



TOPEX/Poseidon MGRD Quality Assessment Report

Cycle 434

25-06-2004 05-07-2004

| | | |
|----------------|--|--|
| Prepared by : | C. Schgounn, CLS G. Pontonnier, CLS M. Ablain, CLS | |
| Accepted by : | J. Dorandeu, CLS | |
| Quality visa : | M. Destouesse, CLS | |
| Approved by : | N. Picot, CNES | |



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 6.41 cm rms, and the standard deviation of Sea Level Anomalies (SLA) relative to a Mean Sea Surface is 0.00 cm.

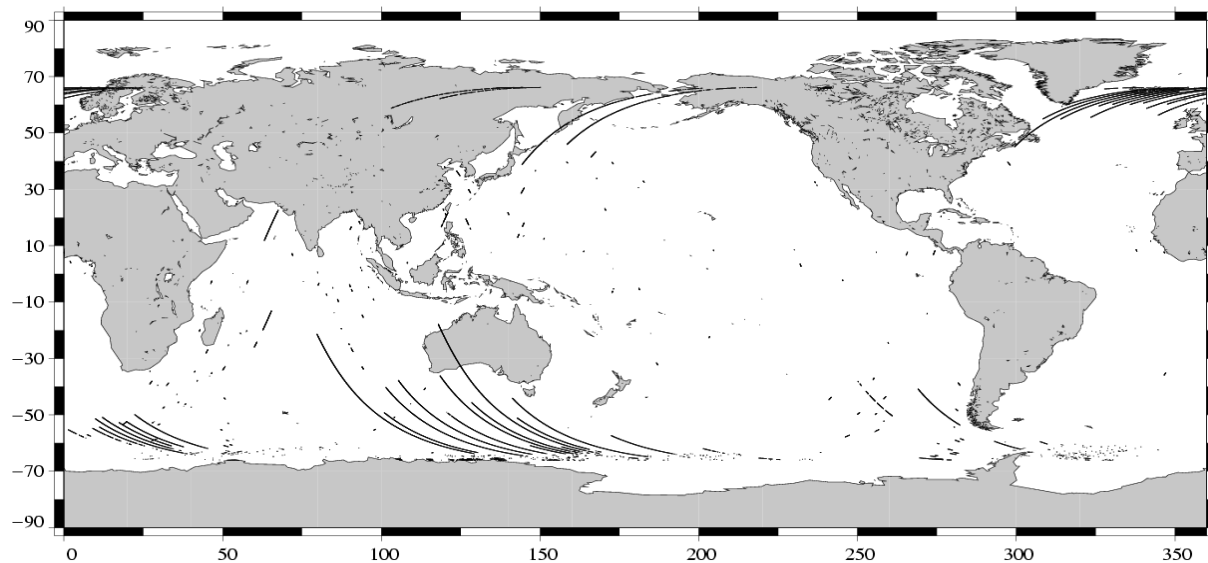
2.2 Warnings and recommendations

- Missing measurements :
 - There is a lot of data gaps due to tape recorder anomalies, especially in the Indian Ocean, in the South Pacific Ocean close to the South and Central America coasts and below the Groenland coasts.
- Measurements edited on waveform attitude parameter :
 - 20.52% of the measurements are removed by the waveform attitude parameter. This is due to the pitch wheel event linked to the T/P safehold mode from cycle 430 to 432 (see electronic communication : T/P Daily Status (26/07/2004)).
- 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 :

 - 2.35% of the measurements are removed by the TMR correction criterion (see the following figure).
 - Some measurements have radiometer earth flag set to valid over earth. A new criterion has been added to the editing procedure to remove all these measurements (see [Editing](#)) .

Edited parameter : Radiometer wet tropospheric correction
T/P Cycle 434 (25/06/2004 / 05/07/2004)



3 CALVAL main results

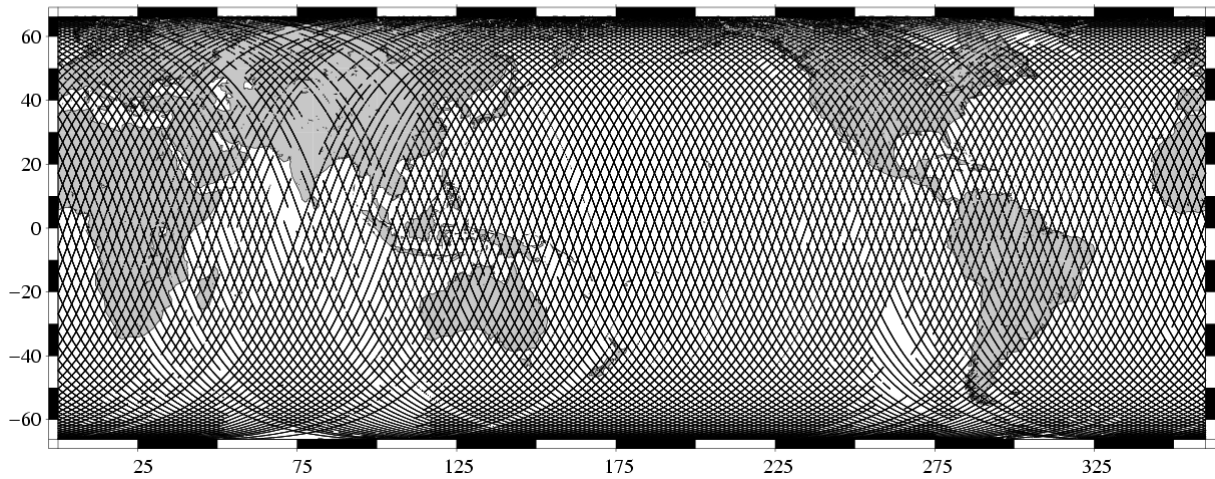
This section presents results that illustrate data quality during this cycle. These verification products are produced operationally so that they allow systematic monitoring of the main relevant parameters.

3.1 Missing measurements

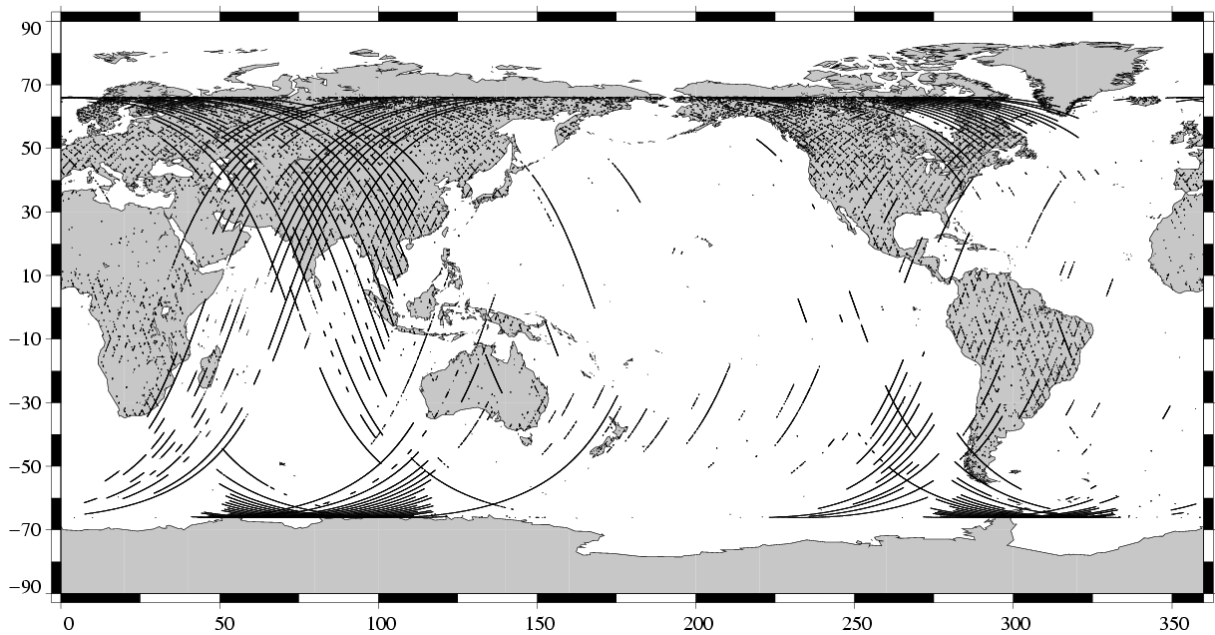
680015 altimeter measurements are present, and 114550 are missing.

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 434 (25/06/2004 / 05/07/2004)



Missing measurements
TOPEX/Poseidon Cycle 434 (25/06/2004 / 05/07/2004)



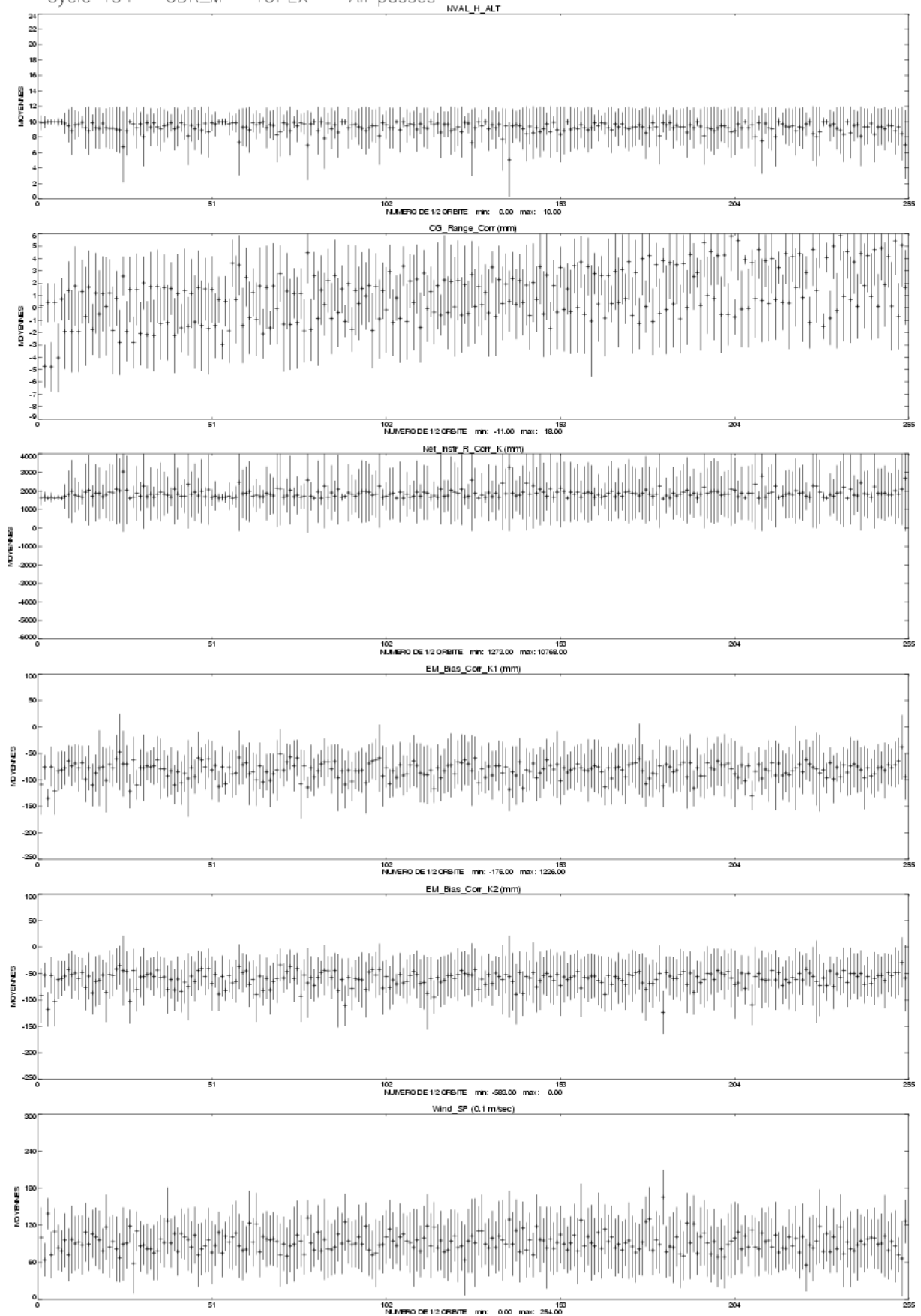
3.2 M-GDR quality flags

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

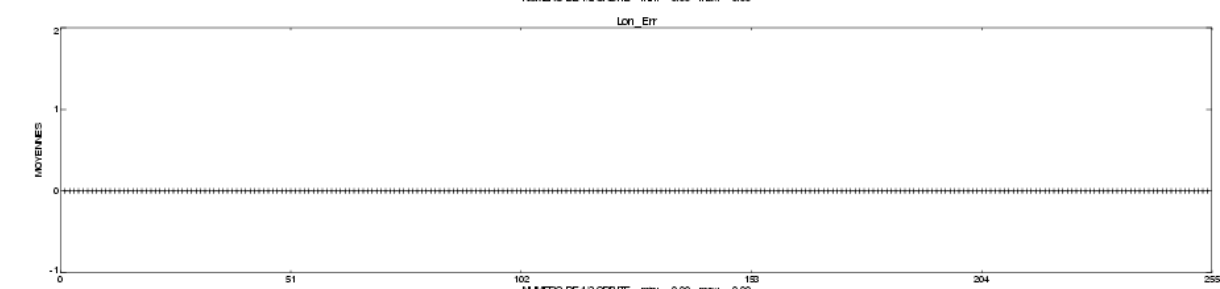
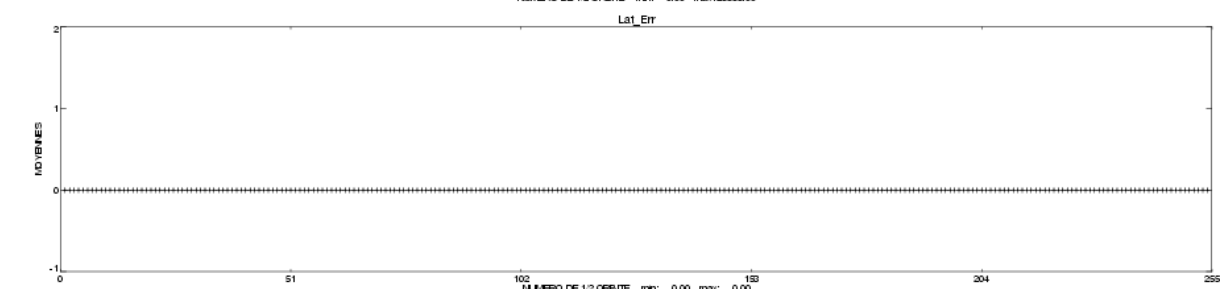
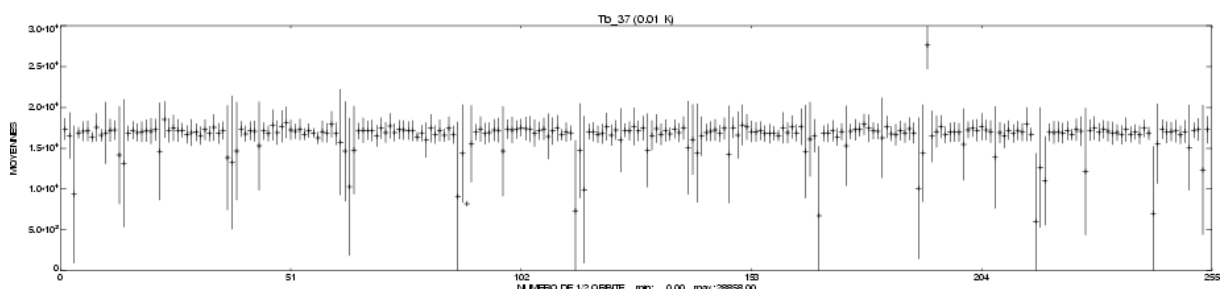
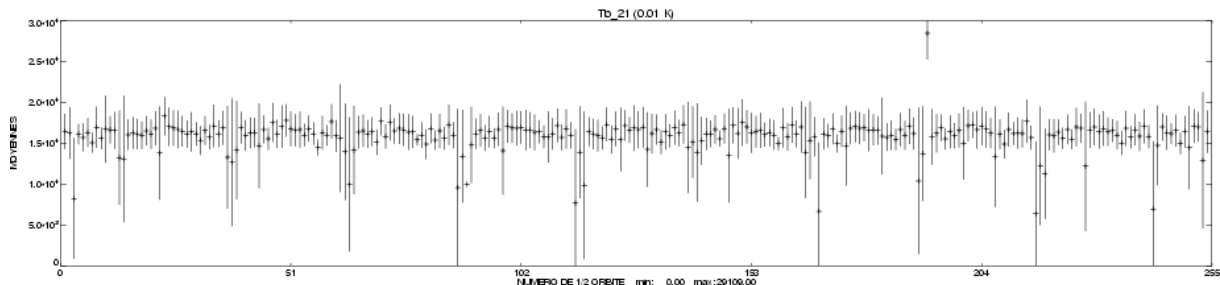
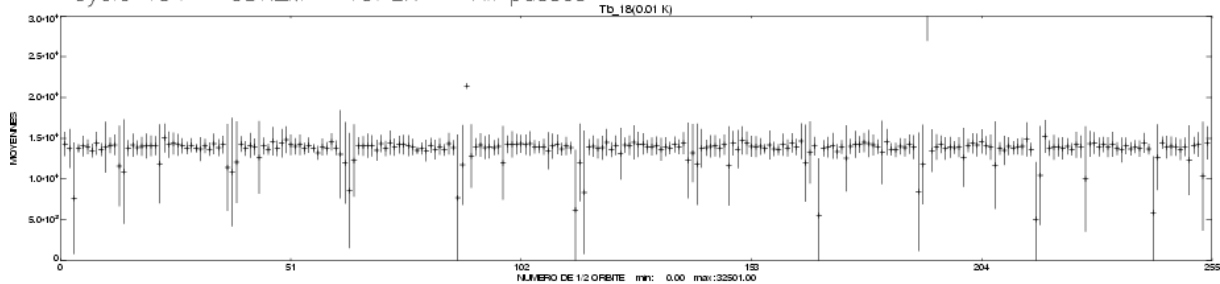
| Name | Description | % bad |
|-----------|---|-------|
| Geo_Bad_1 | altimeter land flag | 24.85 |
| Geo_Bad_1 | ice flag | 7.16 |
| Geo_Bad_1 | radiometer land flag | 26.89 |
| Alt_Bad_1 | conditions 1 altimeter | 23.73 |
| Alt_Bad_2 | conditions 2 altimeter | 18.22 |
| Geo_Bad_2 | rain (liquid water in excess) | 7.34 |
| Geo_Bad_2 | less than 4 points for CSR3.0 tide calculation | 0.39 |
| Geo_Bad_2 | less than 4 points for FES95.2.1 tide calculation | 2.79 |
| TOPEX | TOPEX not valid | 0.00 |
| TMR | TMR not valid | 0.00 |
| TMR_Bad | Brightness temperatures not valid | 5.37 |
| DORIS | DORIS not valid | 0.00 |

3.3 M-GDR parameter plots

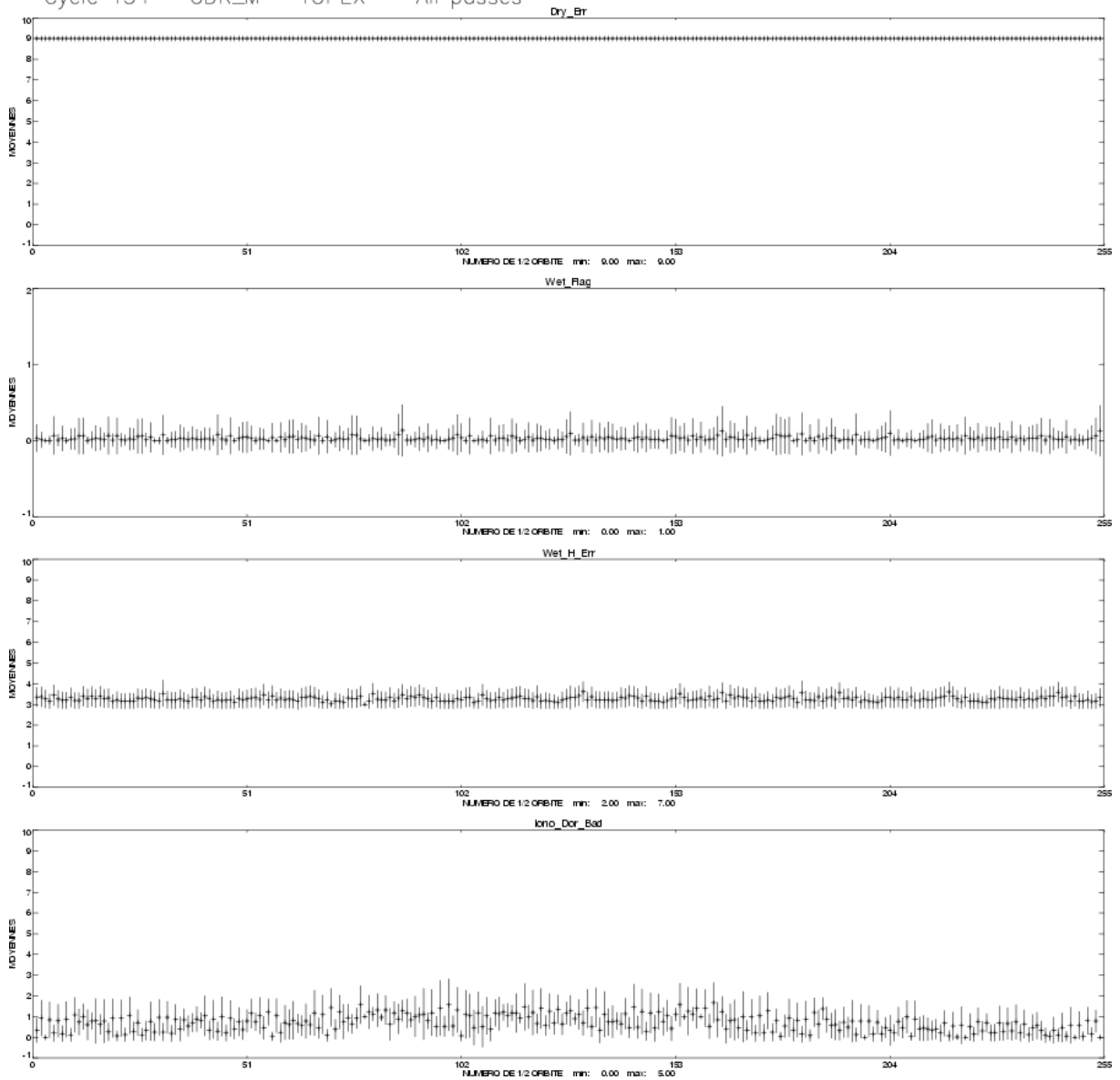
Cycle 434 – GDR_M – TOPEX – All passes –



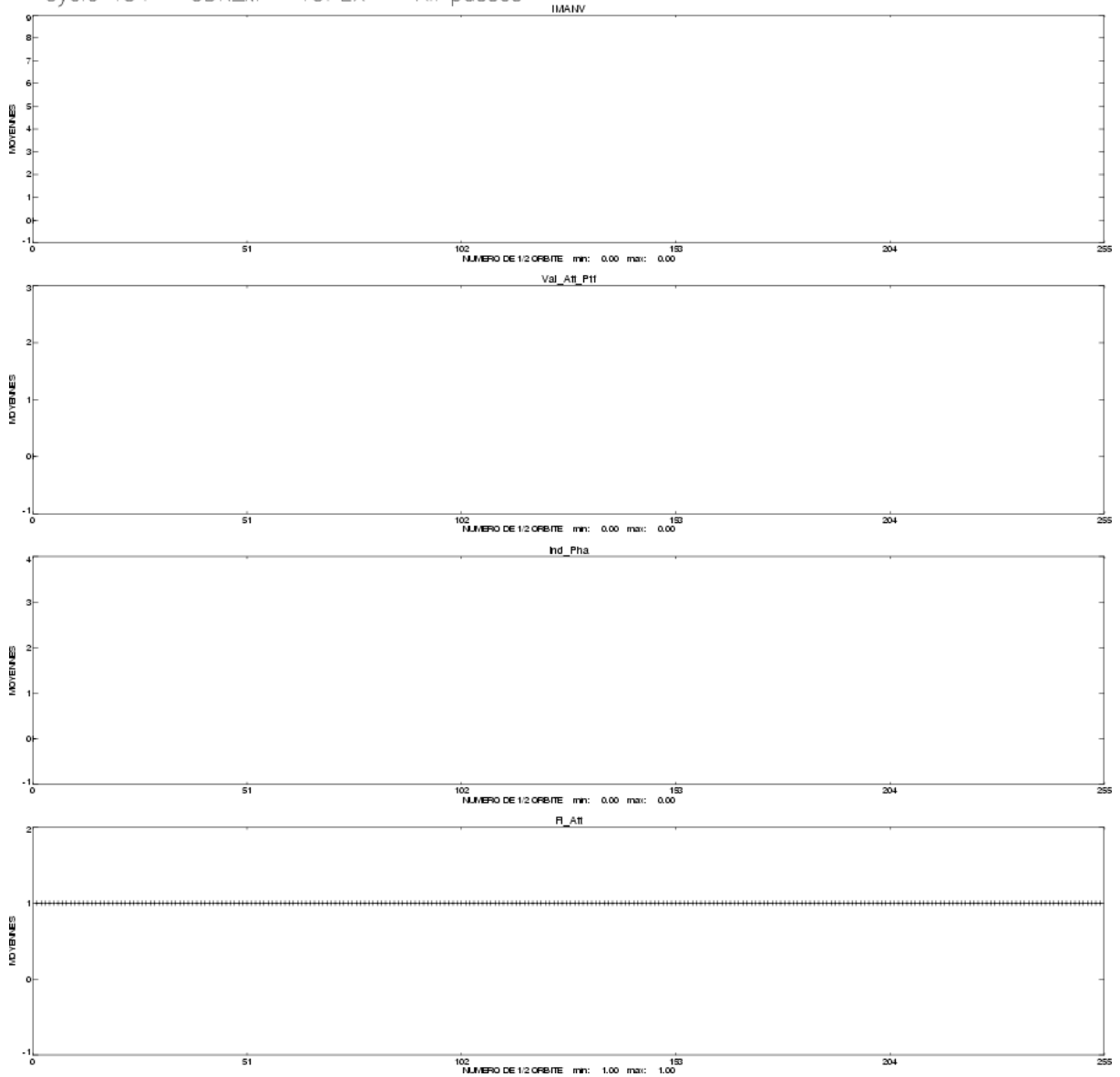
Cycle 434 – GDR_M – TOPEX – All passes –

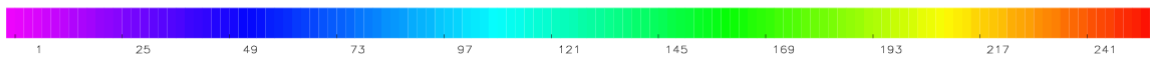
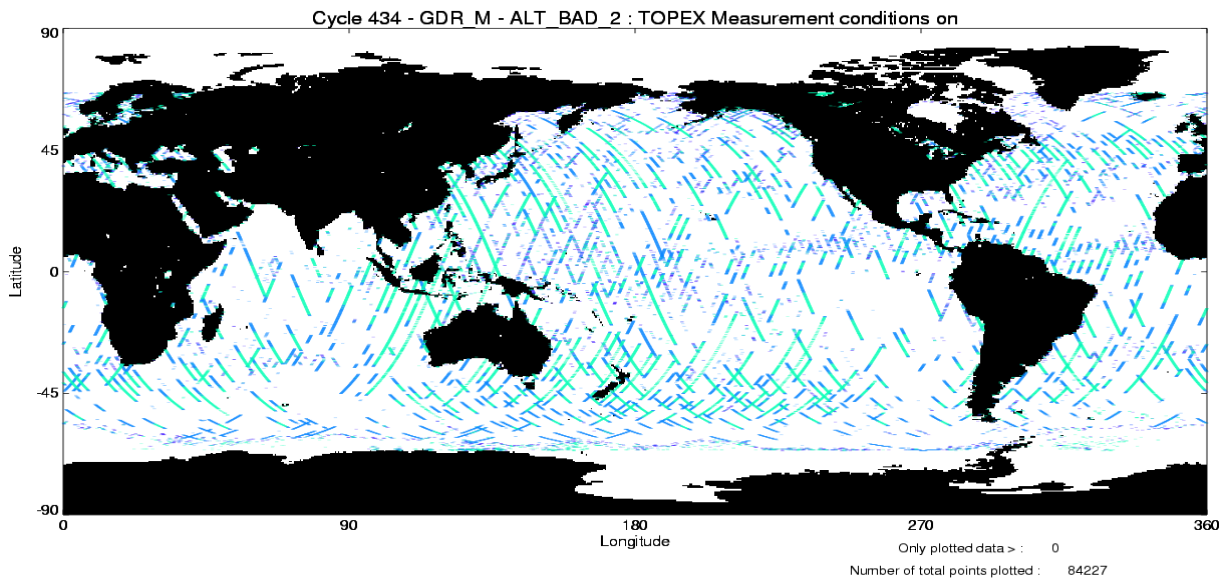
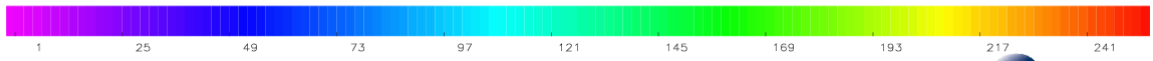
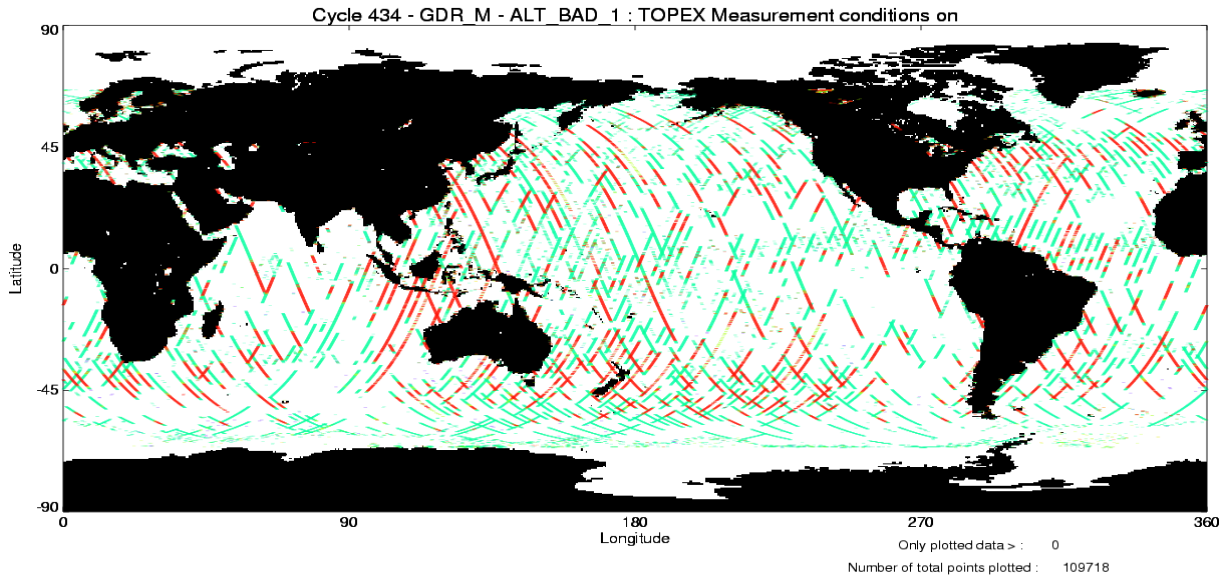


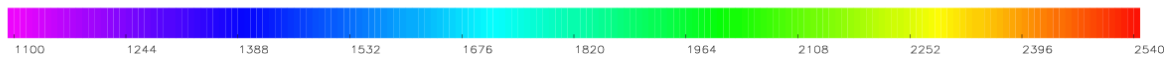
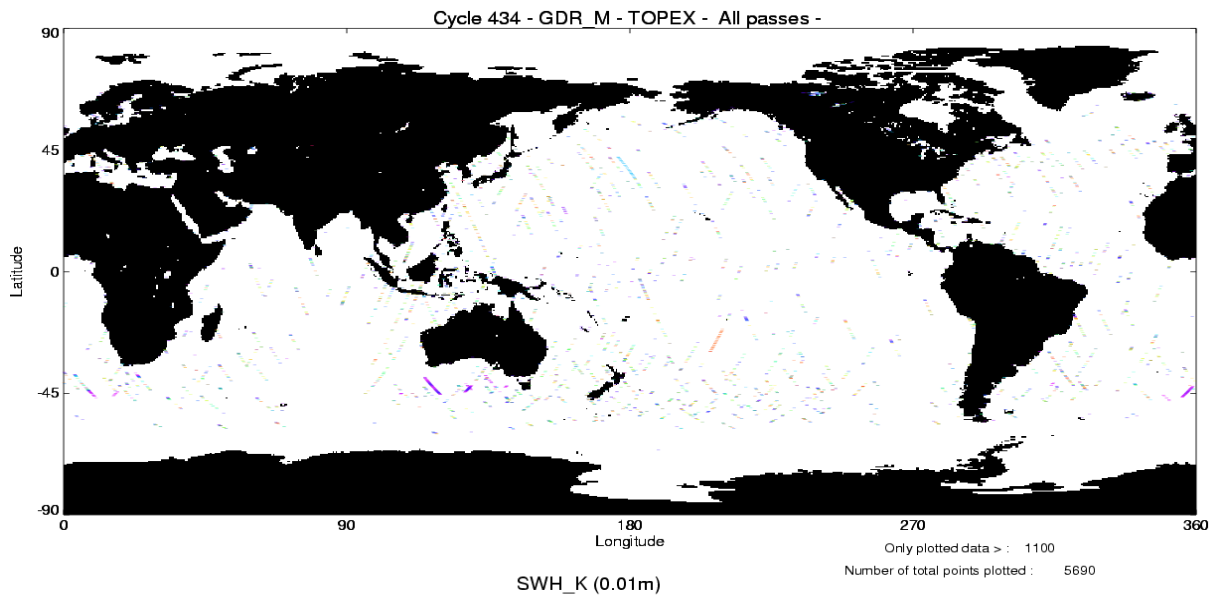
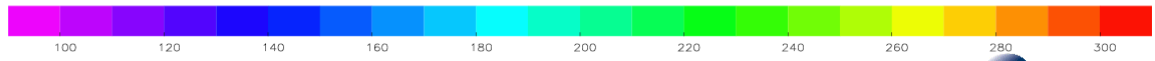
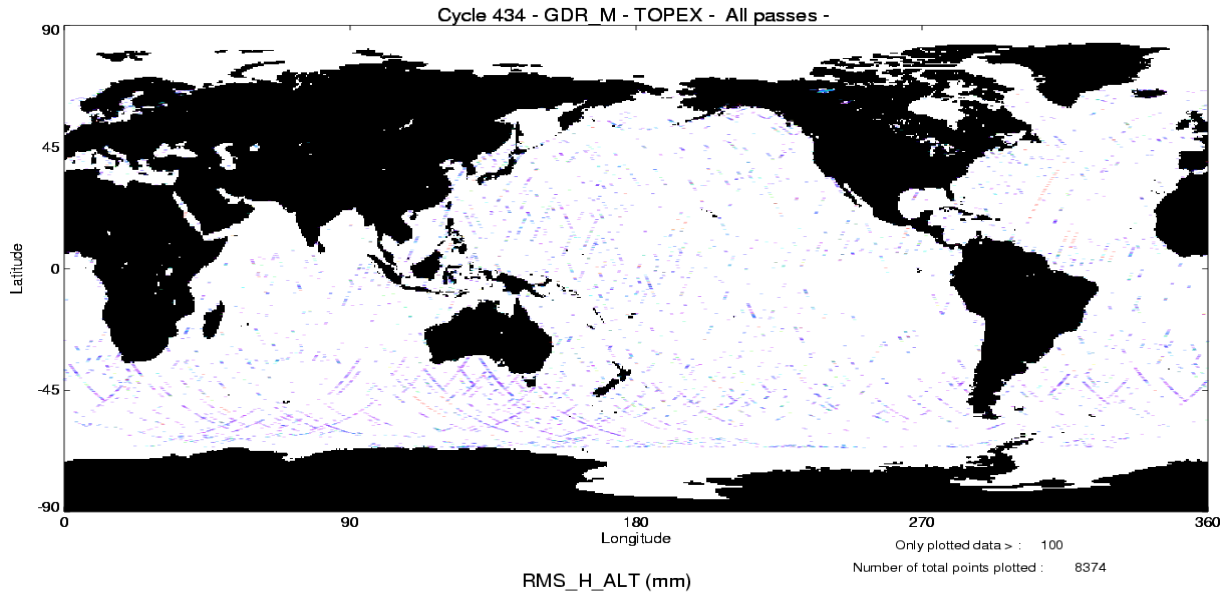
Cycle 434 – GDR_M – TOPEX – All passes –

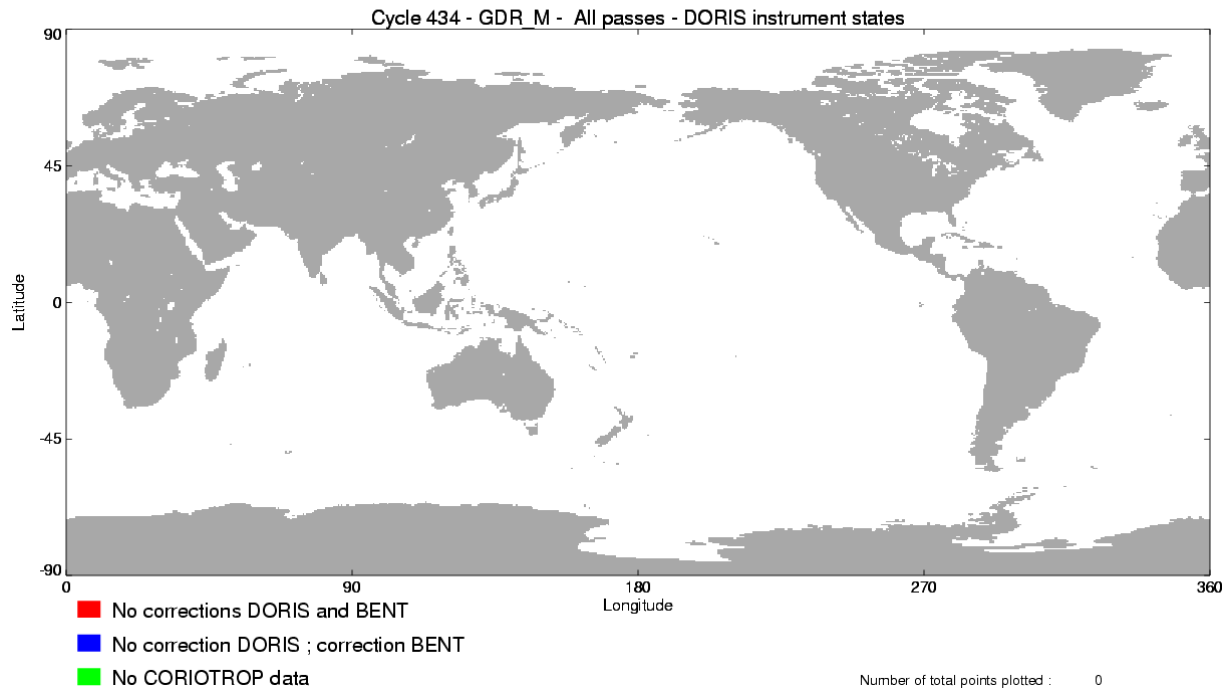


Cycle 434 – GDR_M – TOPEX – All passes –









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 measurements where the absolute value of the difference between the TMR correction and the ECMWF model wet tropospheric correction is greater than 20 cm.

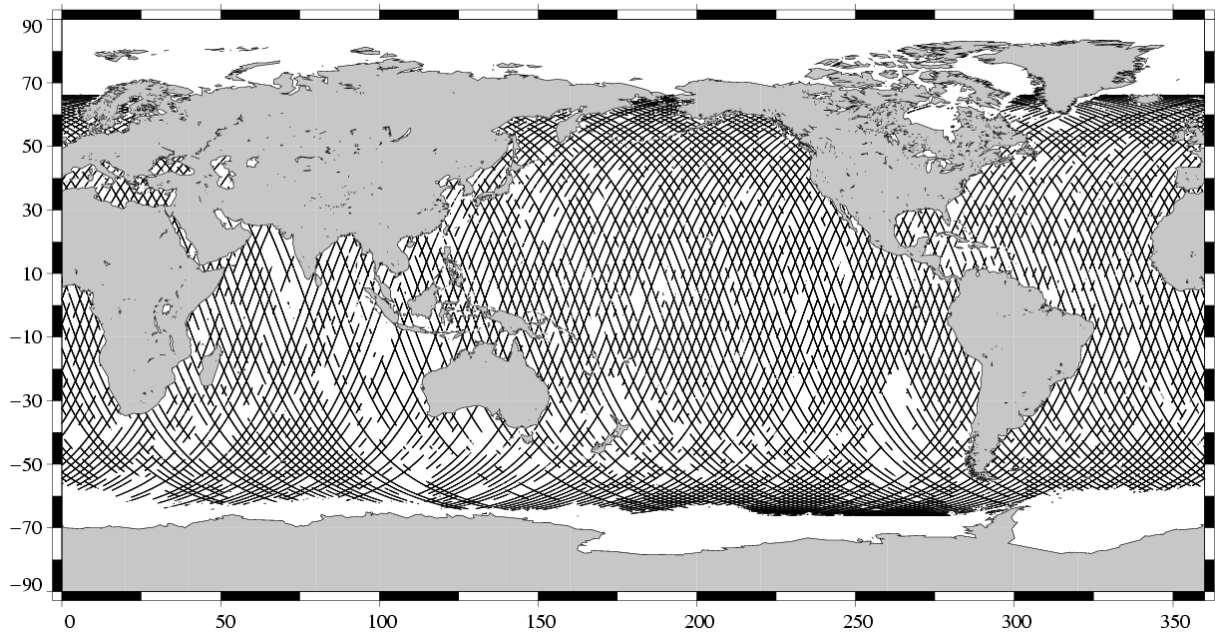
Probably due to the interpolation problem with the TMR, some measurements have radiometer land flag unset over land. This has no impact on the valid data because these measurements have been edited by the altimetric parameter criteria. Nevertheless, this anomaly leads to wrong statistics of the edited measurements. Therefore a new criterion has been added in the editing procedure to remove all the measurements for which the radiometer land flag is set to ocean and the altimeter land flag is set to land.

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 (26.89 % of points removed) and ice flag (7.16 % of points removed).

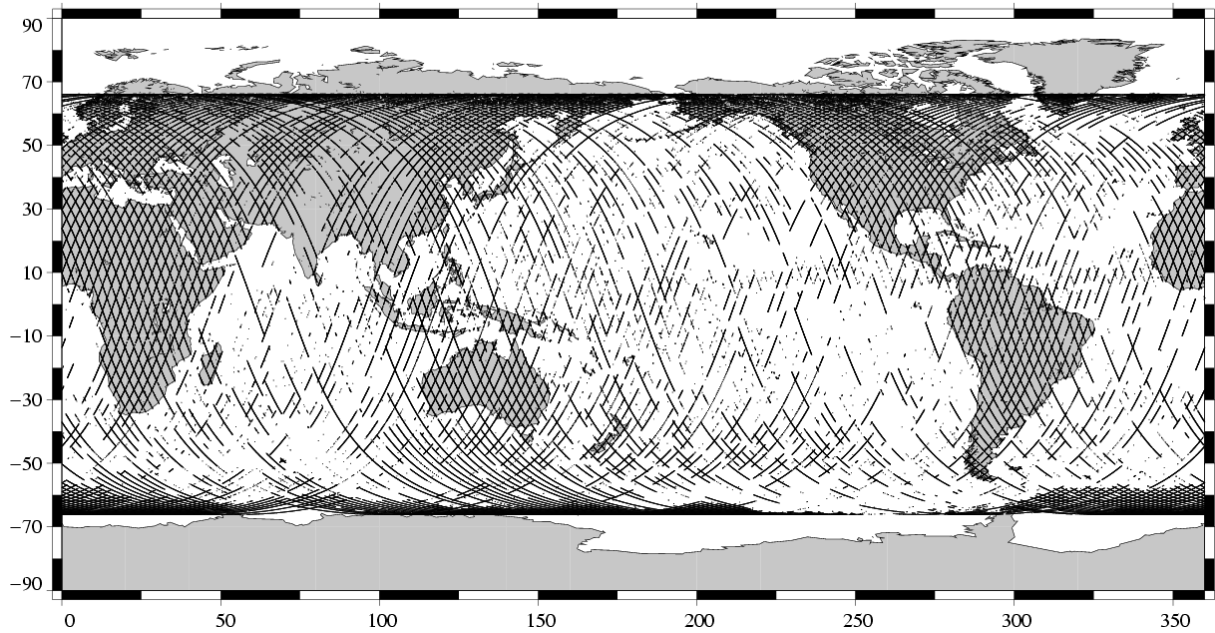
| Parameters | Min Thres. | Max Thres. | Unit | Mean % removed in 1997 | % removed |
|--|------------|------------|------|------------------------|-----------|
| Sea surface height | -130.000 | 100.000 | m | 1.37 | 3.06 |
| Number of 20/10Hz valid points Poseidon/TOPEX | 5.000 | - | | 1.37 | 6.95 |
| Std. deviation of range | 0.000 | 0.100 | m | 1.85 | 8.21 |
| Off nadir angle from waveform | 0.000 | 0.400 | deg | 1.36 | 20.52 |
| 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 | 3.70 |
| Ionospheric correction (Poseidon:Doris, TOPEX: Dual) | -0.400 | 0.040 | m | 0.00 | 6.77 |
| Significant wave height | 0.000 | 11.000 | m | 1.46 | 1.64 |
| Sea state Bias | -0.500 | 0.000 | m | 1.39 | 12.08 |
| Backscatter coefficient | 7.000 | 30.000 | dB | 1.44 | 13.55 |
| 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 |
| TMR and ECMWF tropospheric differences | -0.200 | 0.200 | m | NaN | 0.28 |
| 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.

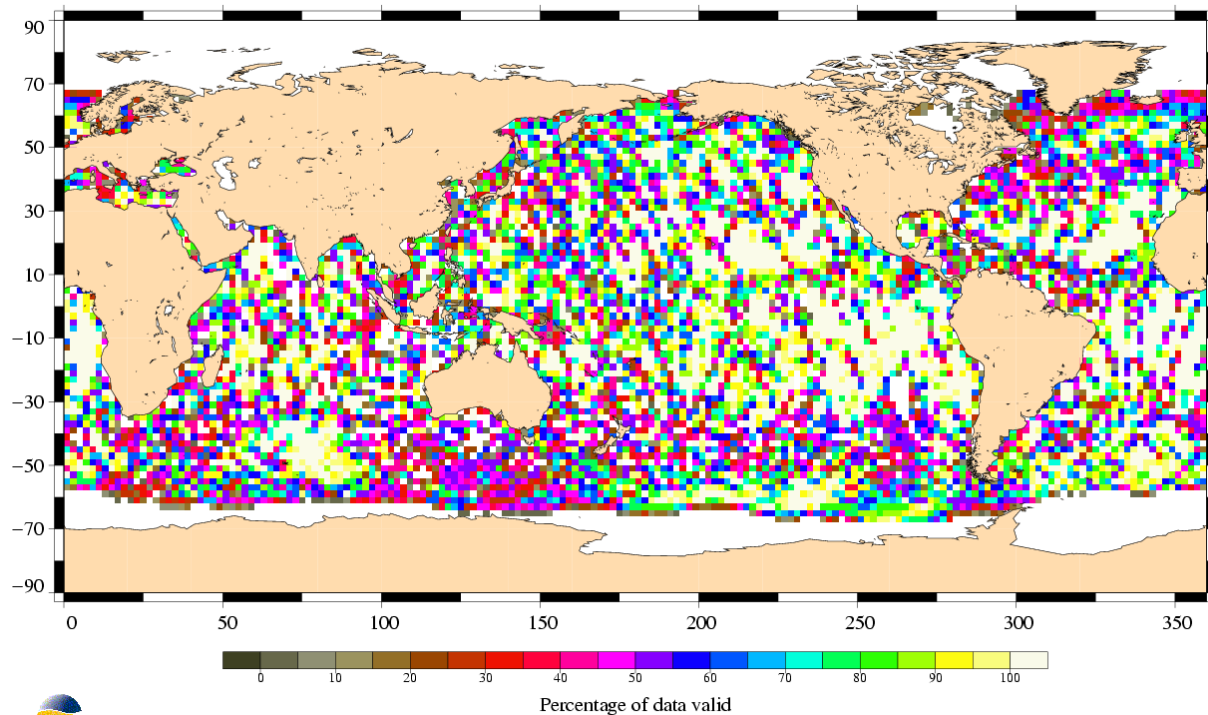
Valid data
TOPEX/Poseidon Cycle 434 (25/06/2004 / 05/07/2004)



Edited measurements
TOPEX Cycle 434 (25/06/2004 / 05/07/2004)

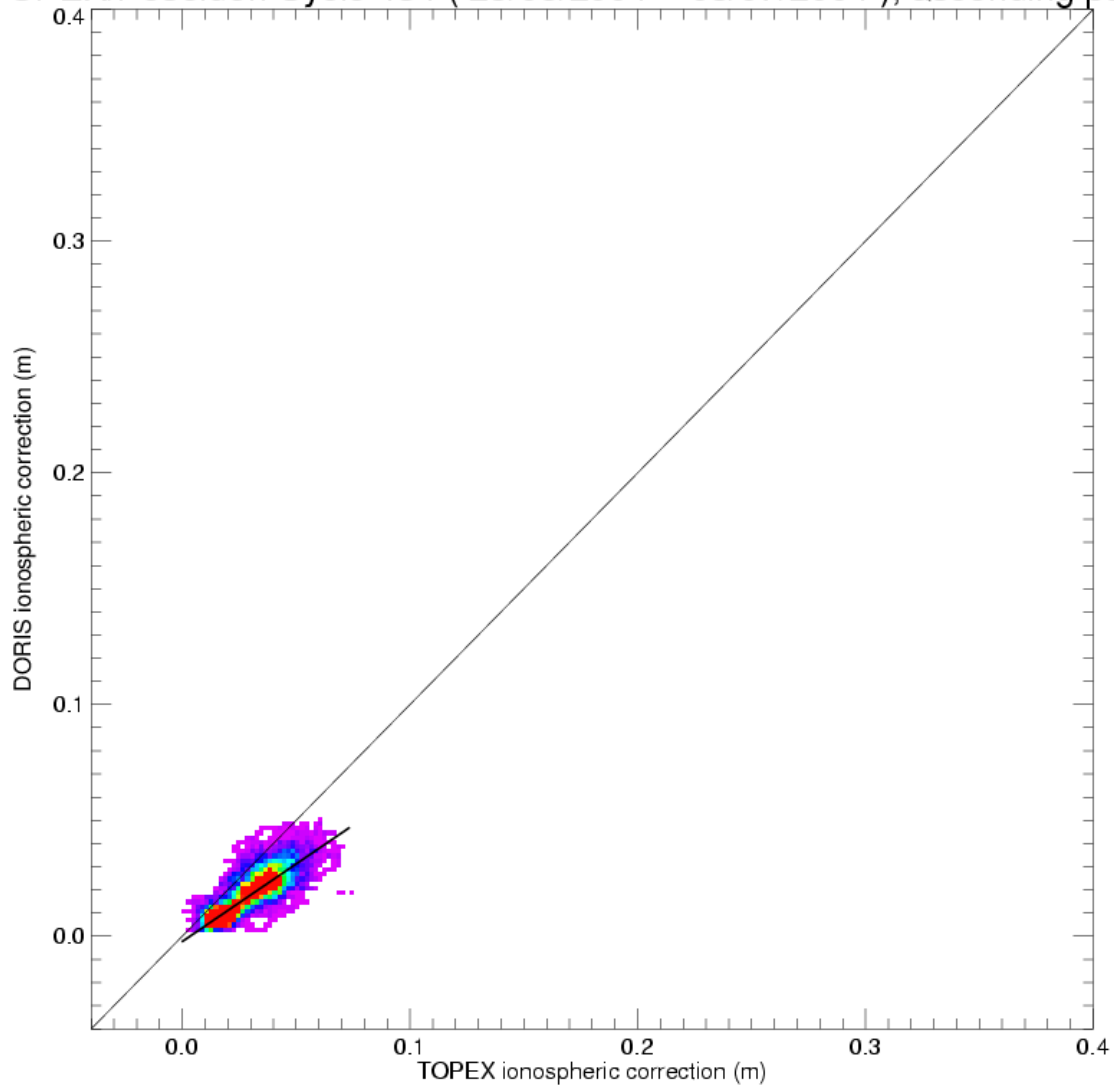


Percentage of valid data relative to the nominal pass
TOPEX/Poseidon Cycle 434 (25/06/2004 / 05/07/2004)

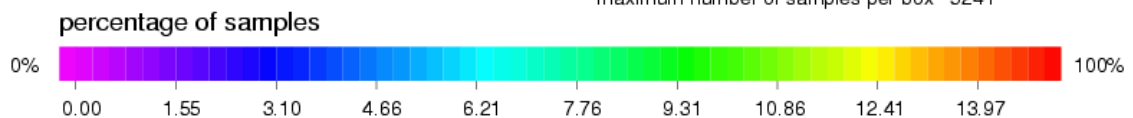


3.5 Ionospheric correction

TOPEX/Poseidon Cycle 434 (25/06/2004 – 05/07/2004), ascending passes



minimum number of samples per box 1
maximum number of samples per box 5241



Statistics Y-X

mean = -0.01094
rms = 0.01250
std = 0.00604

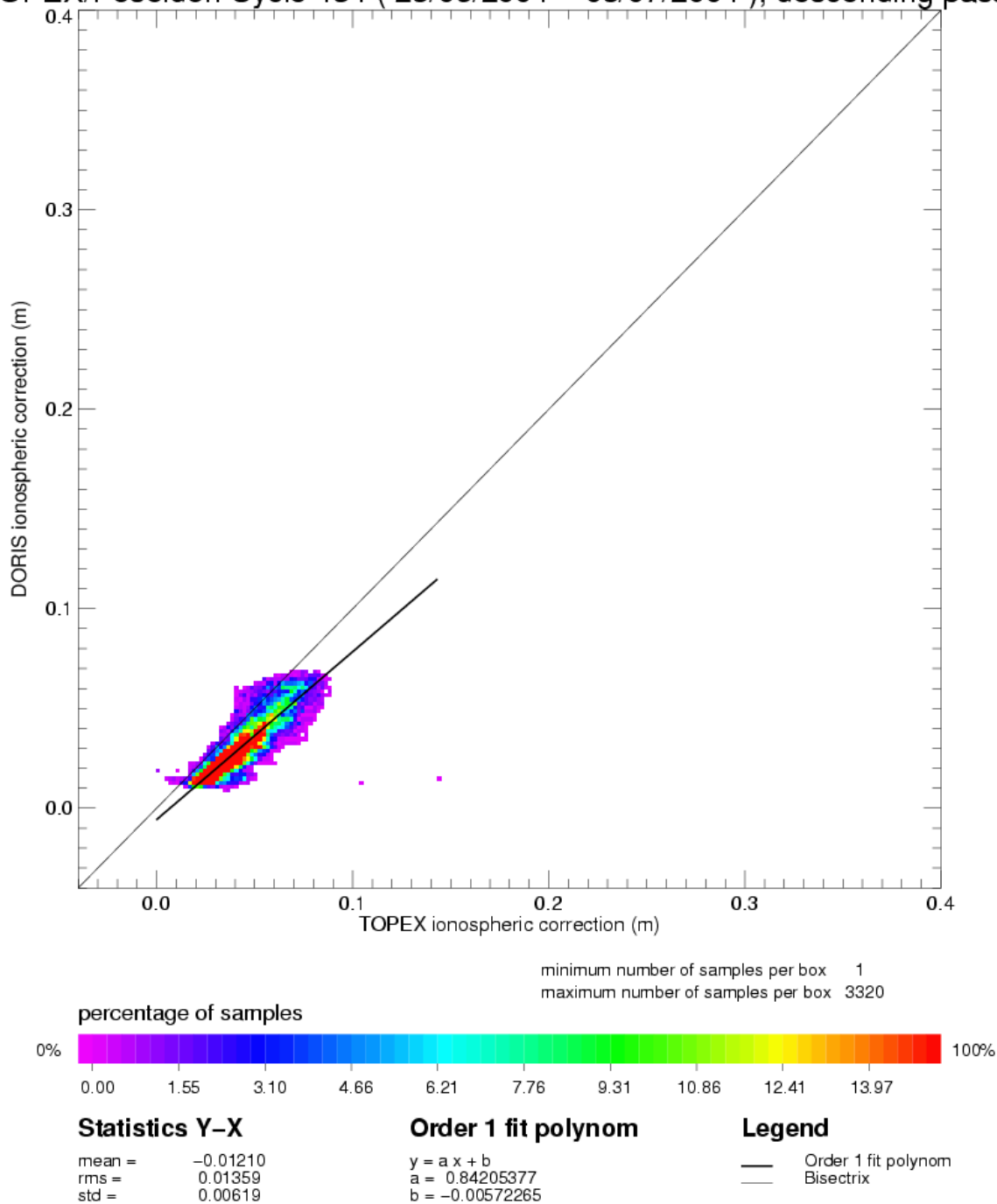
Order 1 fit polynomial

$y = a x + b$
a = 0.66948450
b = -0.00228658

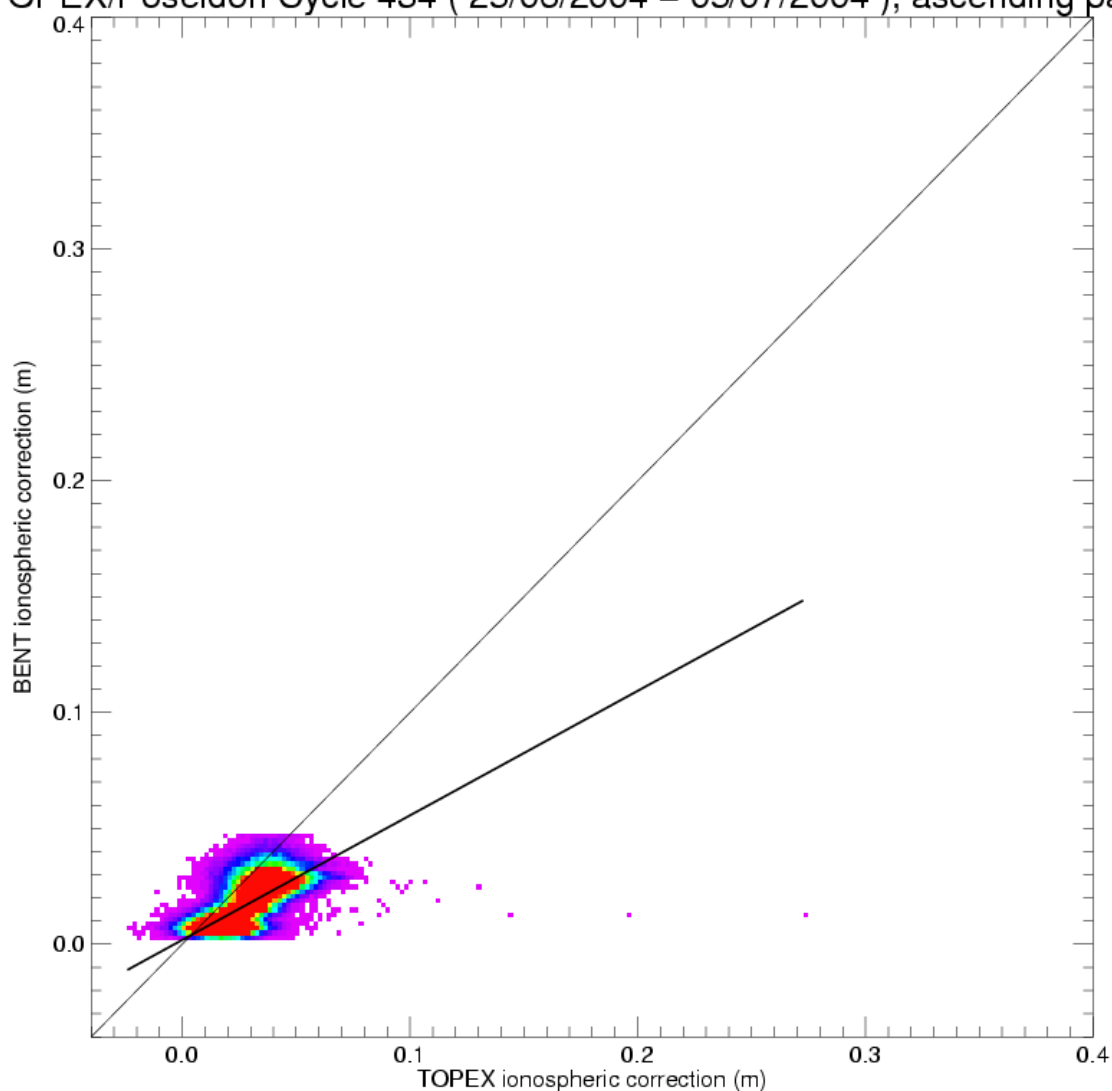
Legend

— Order 1 fit polynomial
— Bisectrix

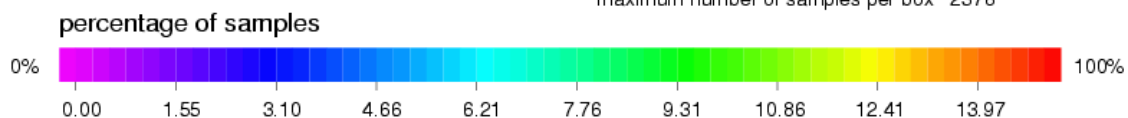
TOPEX/Poseidon Cycle 434 (25/06/2004 – 05/07/2004), descending passes



TOPEX/Poseidon Cycle 434 (25/06/2004 – 05/07/2004), ascending passes



minimum number of samples per box 1
 maximum number of samples per box 2378



Statistics Y-X

mean = -0.01047
 rms = 0.01391
 std = 0.00916

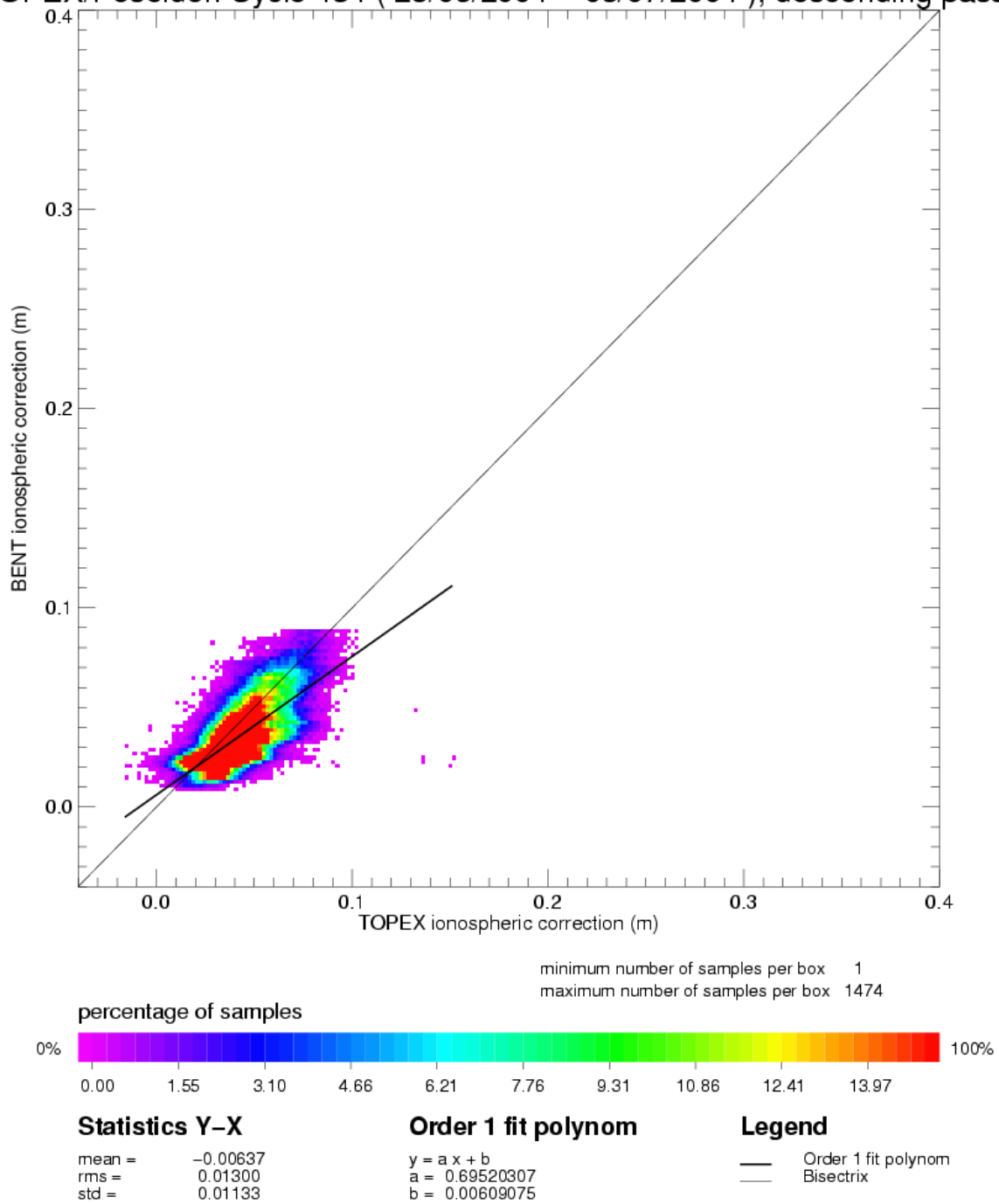
Order 1 fit polynom

$y = a x + b$
 $a = 0.53745043$
 $b = 0.00185858$

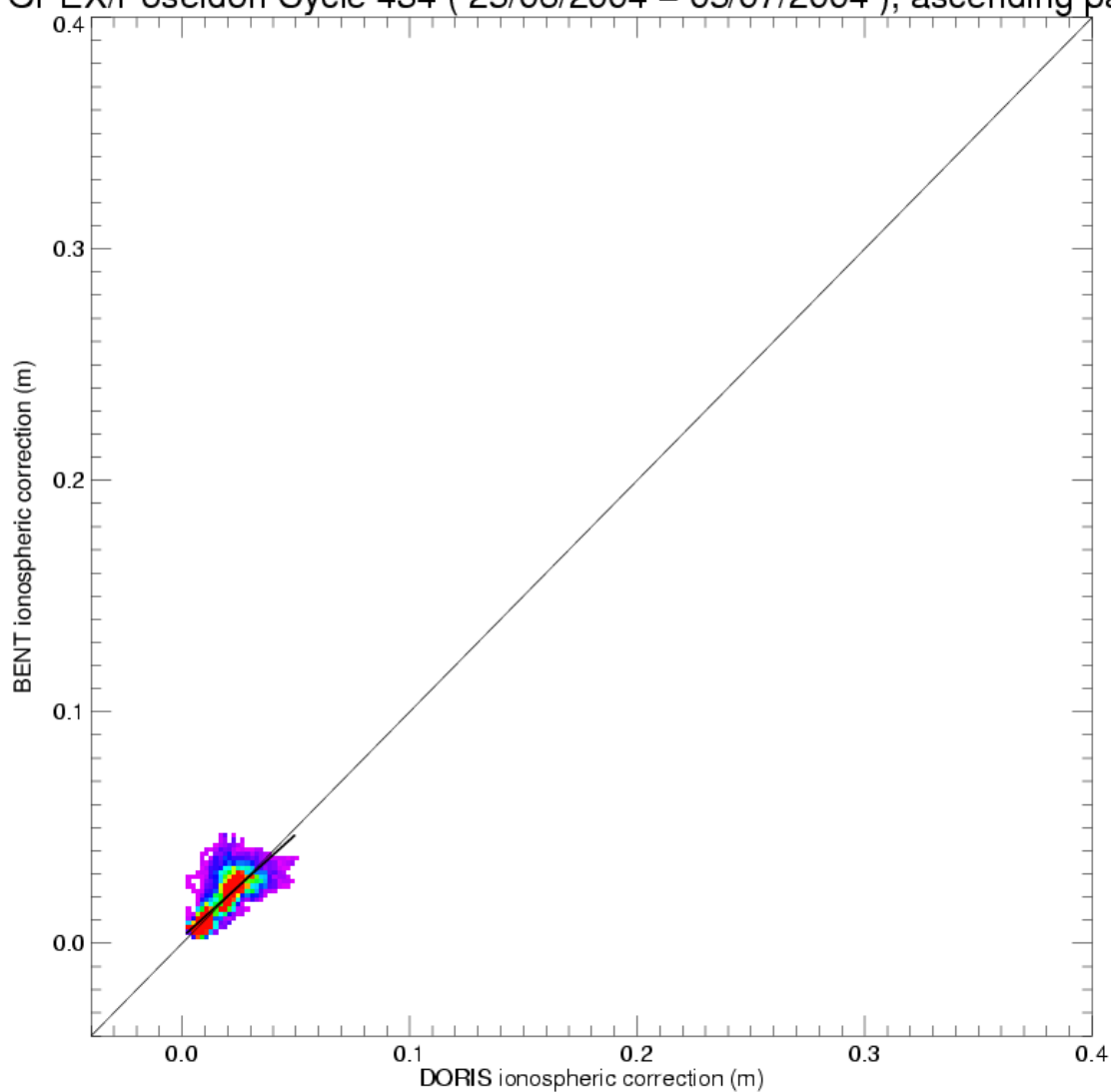
Legend

— Order 1 fit polynom
 — Bisectrix

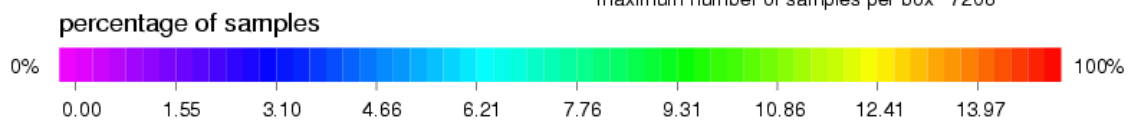
TOPEX/Poseidon Cycle 434 (25/06/2004 – 05/07/2004), descending passes



TOPEX/Poseidon Cycle 434 (25/06/2004 – 05/07/2004), ascending passes



minimum number of samples per box 1
 maximum number of samples per box 7208



Statistics Y-X

mean = 0.00095
 rms = 0.00591
 std = 0.00584

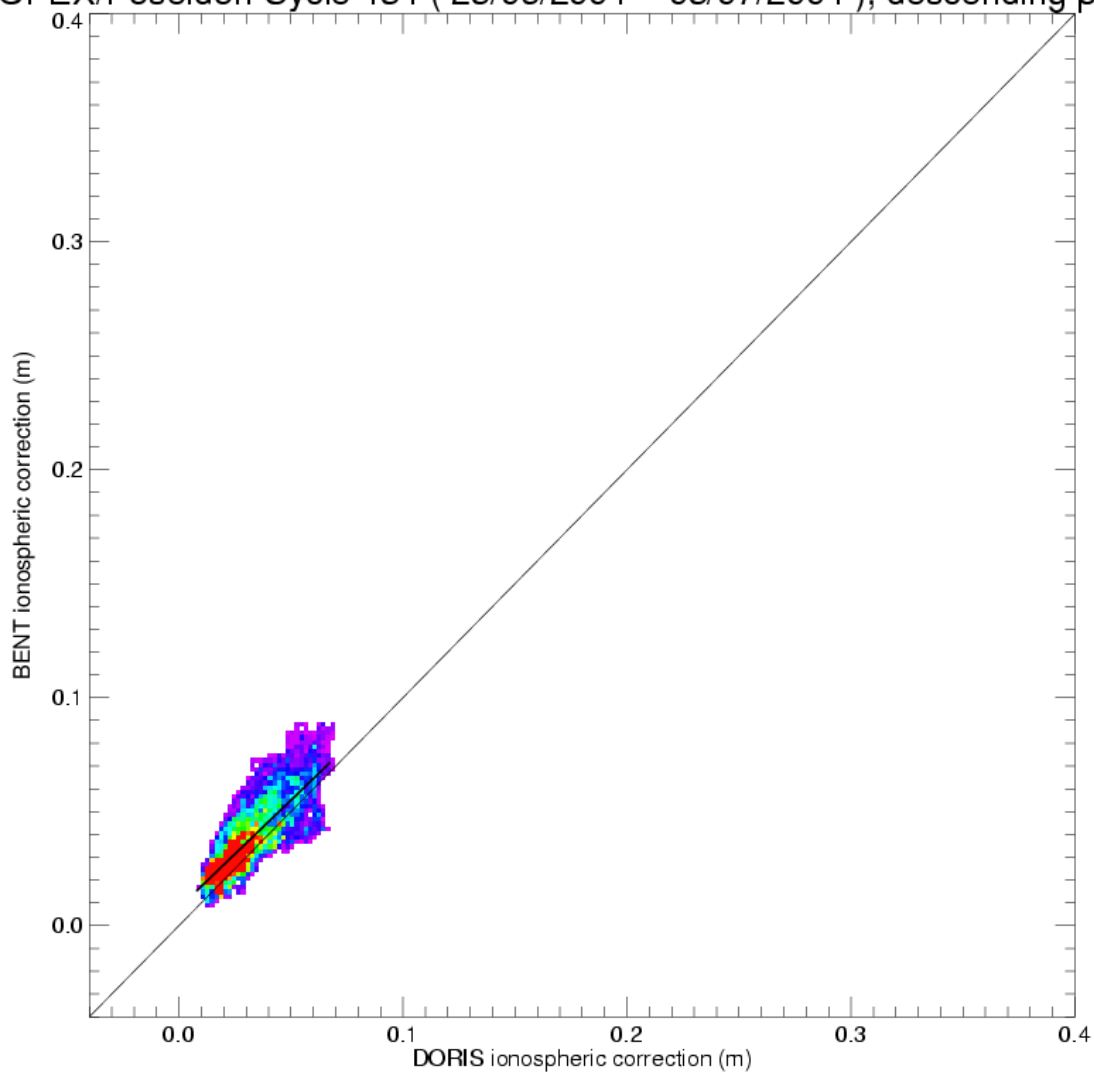
Order 1 fit polynom

$y = a x + b$
 $a = 0.88986194$
 $b = 0.00262555$

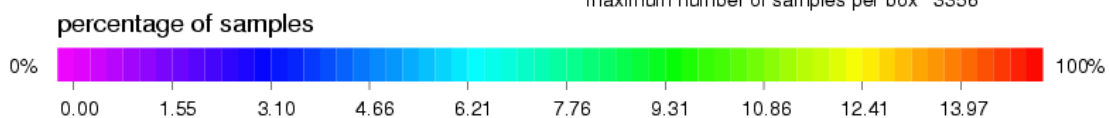
Legend

— Order 1 fit polynom
 — Bisectrix

TOPEX/Poseidon Cycle 434 (25/06/2004 – 05/07/2004), descending passes



minimum number of samples per box 1
 maximum number of samples per box 3356



Statistics Y-X

mean = 0.00623
 rms = 0.01024
 std = 0.00813

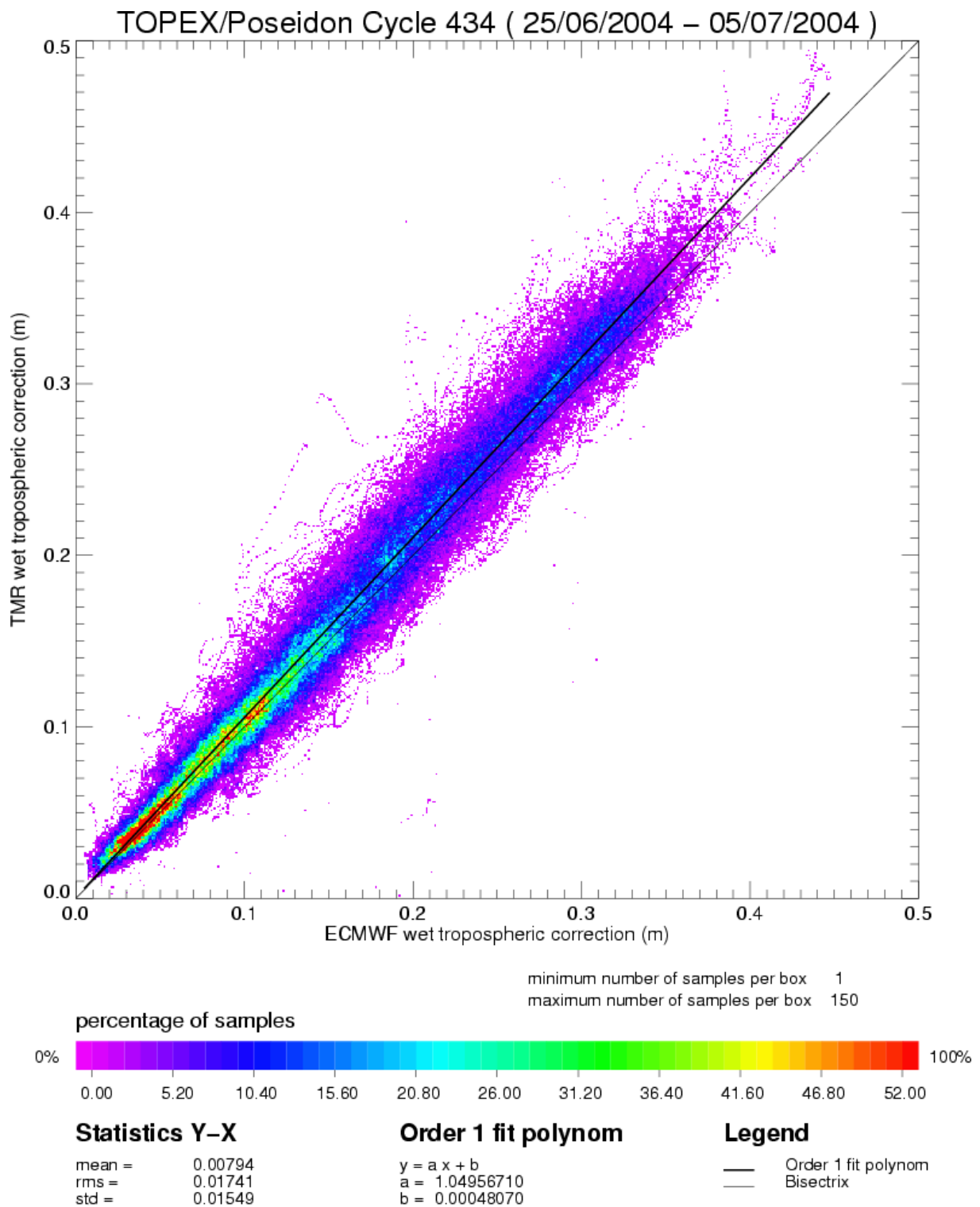
Order 1 fit polynom

$y = a x + b$
 $a = 0.94454950$
 $b = 0.00779583$

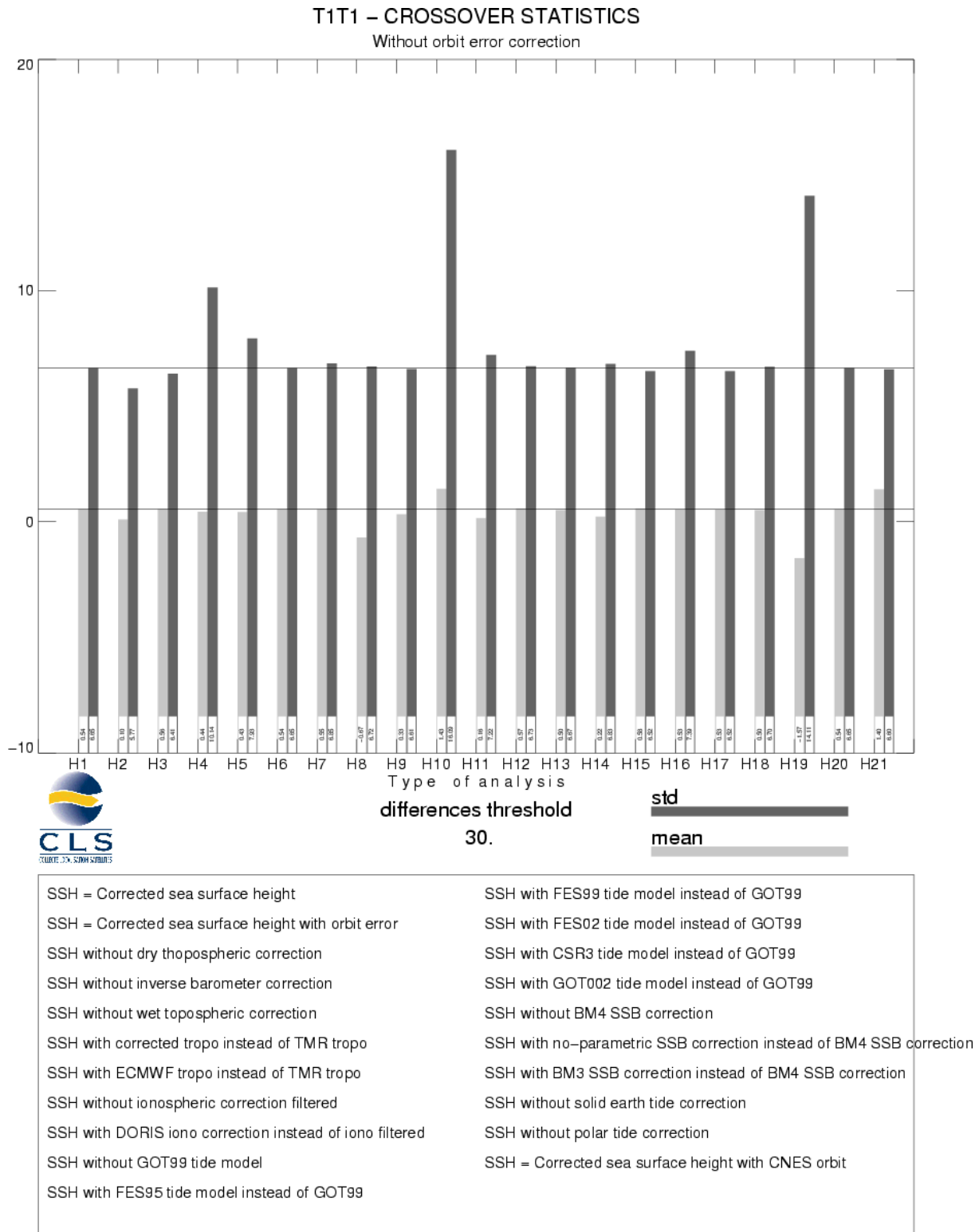
Legend

— Order 1 fit polynom
 — Bisectrix

3.6 Wet tropospheric corection



3.7 Crossover statistics



T1T1 – CROSSOVER STATISTICS

Without orbit error correction

SSH = Corrected sea surface height

RAPPEL DES SELECTIONS

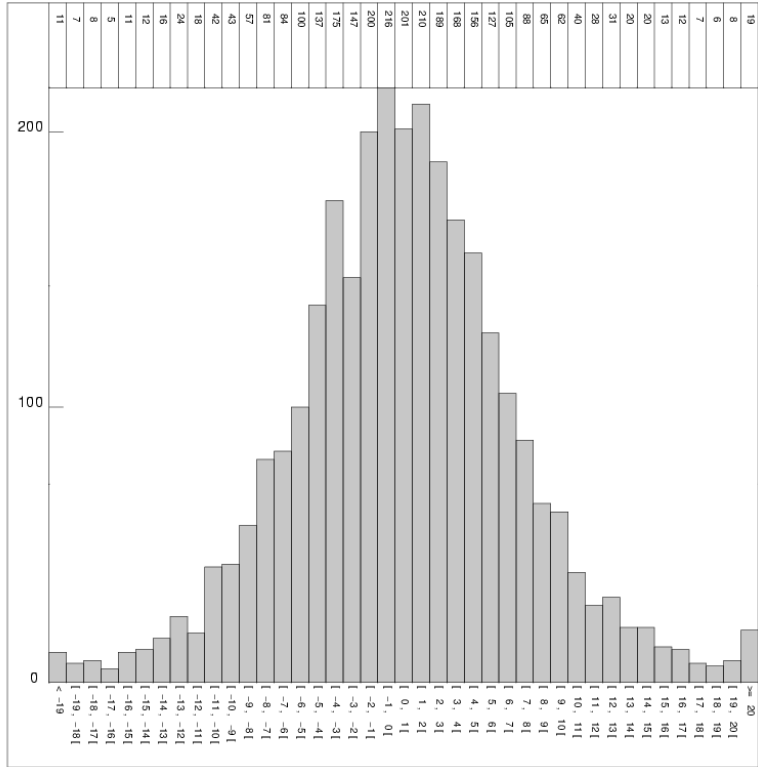
Type de points de croisement: T1T1
 Zone géographique (deg): -90 / 90 , 0 / 360
 Seuil sur les écarts d'analyse 0.00 (moy) / 30.00 (seuil)
 Selection(s) sur les champs :
 CL Arc 1 :=INTERP_SPLN
 CL Arc 2 :=INTERP_SPLN
 Seuil Min +: 0.0000000
 Seuil Max : 0.0000000

Selection(s) sur les écarts :
 Aucune

RESULTATS STATISTIQUES

Valeur minimale : -27.5300
 Valeur maximale : 29.6700
 Différence Max – Min: 57.2000
 Nombre de points lus: 3094
 Nombre de points sélectionnés: 2969
 Moyenne : 0.541307
 Écart-type : 6.64647
 Moyenne Quadratique : 6.66848

CLS Space Oceanography Division



T1T1 – CROSSOVER STATISTICS

With orbit error correction

SSH = Corrected sea surface height

RAPPEL DES SELECTIONS

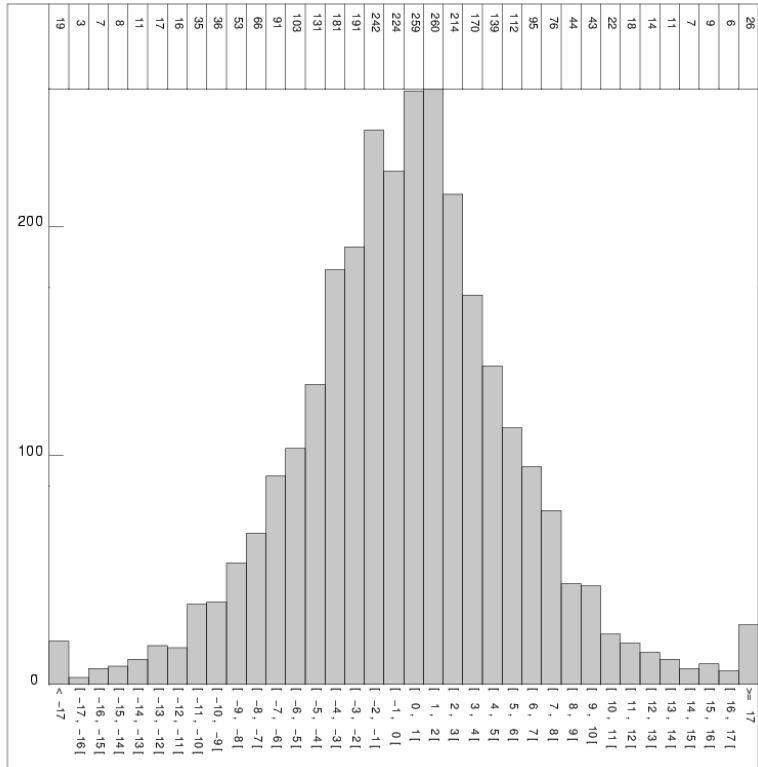
Type de points de croisement: T1T1
 Zone géographique (deg): -90 / 90 , 0 / 360
 Seuil sur les écarts d'analyse 0.00 (moy) / 30.00 (seuil)
 Selection(s) sur les champs :
 CL Arc 1 :=INTERP_SPLN
 CL Arc 2 :=INTERP_SPLN
 Seuil Min +: 0.0000000
 Seuil Max : 0.0000000

Selection(s) sur les écarts :
 Aucune

RESULTATS STATISTIQUES

Valeur minimale : -28.9900
 Valeur maximale : 27.8300
 Différence Max – Min: 56.8200
 Nombre de points lus: 3094
 Nombre de points sélectionnés: 2959
 Moyenne : 0.0972860
 Écart-type : 5.76743
 Moyenne Quadratique : 5.76825

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T1T1 – CROSSOVER STATISTICS
SSH, BATHY < -1000 m, VAR_OCE < 20 cm, LAT [-50°, +50]
SSH = Corrected sea surface height before orbit error

RAPPEL DES SELECTIONS

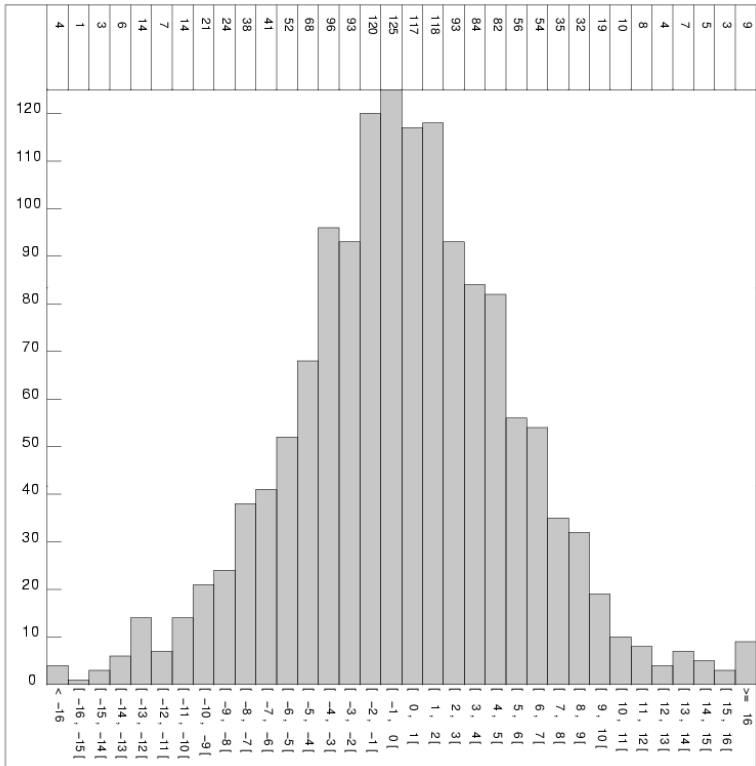
Type de points de croisement: T1T1
 Zone géographique (deg): -50 / 50 , 0 / 360
 Seuil sur les écarts d'analyse : aucun
 Selection(s) sur les champs :
 CL Arc 1 :=BATHY
 CL Arc 2 :=BATHY
 Seuil Min : aucun
 Seuil Max : -100000.00
 CL Arc 1 :=VAR_OCE
 CL Arc 2 :=VAR_OCE
 Seuil Min : aucun
 Seuil Max : 20.000000
 [...]

 Selection(s) sur les écarts :
 Aucune

RESULTATS STATISTIQUES

Valeur minimale : -33.7000
 Valeur maximale : 27.2700
 Différence Max – Min: 60.9700
 Nombre de points lus: 1566
 Nombre de points sélectionnés: 1463
 Moyenne : 0.105400
 Écart-type : 5.51090
 Moyenne Quadratique : 5.51191

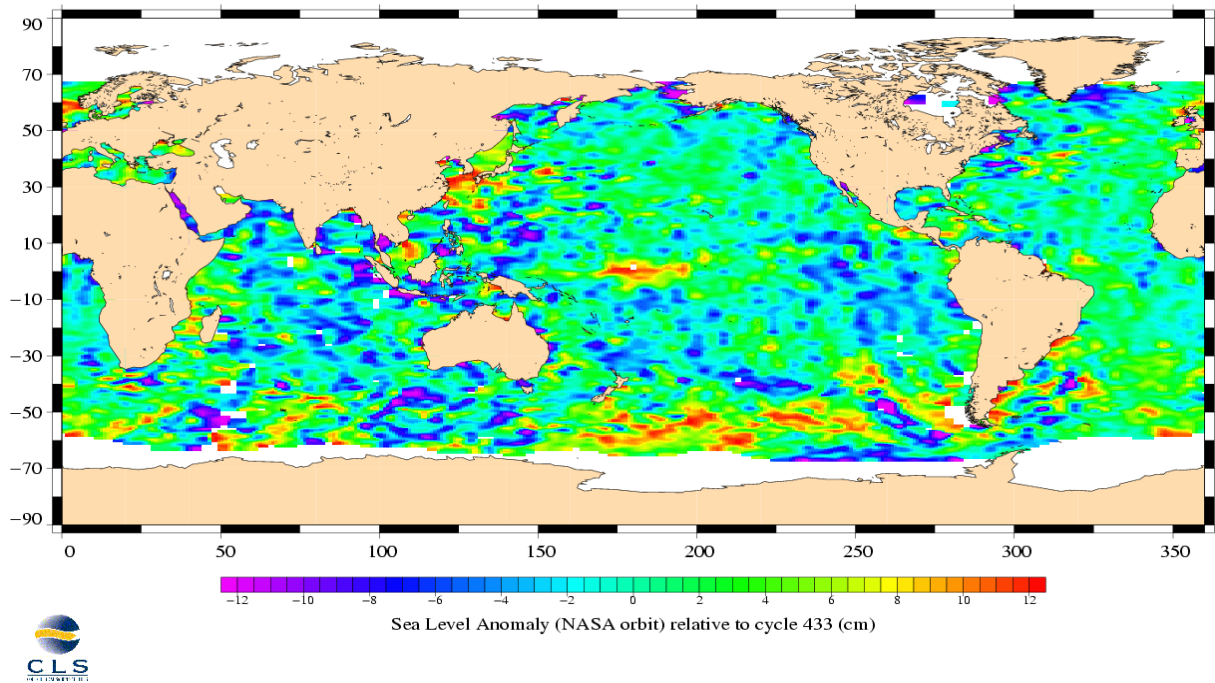
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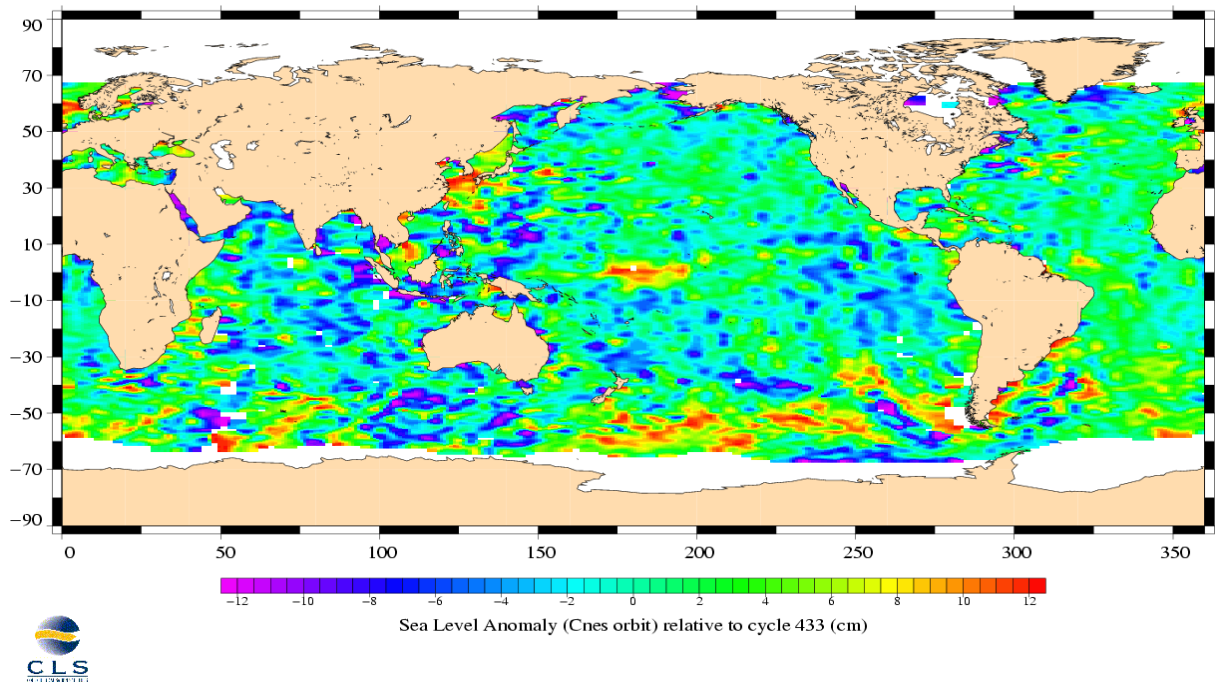
3.8 SSH variability

3.8.1 Sea Level Anomaly

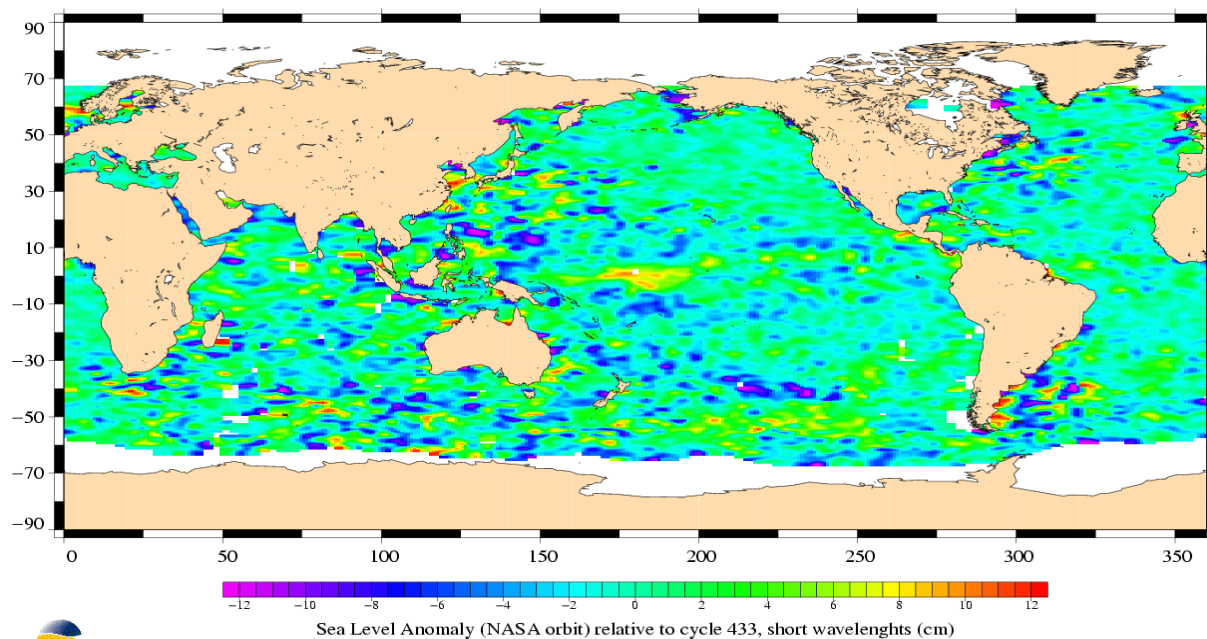
TOPEX/Poseidon, cycle 434
Period : 25/06/2004 – 05/07/2004



TOPEX/Poseidon, cycle 434
Period : 25/06/2004 – 05/07/2004



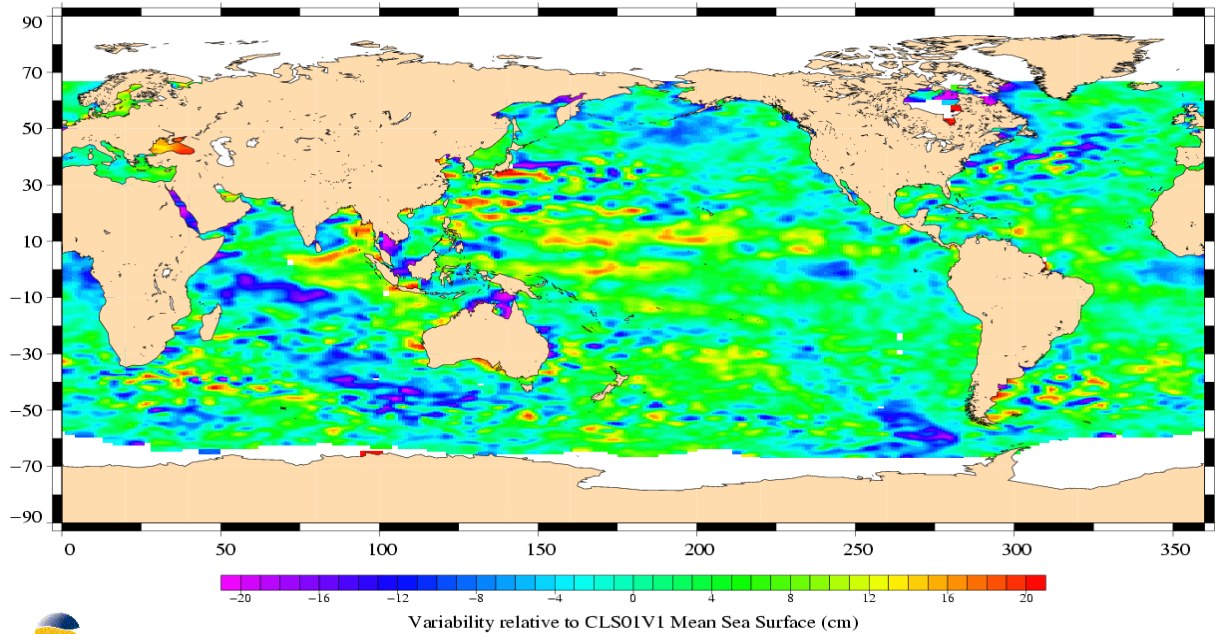
TOPEX/Poseidon, cycle 434
Period : 25/06/2004 – 05/07/2004



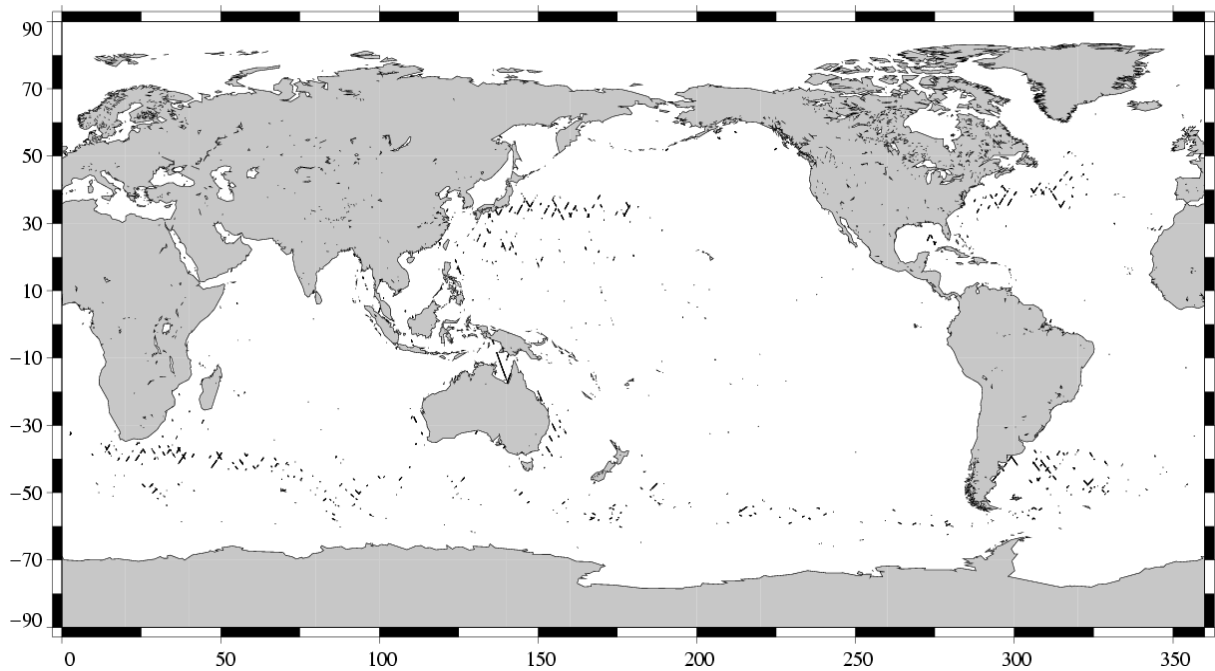
3.8.2 Comparison to a precise Mean Sea Surface

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.

TOPEX/Poseidon, cycle 434
Period : 25/06/2004 – 05/07/2004

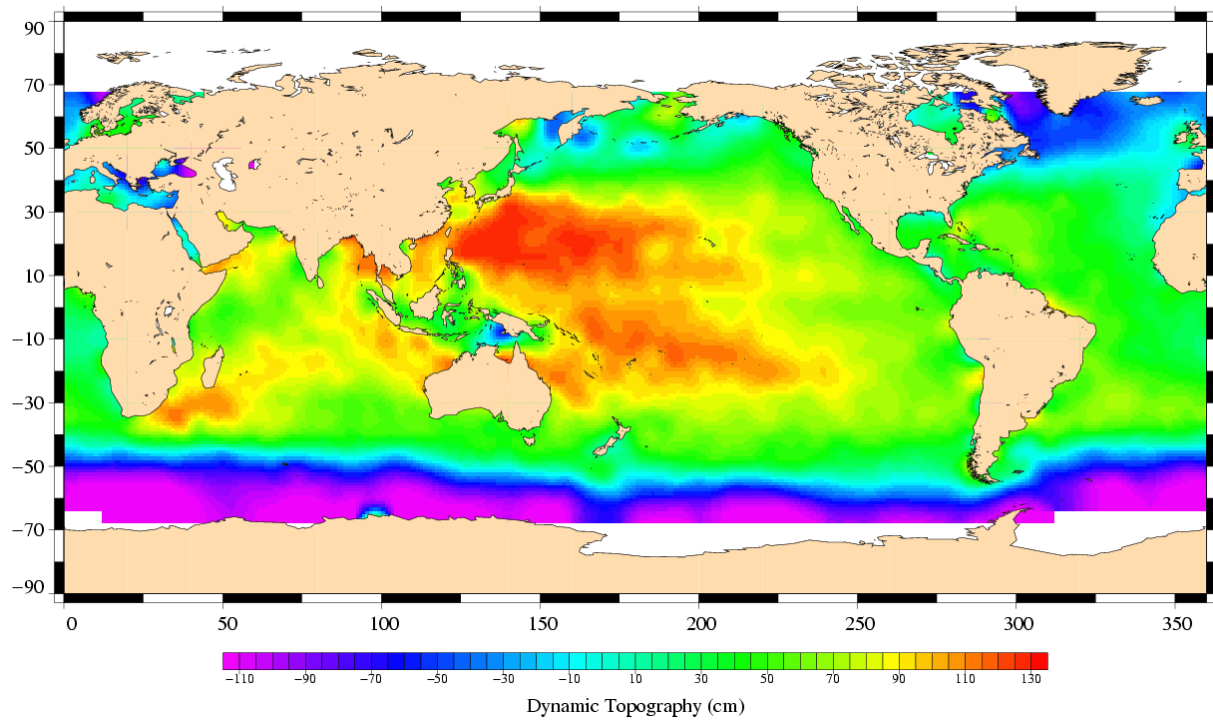


(SSH - MSS) differences greater than 0.3 m
TOPEX/Poseidon Cycle 434 (25/06/2004 / 05/07/2004)



3.9 Dynamic topography

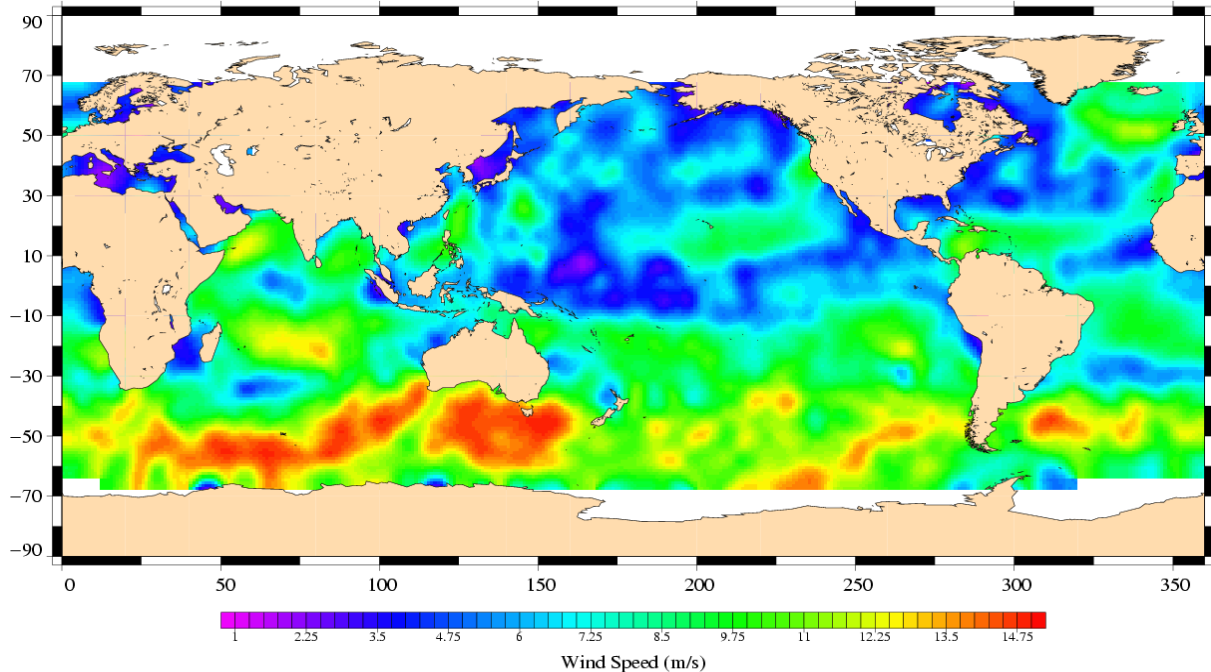
TOPEX/Poseidon, cycle 434
Period : 25/06/2004 – 05/07/2004



3.10 Wind and wave maps

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

TOPEX/Poseidon, cycle 434
Period : 25/06/2004 – 05/07/2004



TOPEX/Poseidon, cycle 434
Period : 25/06/2004 – 05/07/2004

