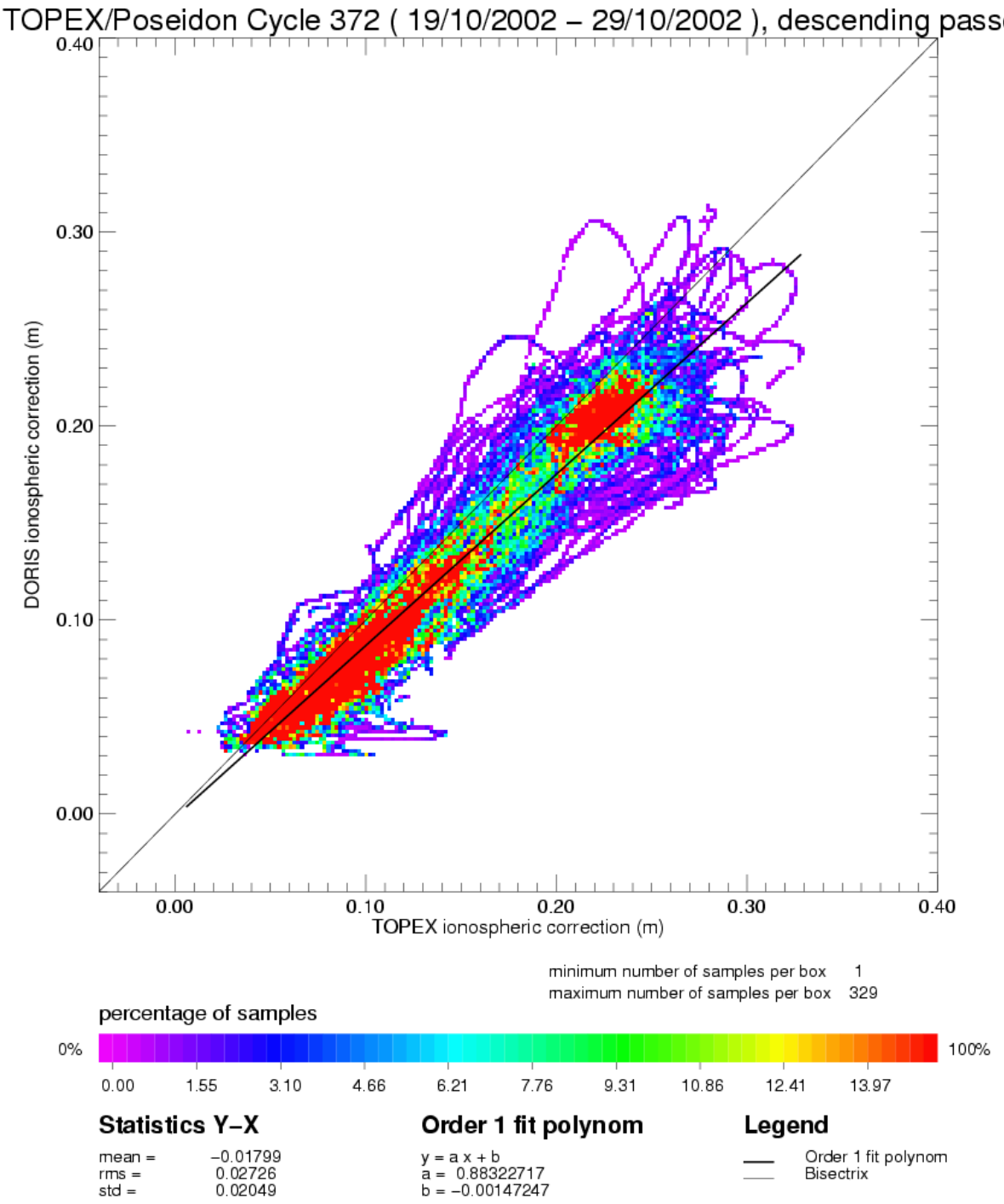


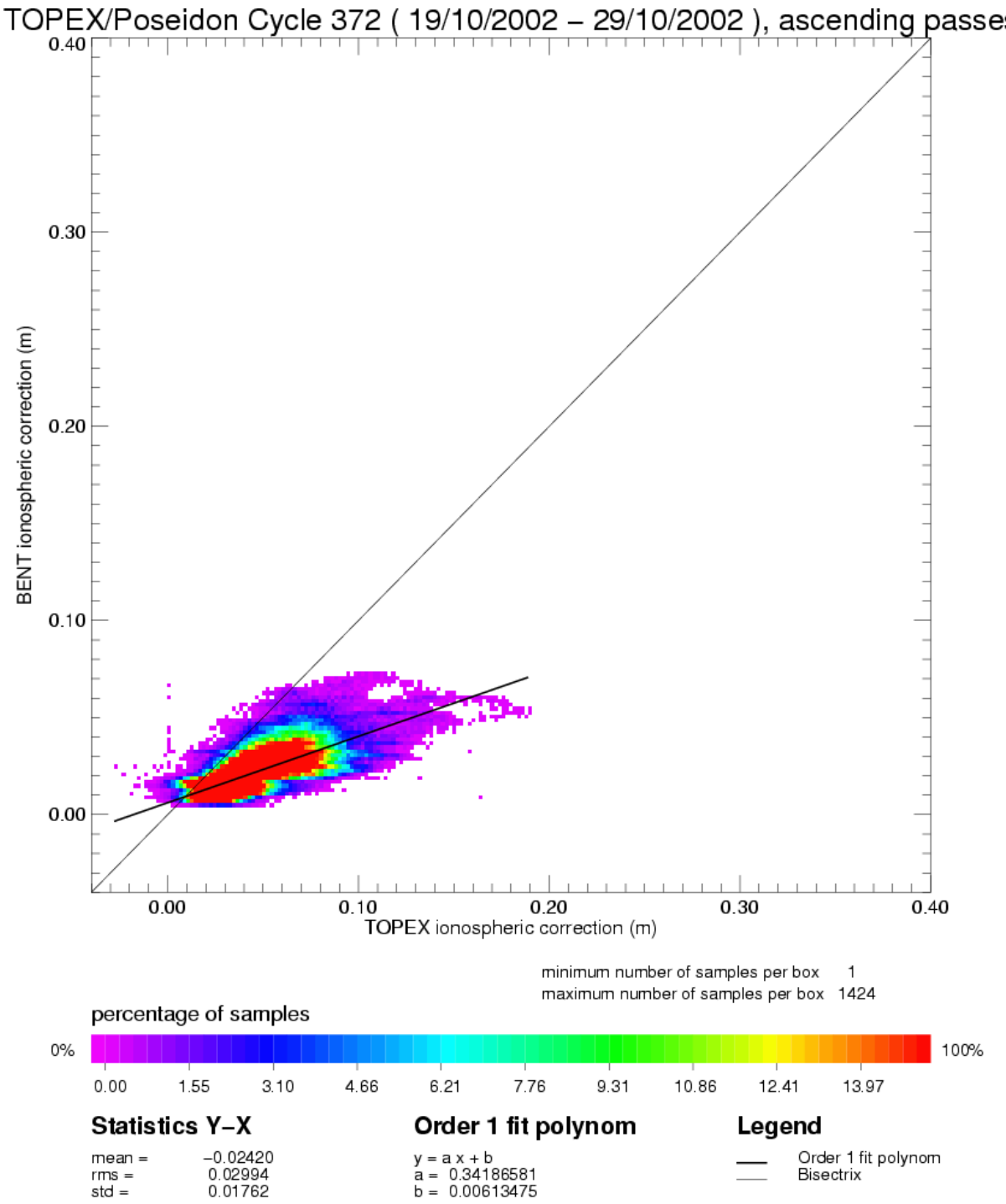
Percentage of valid data relative to the nominal pass
TOPEX/Poseidon Cycle 372 (19/10/2002 / 29/10/2002)

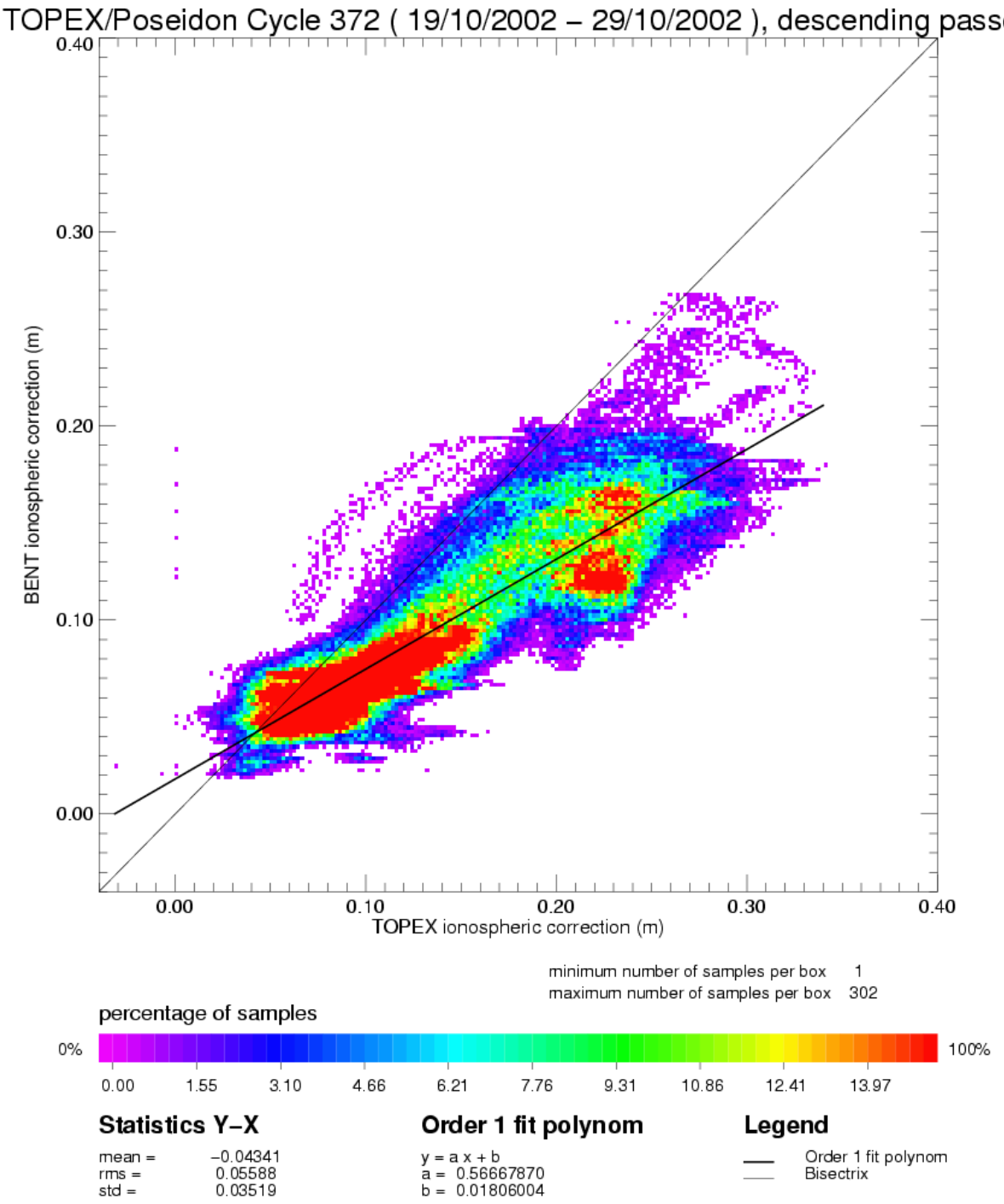


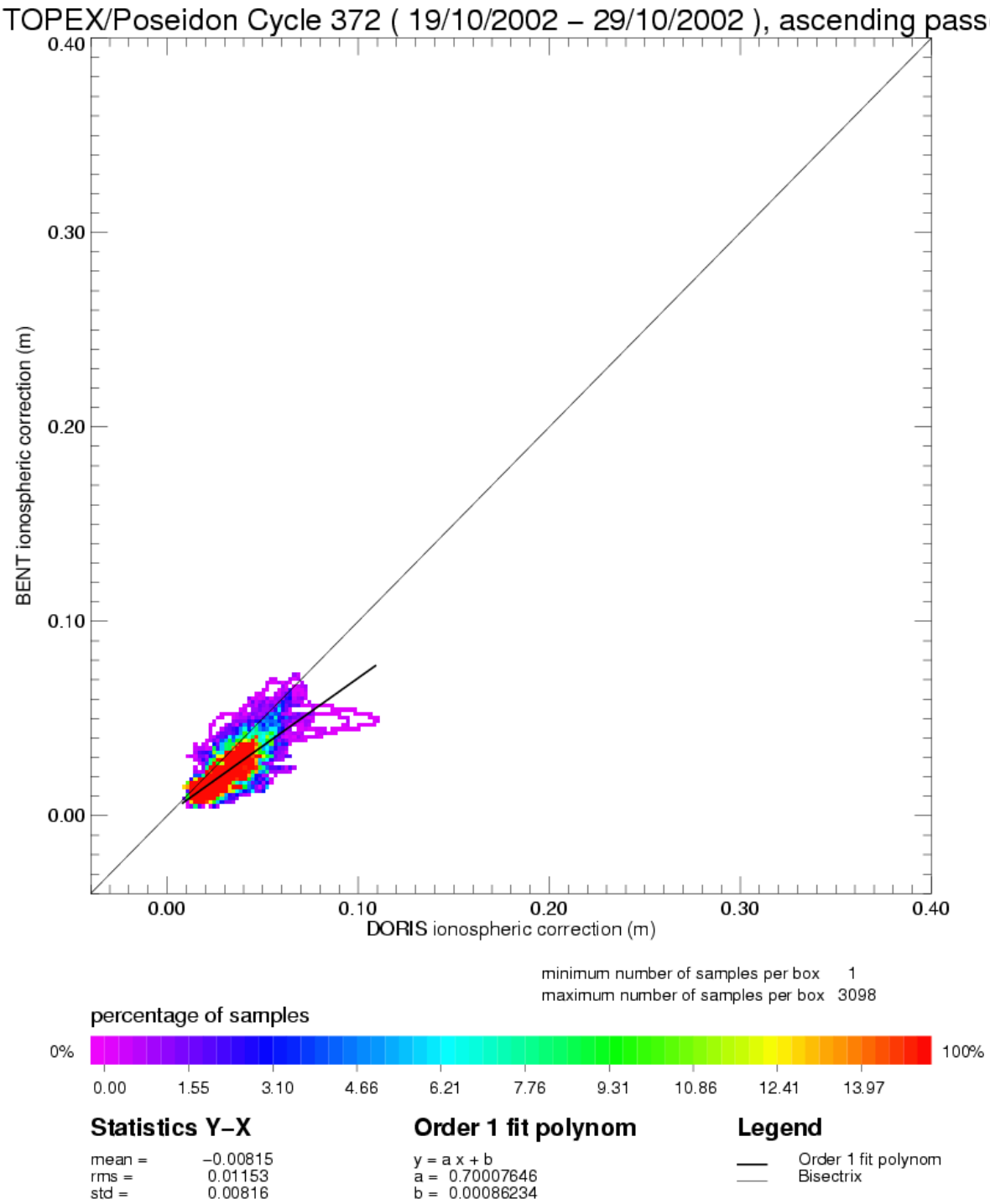
## 3.5 Ionospheric correction

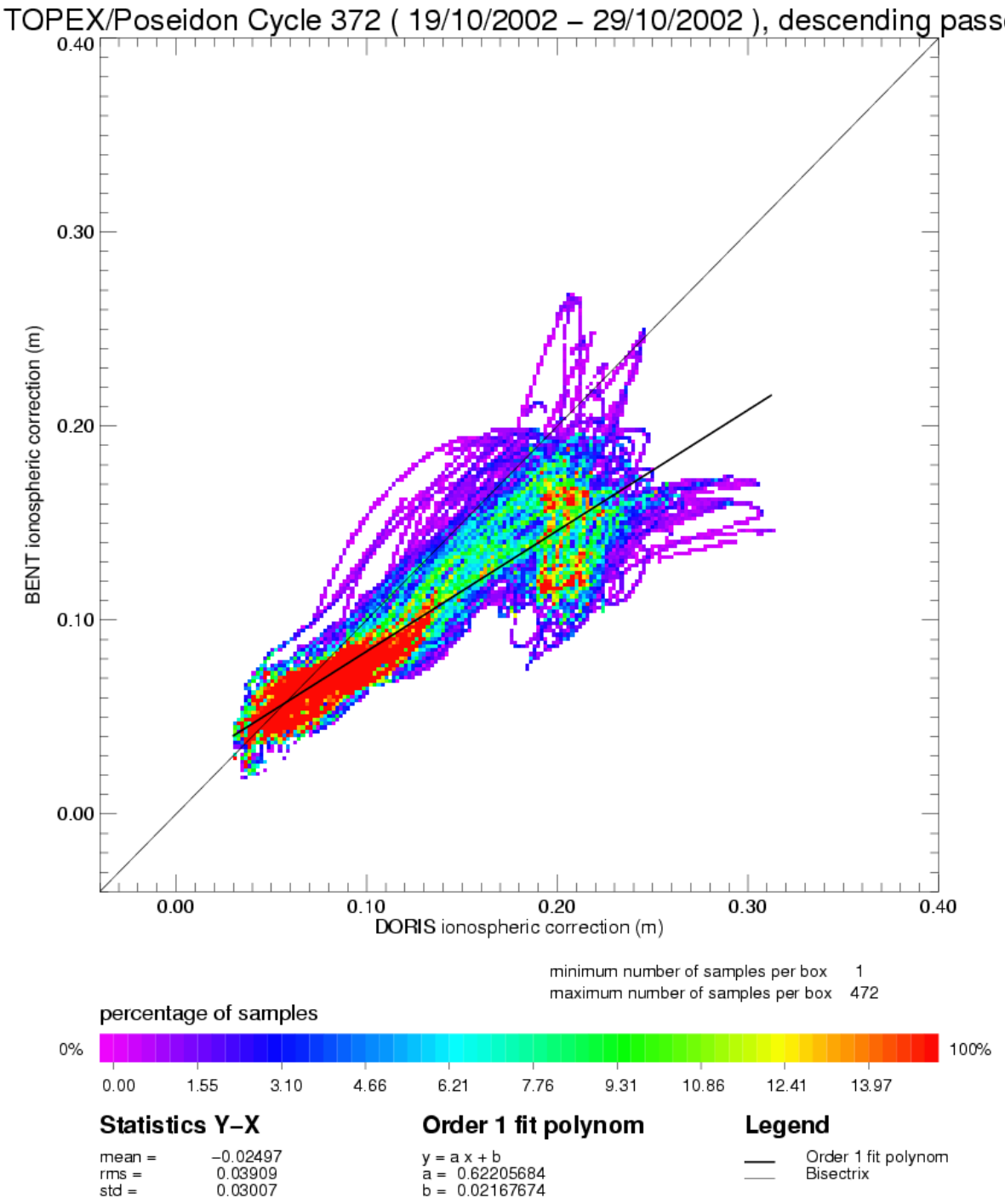



TOPEX/Poseidon Cycle 372 ( 19/10/2002 – 29/10/2002 ), descending passes
DORIS ionospheric correction (m)
TOPEX ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 329
percentage of samples
0%
100%
0.00 1.55 3.10 4.66 6.21 7.76 9.31 10.86 12.41 13.97
Statistics Y–X
mean = −0.01799
rms = 0.02726
std = 0.02049
Order 1 fit polynom
y = a x + b
a = 0.88322717
b = −0.00147247
Legend
Order 1 fit polynom
Bisectrix

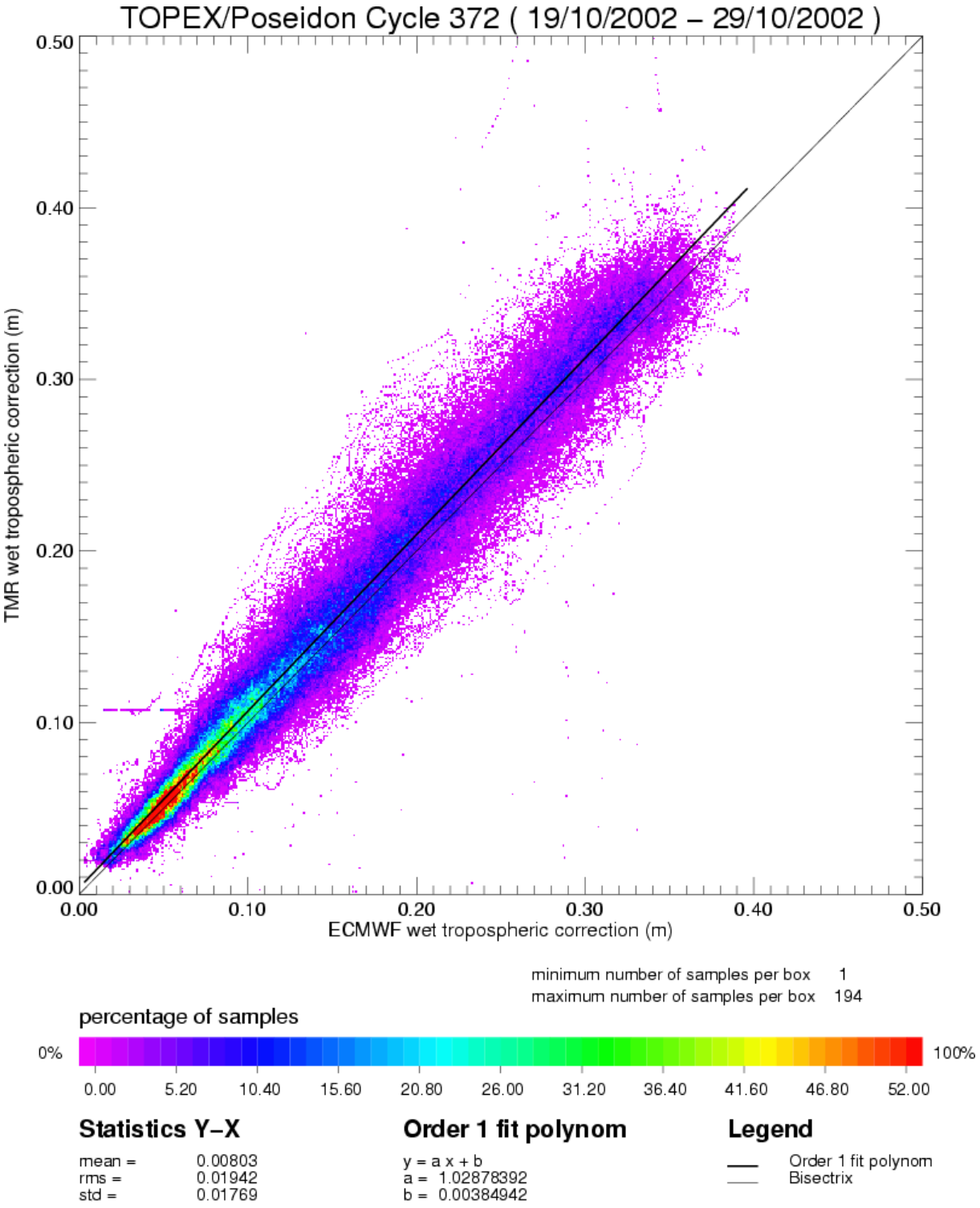

TOPEX/Poseidon Cycle 372 ( 19/10/2002 – 29/10/2002 ), ascending passes
BENT ionospheric correction (m)
TOPEX ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 1424
percentage of samples
0%
100%
0.00
1.55
3.10
4.66
6.21
7.76
9.31
10.86
12.41
13.97
Statistics Y–X
mean = −0.02420
rms = 0.02994
std = 0.01762
Order 1 fit polynom
y = a x + b
a = 0.34186581
b = 0.00613475
Legend
Order 1 fit polynom
Bisectrix


TOPEX/Poseidon Cycle 372 ( 19/10/2002 – 29/10/2002 ), 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 302
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 = −0.04341
rms = 0.05588
std = 0.03519
Order 1 fit polynom
y = a x + b
a = 0.56667870
b = 0.01806004
Legend
Order 1 fit polynom
Bisectrix

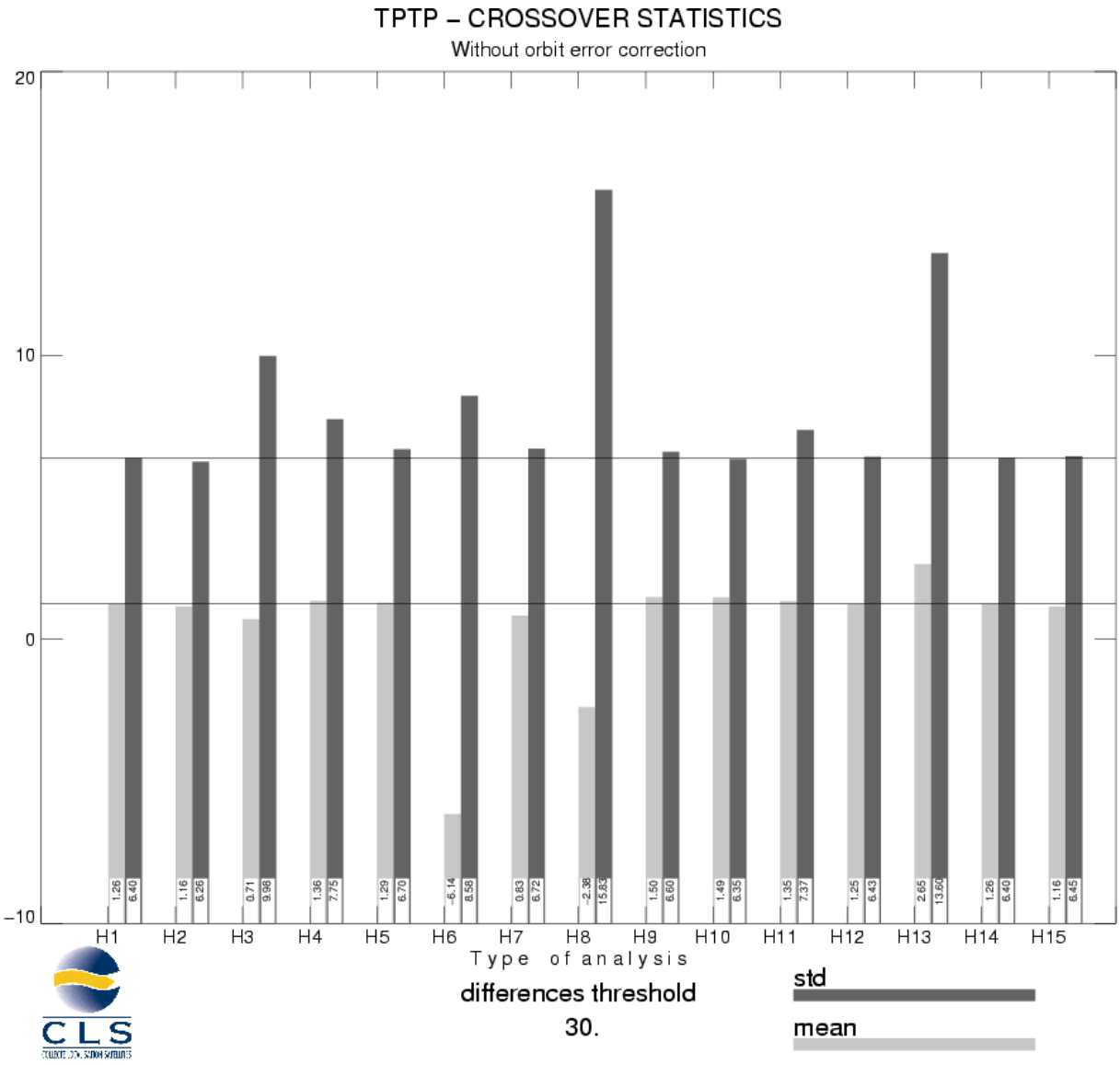

TOPEX/Poseidon Cycle 372 ( 19/10/2002 – 29/10/2002 ), ascending passes
BENT ionospheric correction (m)
DORIS ionospheric correction (m)
0.00
0.10
0.20
0.30
0.40
minimum number of samples per box 1
maximum number of samples per box 3098
percentage of samples
0%
100%
0.00
1.55
3.10
4.66
6.21
7.76
9.31
10.86
12.41
13.97
Statistics Y–X
mean = −0.00815
rms = 0.01153
std = 0.00816
Order 1 fit polynom
y = a x + b
a = 0.70007646
b = 0.00086234
Legend
Order 1 fit polynom
Bisectrix


TOPEX/Poseidon Cycle 372 ( 19/10/2002 – 29/10/2002 ), 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 472
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 = −0.02497
rms = 0.03909
std = 0.03007
Order 1 fit polynom
y = a x + b
a = 0.62205684
b = 0.02167674
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 : –28.4400

Valeur maximale : 29.1100

Difference Max – Min: 57.5500

Nombre de points lus: 3330

Nombre de points selectionnes: 3237

Moyenne : 1.26057

Ecart–type : 6.40011

Moyenne Quadratique : 6.52307

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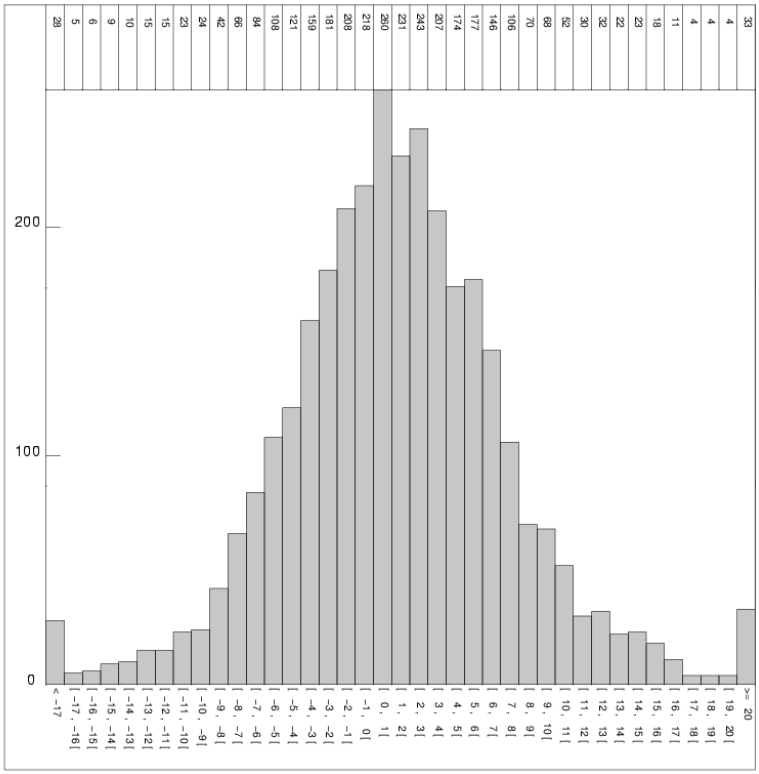


TPTP – CROSSOVER STATISTICS

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 : –28.2000

Valeur maximale : 29.5000

Difference Max – Min: 57.7000

Nombre de points lus: 3330

Nombre de points selectionnes: 3236

Moyenne : 0.122849

Ecart–type : 5.75933

Moyenne Quadratique : 5.76064

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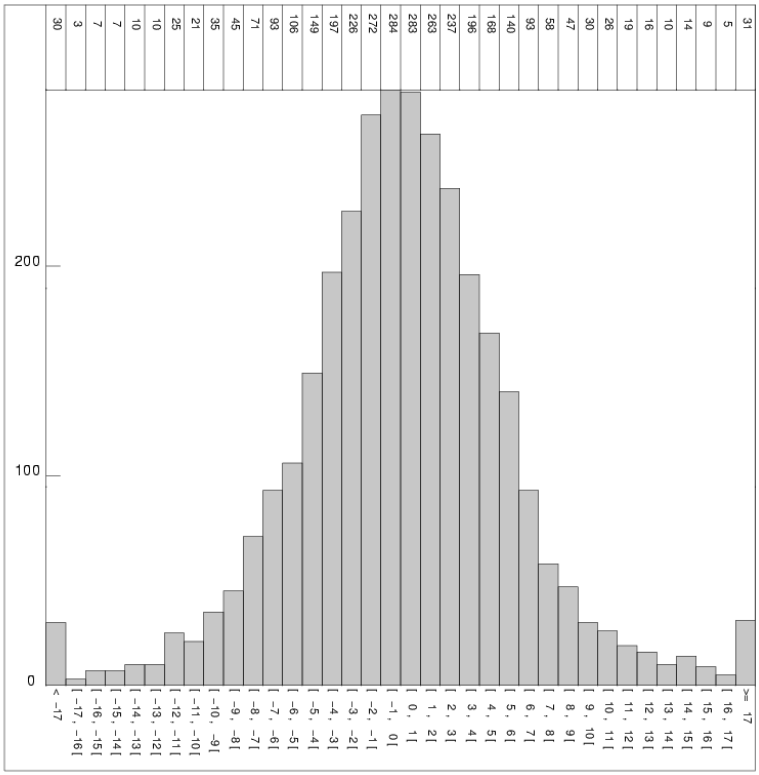


TPTP – CROSSOVER STATISTICS

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 : –41.1600

Valeur maximale : 23.2500

Difference Max – Min: 64.4100

Nombre de points lus: 2020

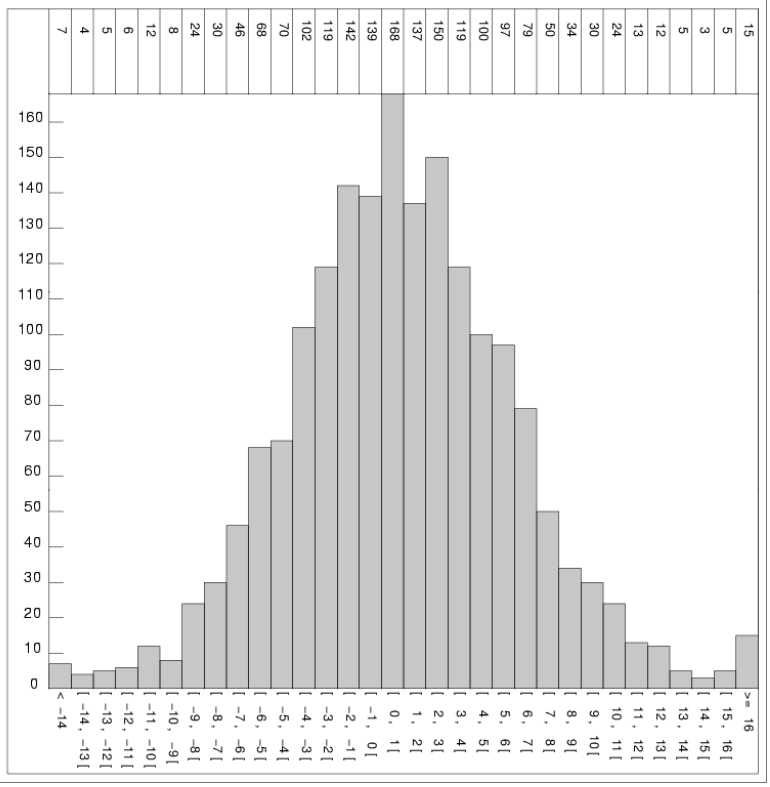
Nombre de points selectionnes: 1823

Moyenne : 0.915200

Ecart–type : 5.29275

Moyenne Quadratique : 5.37129

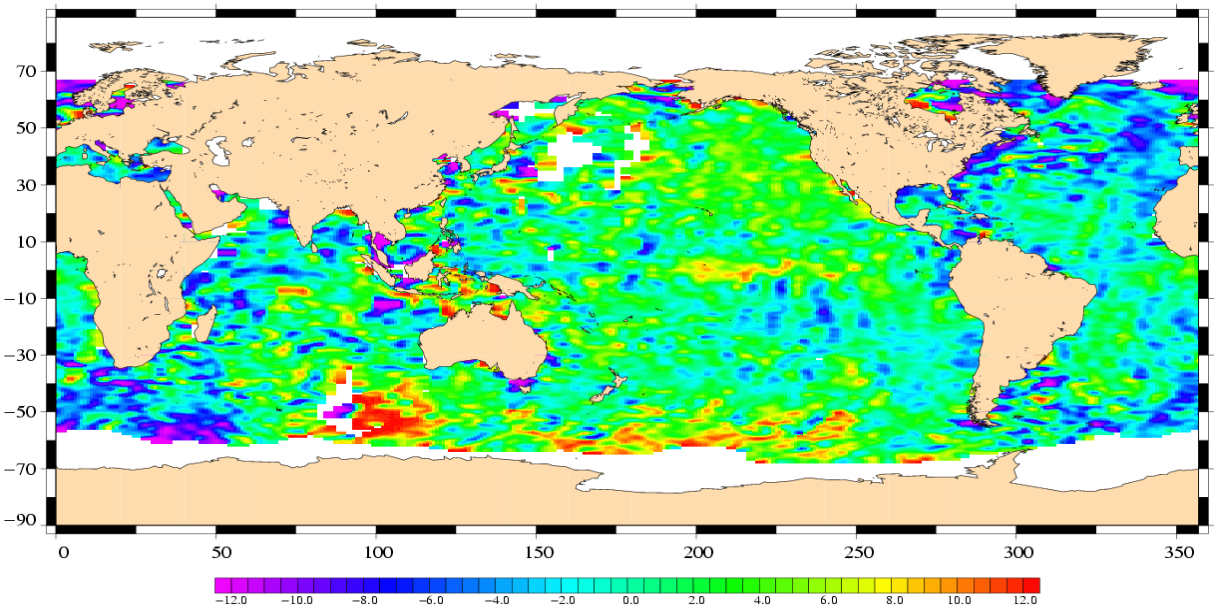
***CLS Space Oceanography Division***



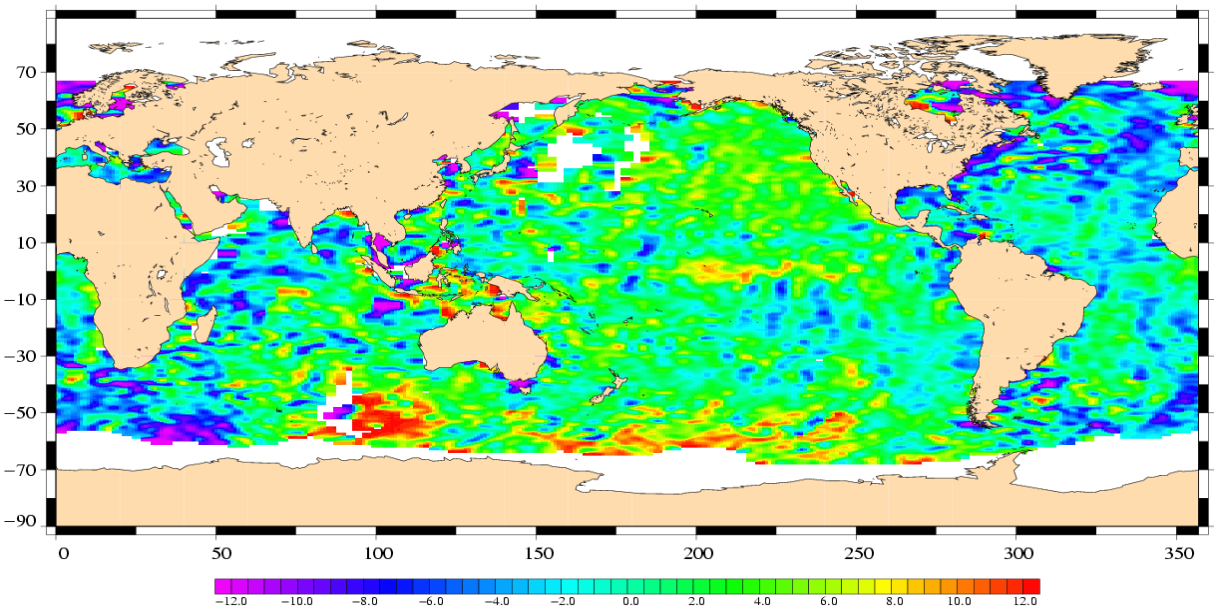
## 3.8 SSH variability

### 3.8.1 Sea Level Anomaly

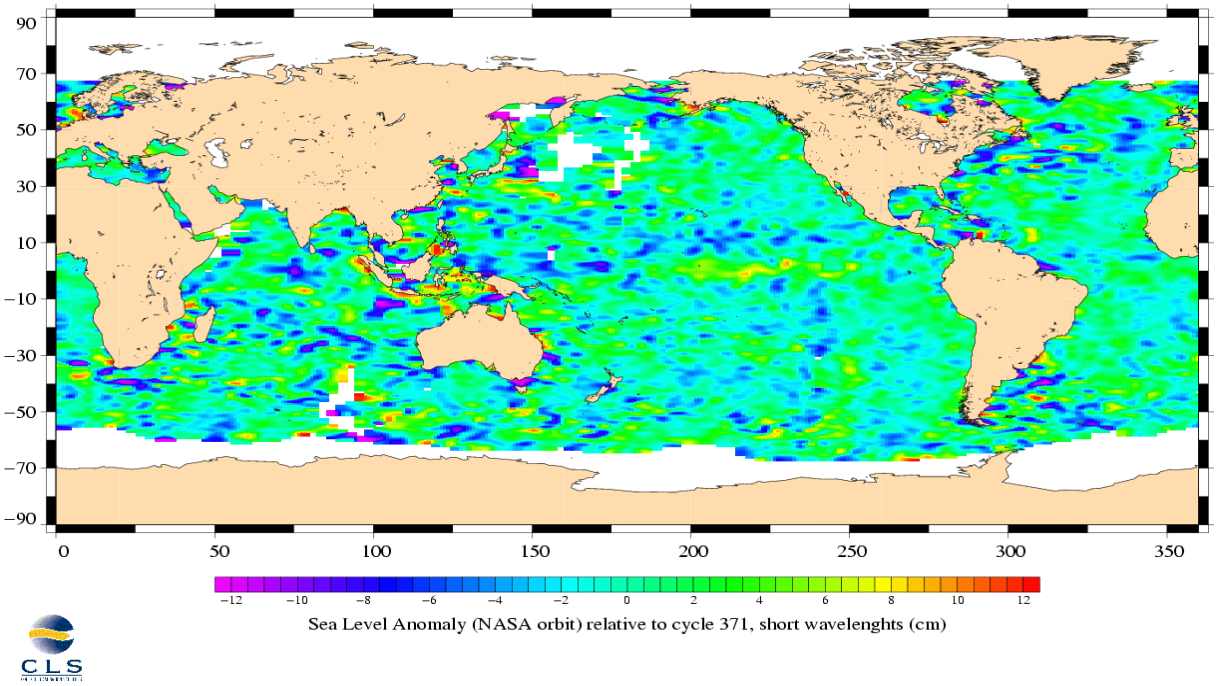
TOPEX/Poseidon, cycle 372
Period : 19/10/2002 – 29/10/2002




TOPEX/Poseidon, cycle 372
Period : 19/10/2002 – 29/10/2002

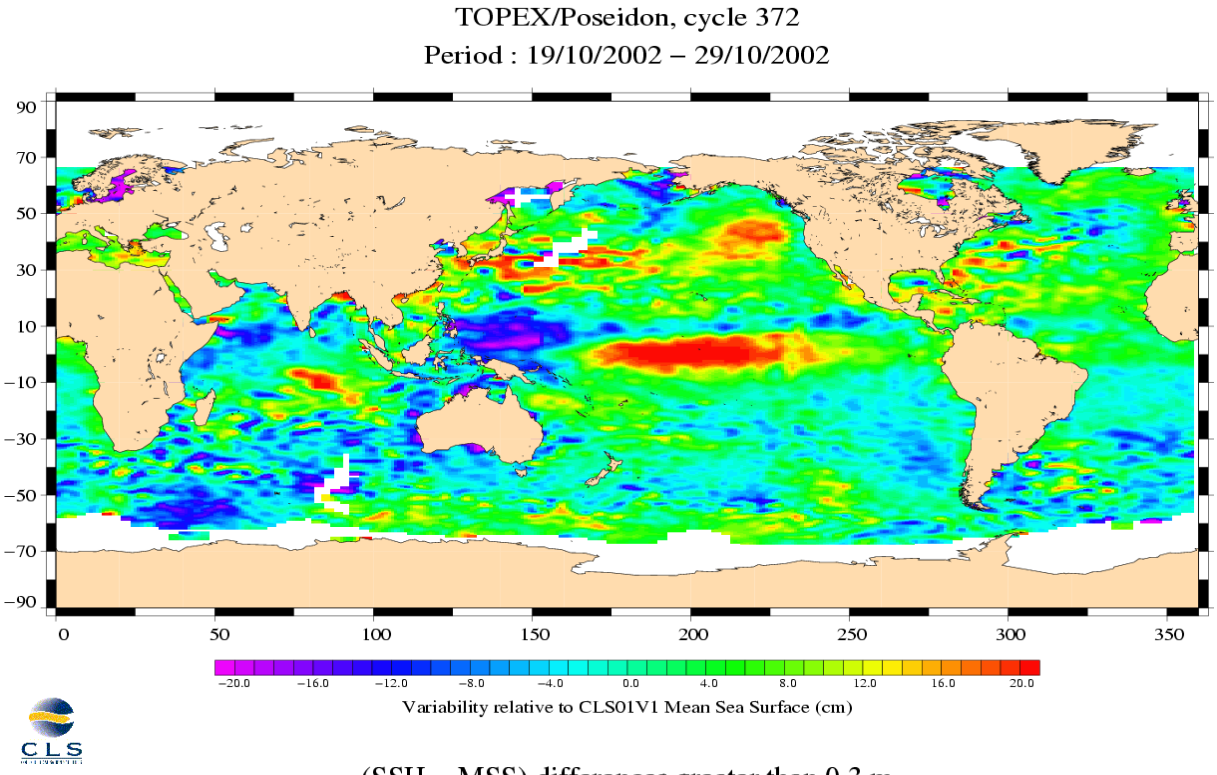


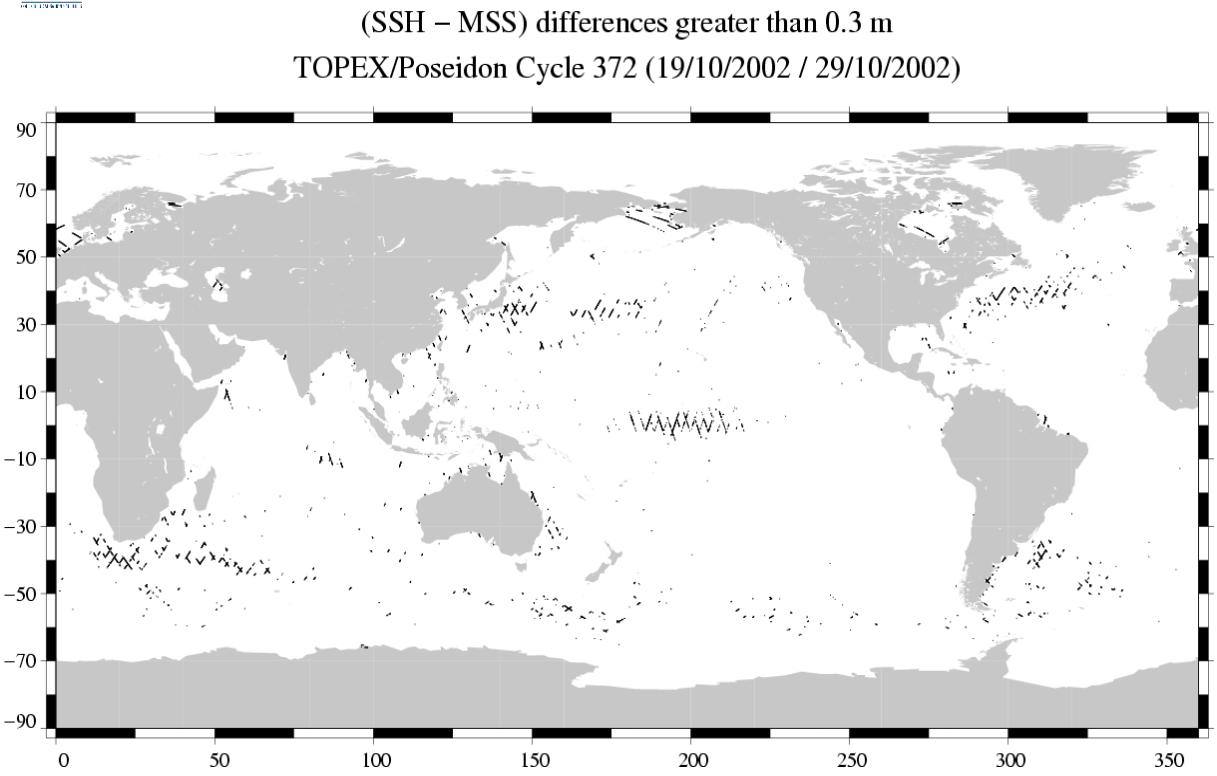
TOPEX/Poseidon, cycle 372
Period : 19/10/2002 – 29/10/2002



### 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.

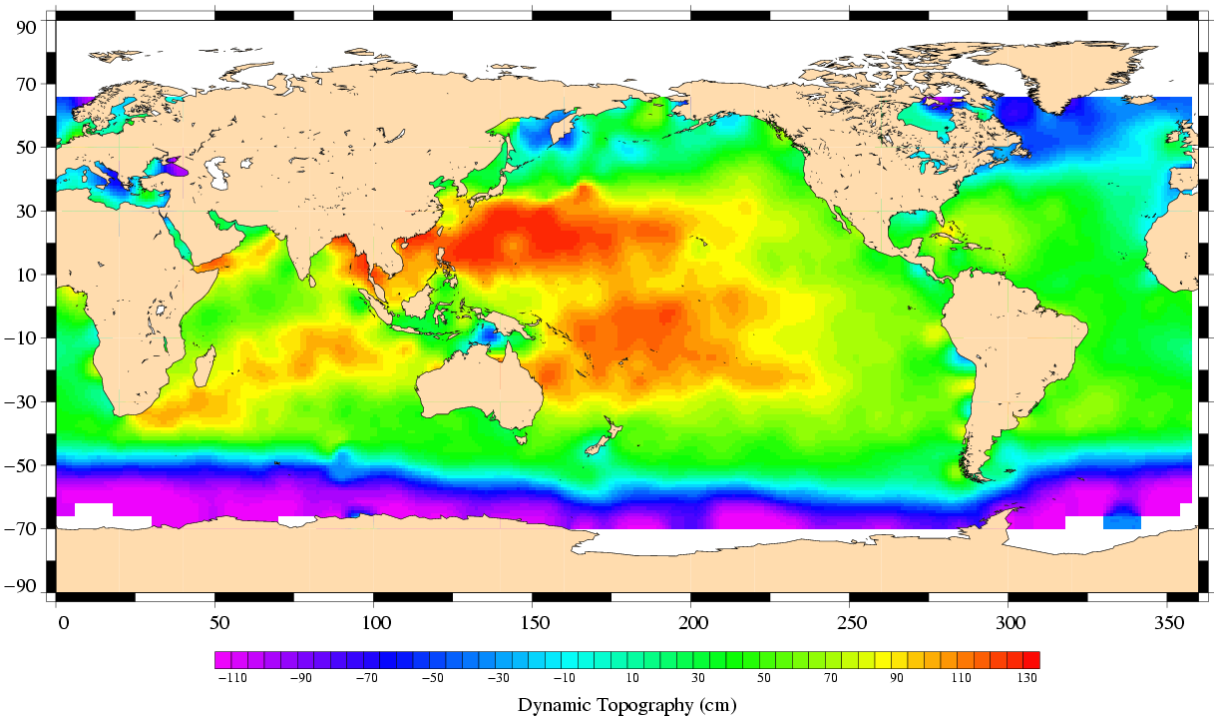


## 3.9 Dynamic topography

TOPEX/Poseidon, cycle 372

Period : 19/10/2002 – 29/10/2002

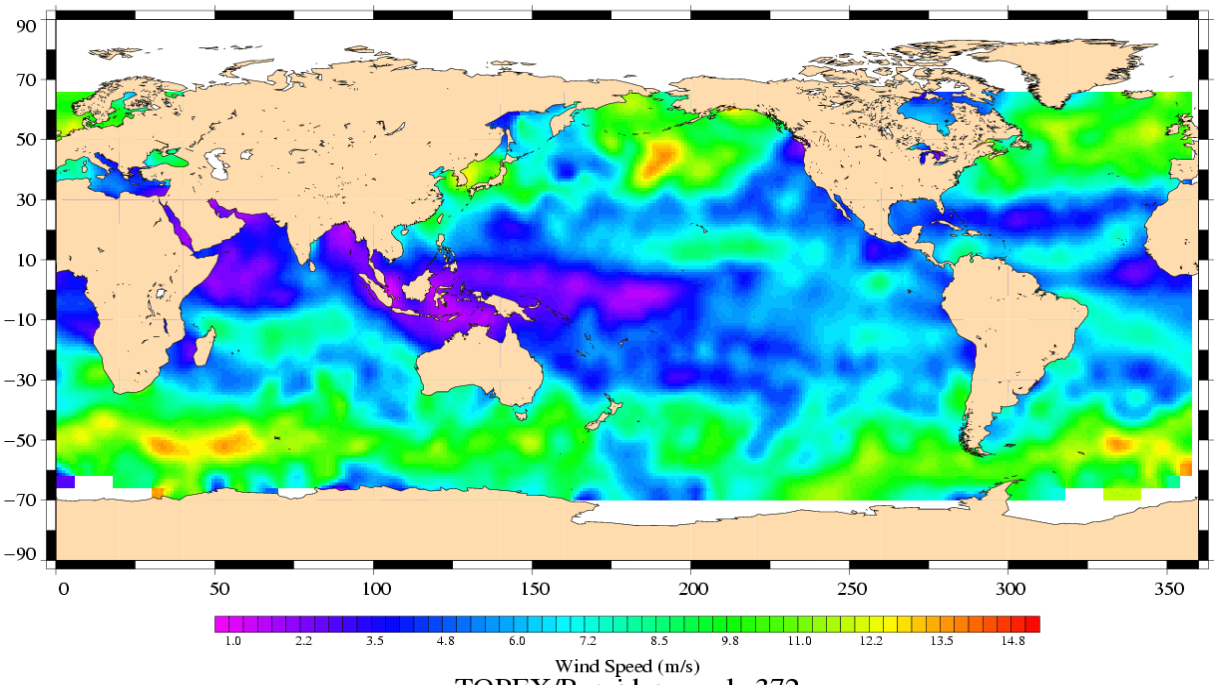


## 3.10 Wind and wave maps

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

TOPEX/Poseidon, cycle 372

Period : 19/10/2002 – 29/10/2002




TOPEX/Poseidon, cycle 372

Period : 19/10/2002 – 29/10/2002