TOPEX/Poseidon MGDR
Quality Assessment Report

Cycle 473

17-07-2005 / 27-07-2005

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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 is nominal.

For this cycle, the crossover standard deviation is 5.94 cm rms. When using a selection to remove shallow waters (1000 m), areas of high ocean variability and high latitudes (> |50| deg.) it decreases down to 5.61 cm rms.

The standard deviation of Sea Level Anomalies (SLA) relative to a 7-year Mean Sea Surface is 10.24 cm. When using a selection to remove shallow waters (1000 m), areas of high ocean variability and high latitudes (> |50| deg), it lowers to 8.99 cm .

2.2   Missing measurements

This cycle has no missing pass.

2.3   Warnings and recommendations

- Missing measurements :

    - Since October 08th all mission data recovery requirements have been met via TDRSS real time contacts.
    Therefore there is a lot of data gaps, especially in the Indian Ocean, between the East and Southeast Pacific basin, in the South Pacific Ocean close to the South and Central America coasts and below the Groenland coasts.

- Doris switch off :
  The DORIS instrument was switched off since the incident on 01, November 2004. All the POE requirements are now met using lasernet tracking data. Only bent ionospheric correction is available.

- 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 :

    - 5.67% of the measurements are removed by the TMR correction criterion .

    - 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**) .

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

476313 altimeter measurements are present, and 174148 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/Poseidon Cycle 473 (17/07/2005 / 27/07/2005)
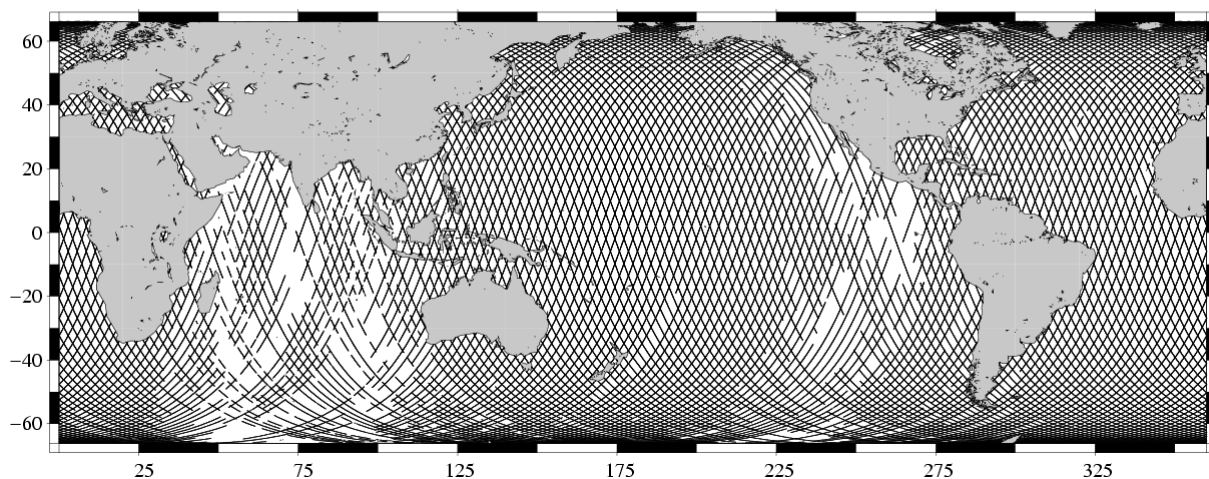
Missing measurements
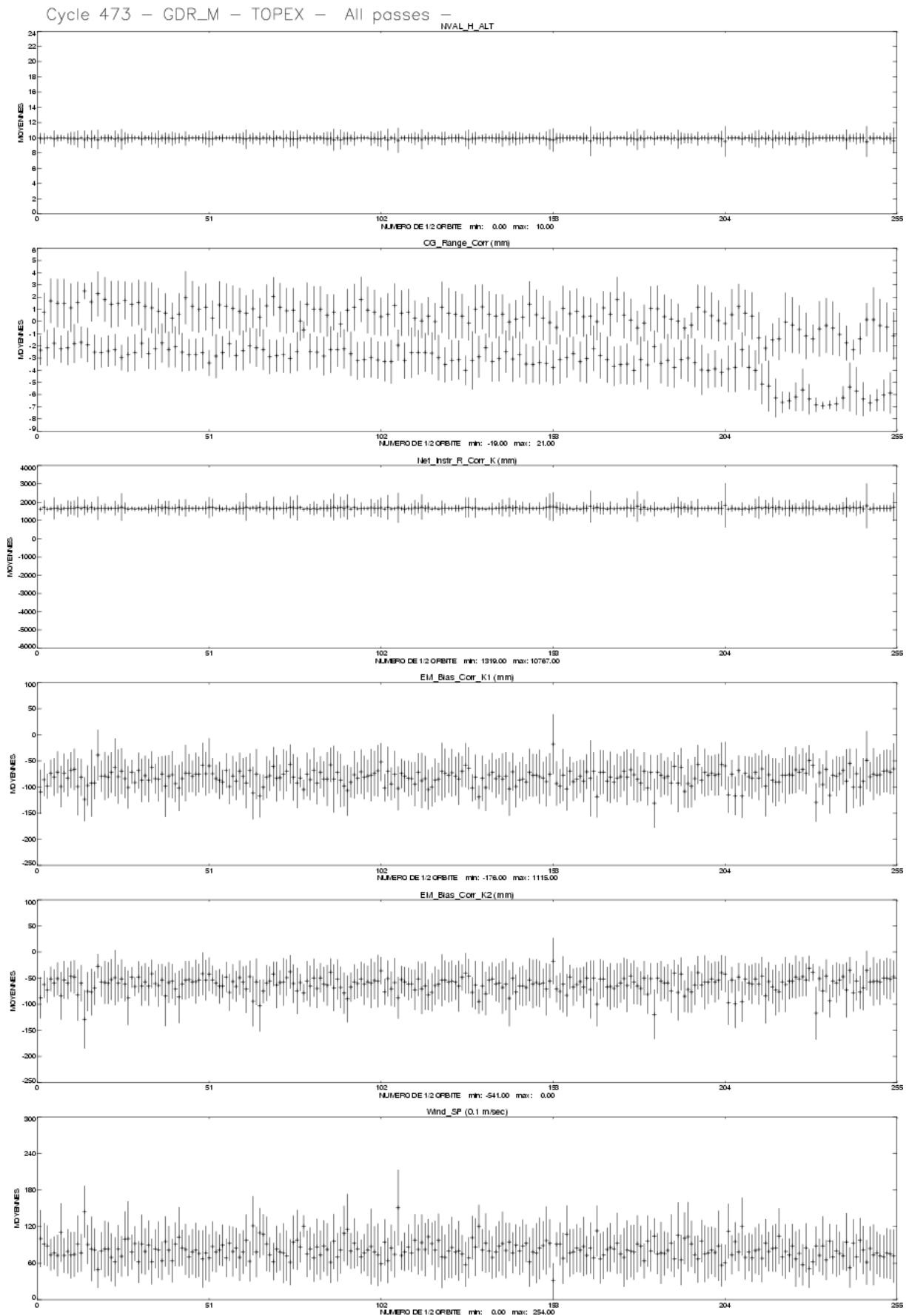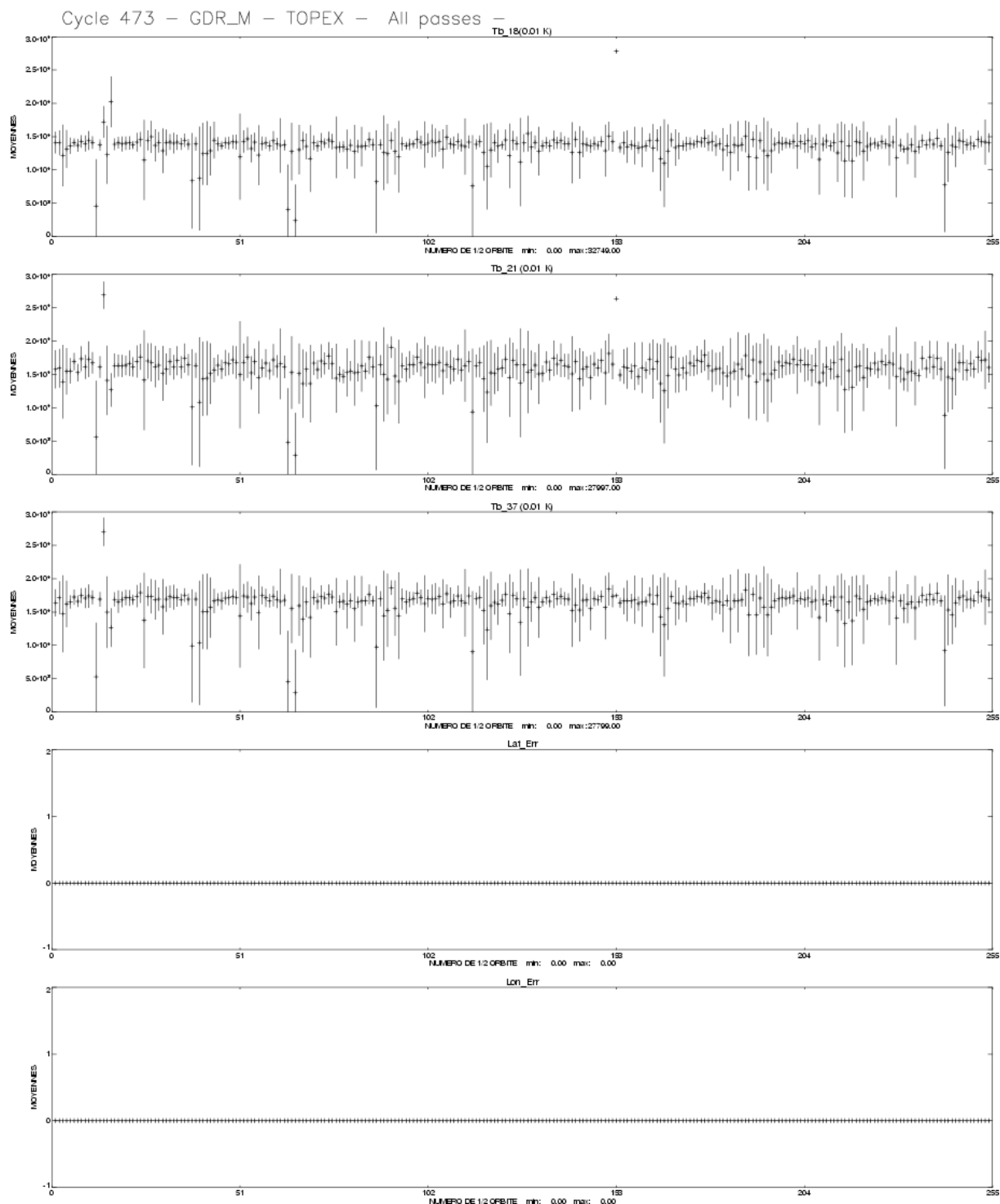TOPEX/Poseidon Cycle 473 (17/07/2005 / 27/07/2005)
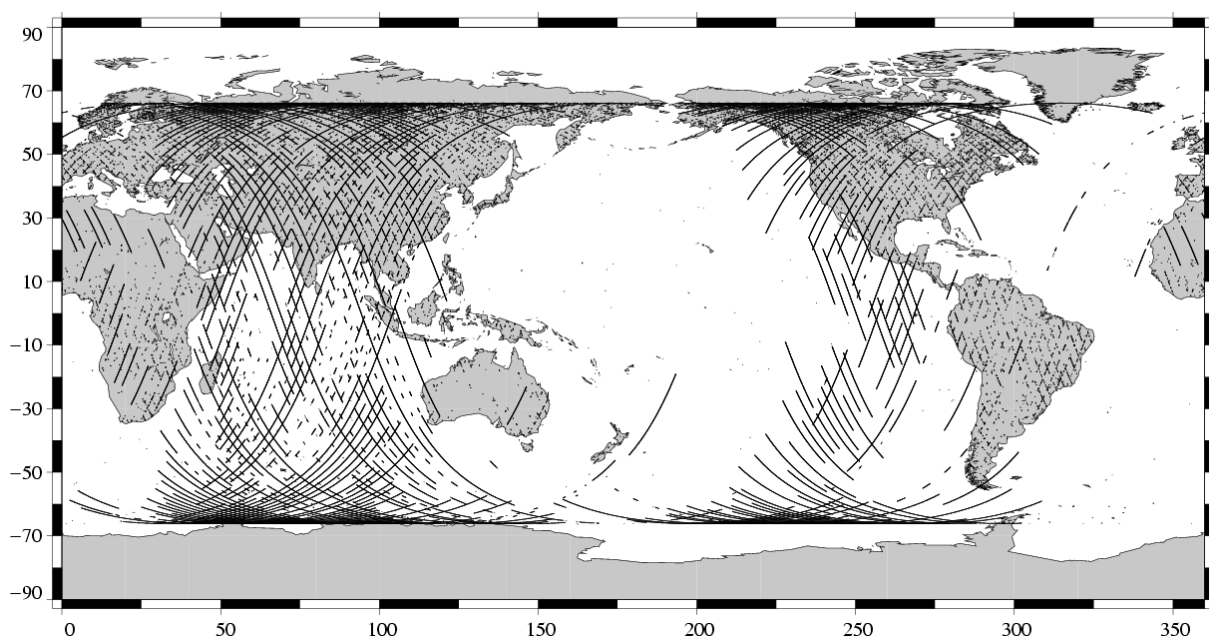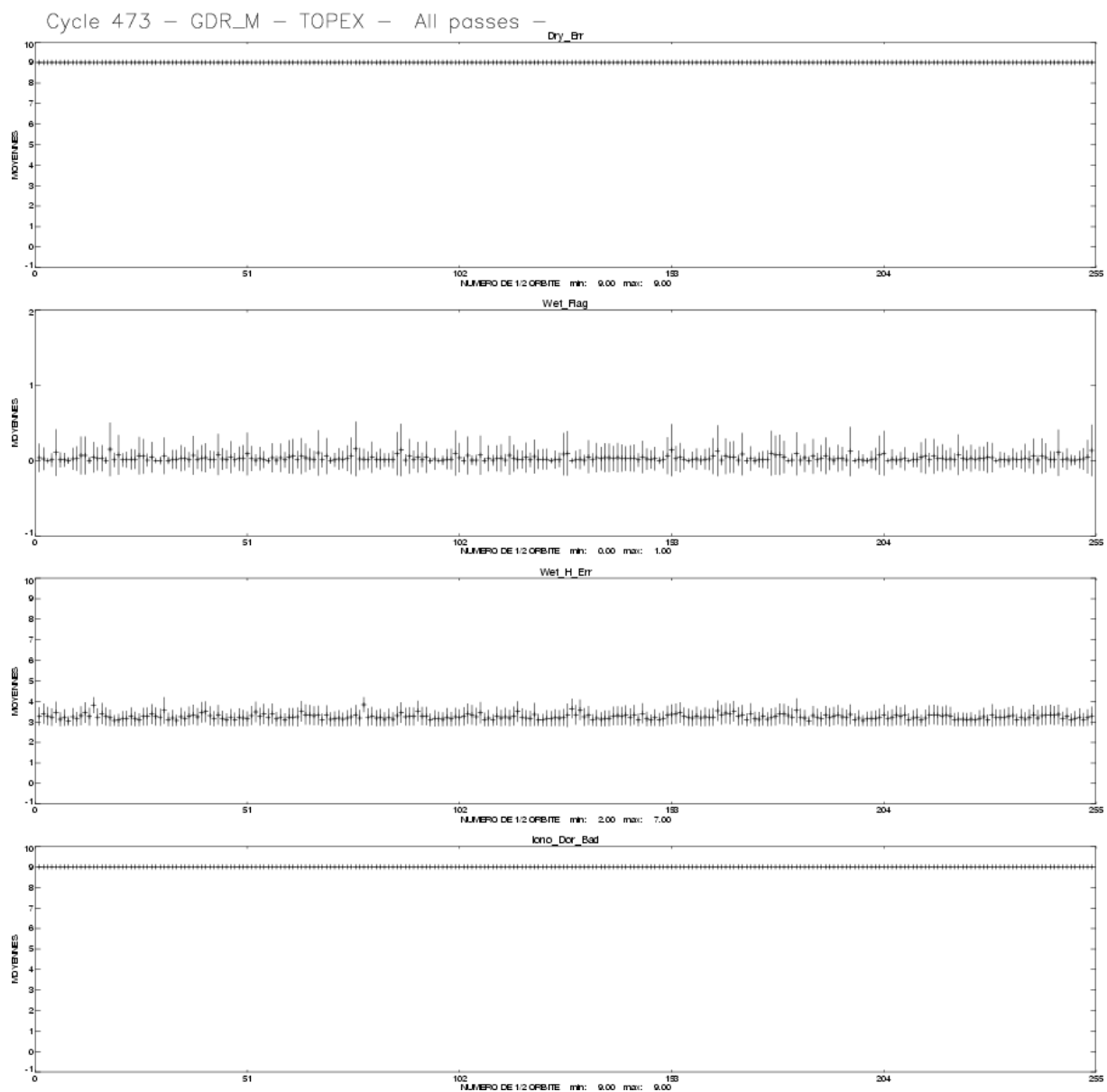
3.2 M-GDR quality flags

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

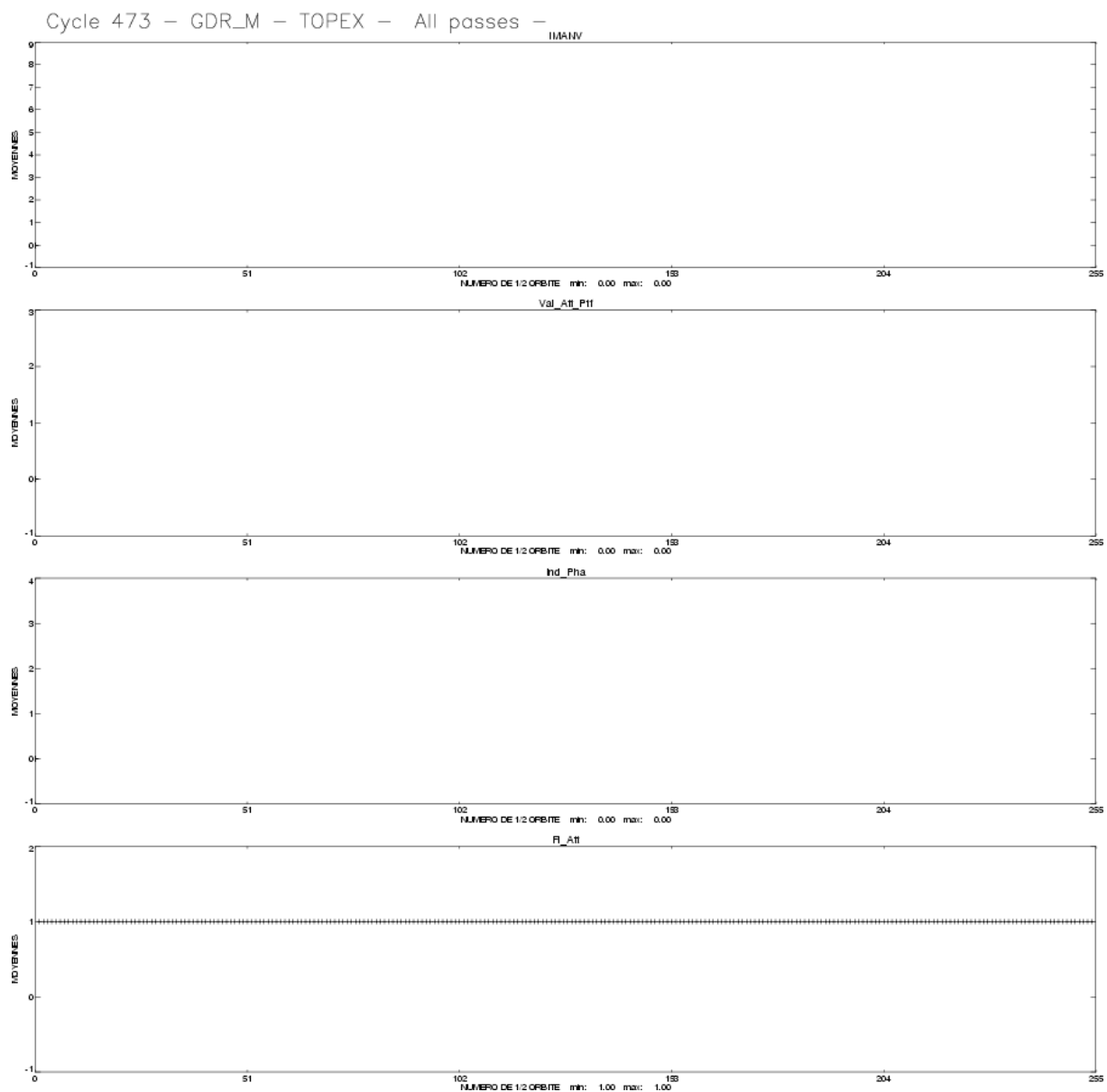| Name	Descrition	% bad
Geo_Bad_1	altimeter land flag	24.20
Geo_Bad_1	ice flag	7.70
Geo_Bad_1	radiometer land flag	26.30
Alt_Bad_1	conditions 1 altimeter	5.02
Alt_Bad_2	conditions 2 altimeter	4.89
Geo_Bad_2	rain (liquid water in excess)	8.26
Geo_Bad_2	less than 4 points for CSR3.0 tide calculation	0.43
Geo_Bad_2	less than 4 points for FES95.2.1 tide calculation	3.02
TOPEX	TOPEX not valid	0.00
TMR	TMR not valid	0.00
TMR_Bad	Brightness temperatures not valid	10.27
DORIS	DORIS not valid	0.00

3.3 M-GDR parameter plots

Cycle 473 — GDR_M — TOPEX — All passes —

NVAL_H_ALT

NUMERO DE 1/2 ORBITE   min: 0.00   max: 10.00

CG_Range_Corr (mm)

NUMERO DE 1/2 ORBITE   min: -19.00   max: 21.00

Net_Instr_R_Corr_K (mm)

NUMERO DE 1/2 ORBITE   min: 1319.00   max: 10787.00

EM_Bias_Corr_K1 (mm)

NUMERO DE 1/2 ORBITE   min: -176.00   max: 1115.00

EM_Bias_Corr_K2 (mm)

NUMERO DE 1/2 ORBITE   min: -541.00   max: 0.00

Wind_SP (0.1 m/sec)

NUMERO DE 1/2 ORBITE   min: 0.00   max: 254.00

Tb_18(0.01 K)

Tb_21 (0.01 K)

Tb_37 (0.01 K)

Lat_Err

Lon_Err

Dry_Err

Wet_Flag

Wet_H_Err

Iono_Dor_Bad

IMANV

MOYENNES

NUMERO DE 1/2 ORBITE   min: 0.00   max: 0.00

Val_Att_P11

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 473 - GDR_M - ALT_BAD_1 : TOPEX Measurement conditions on

Only plotted data > :   0
Number of total points plotted :   21234

Cycle 473 - GDR_M - ALT_BAD_2 : TOPEX Measurement conditions on

Only plotted data > :   0
Number of total points plotted :   20678

RMS_H_ALT (mm)

Only plotted data > :   100
Number of total points plotted :   4232

SWH_K (0.01m)

Only plotted data > :   1100
Number of total points plotted :   810

Cycle 473 - GDR_M - All passes - DORIS instrument states

■ No corrections DORIS and BENT
■ No correction DORIS ; correction BENT
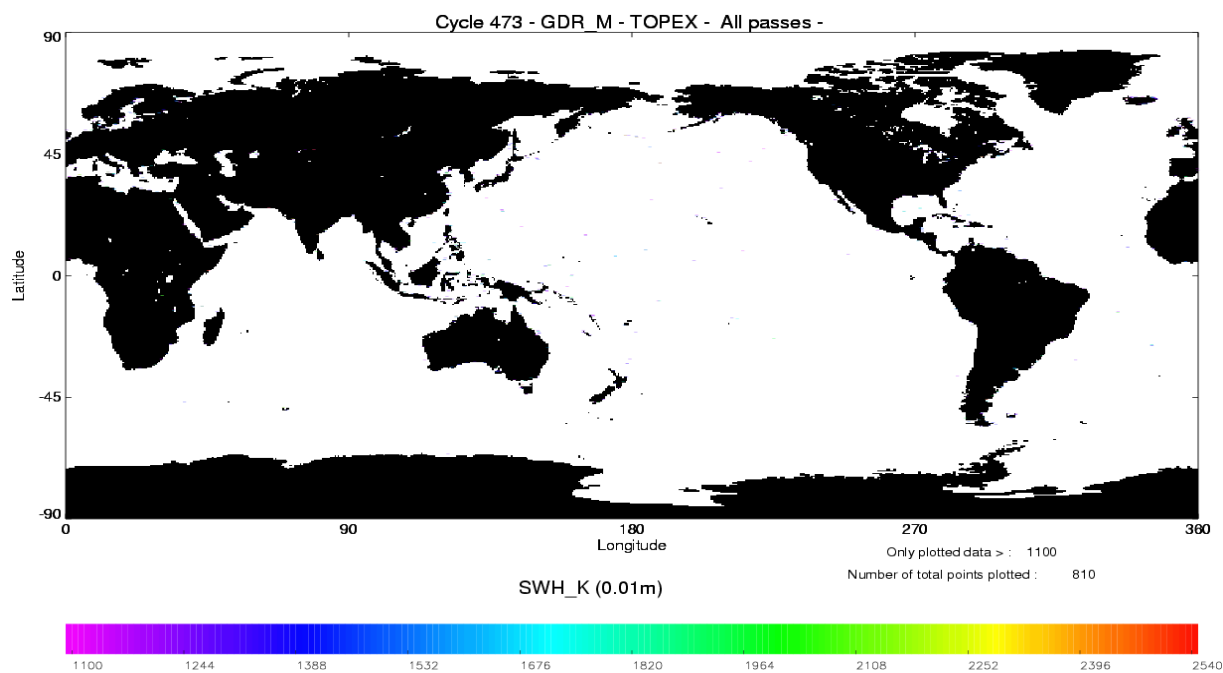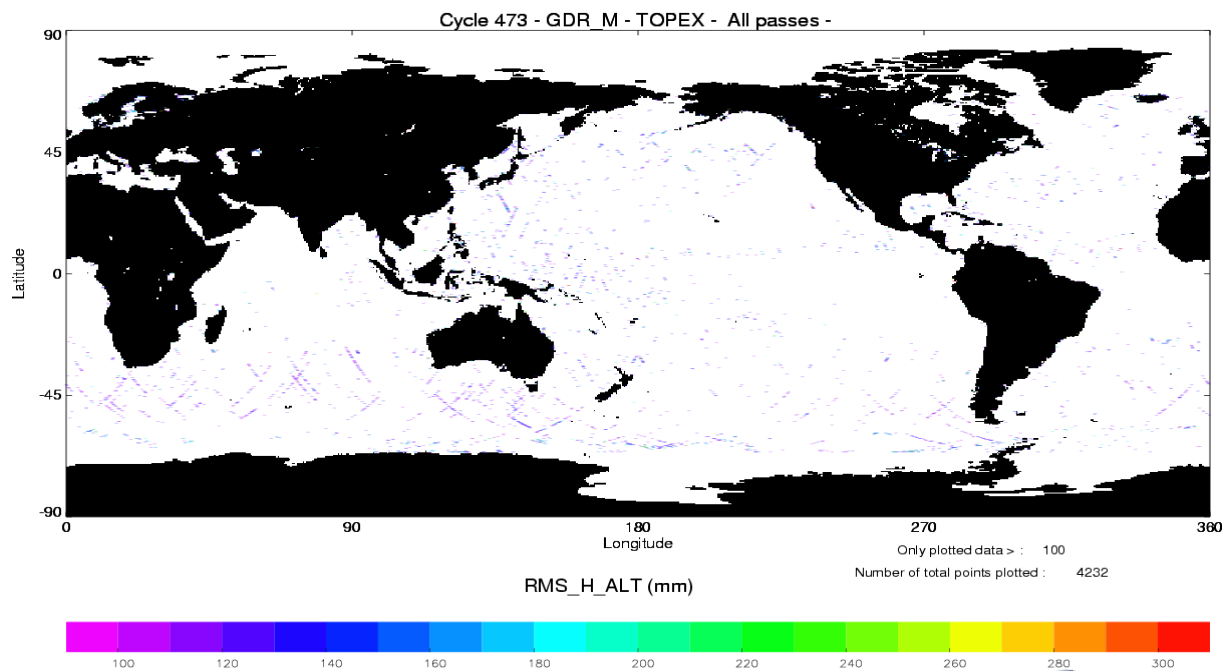■ No CORIOTROP data
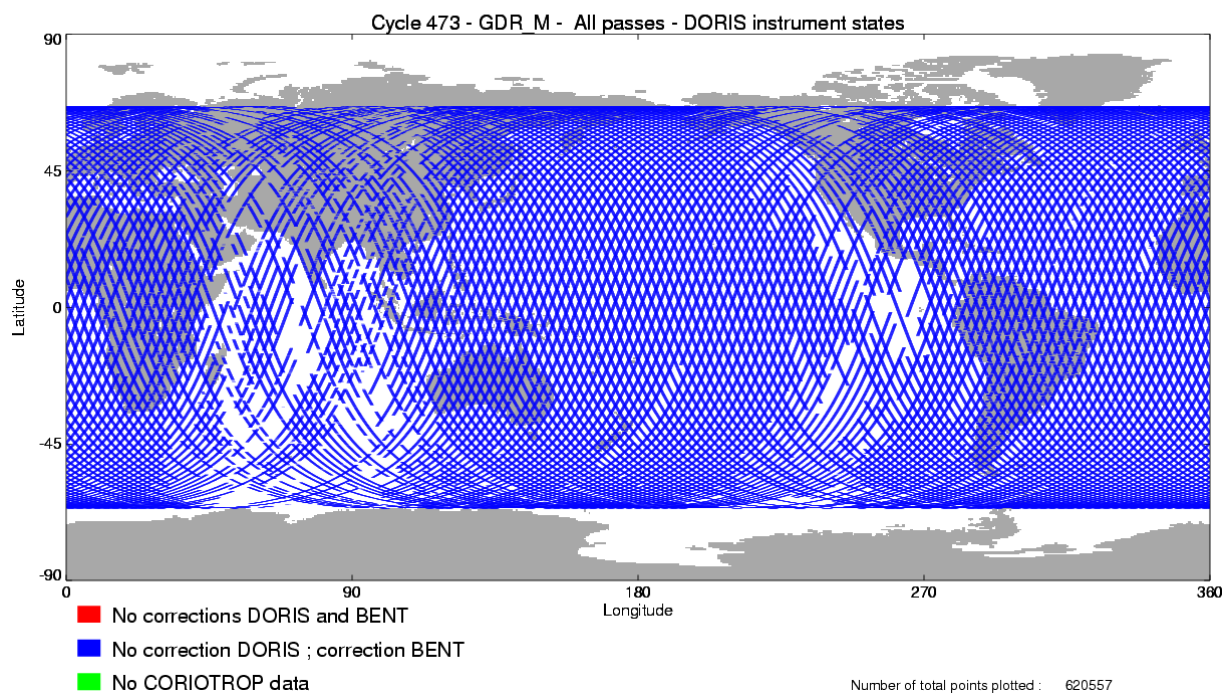
Number of total points plotted : 620557
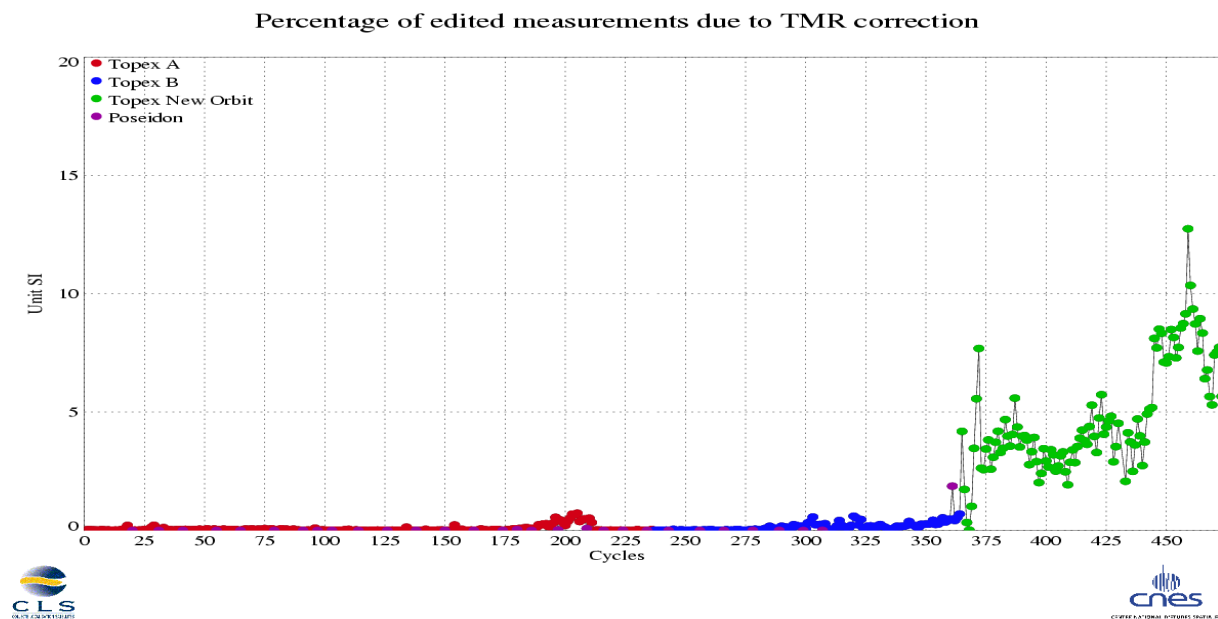
3.4 Editing

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 a large period of Topex/Poseidon (cycle 1 to 468) is also given.

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 ice flag (9.97 % of points removed).

| Parameters	Min Thres.	Max Thres.	Unit	Mean % usually removed	% removed
Sea surface height	-130.000	100.000	m	0.20	0.06
Sea level anomaly	-2.000	2.000	m	1.91	5.25
Number of 20/10Hz valid points Poseidon/TOPEX	10.000	-		0.34	0.16
Std. deviation of range	0.000	0.200	m	1.11	0.91
Off nadir angle from waveform	0.000	0.400	deg	3.20	3.16
Dry tropospheric correction	-2.500	-1.900	m	0.00	0.00
MOG2D and invert barometer correction	-2.000	2.000	m	0.00	0.00
TMR wet tropospheric correction	-0.500	-0.001	m	1.10	5.67
Ionospheric correction (Poseidon:Doris, TOPEX:Dual)	-0.400	0.040	m	0.53	0.18
Significant wave height	0.000	11.000	m	0.19	0.04
Sea state Bias	-0.500	0.000	m	0.54	0.23
Backscatter coefficient	7.000	30.000	dB	0.33	0.13
Ocean tide height	-5.000	5.000	m	0.07	0.07
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 TMR bad is used to set the TMR parameters to default value when this flag is wrong. This allow us to remove the wrong TMR measurements due to the interpolation anomalies close to the data gaps.

The percentage of measurements removed due to problems with the TMR is plotted on the figure hereafter. Some of them are due to interpolation errors from cycle 371 as a result of data gaps.

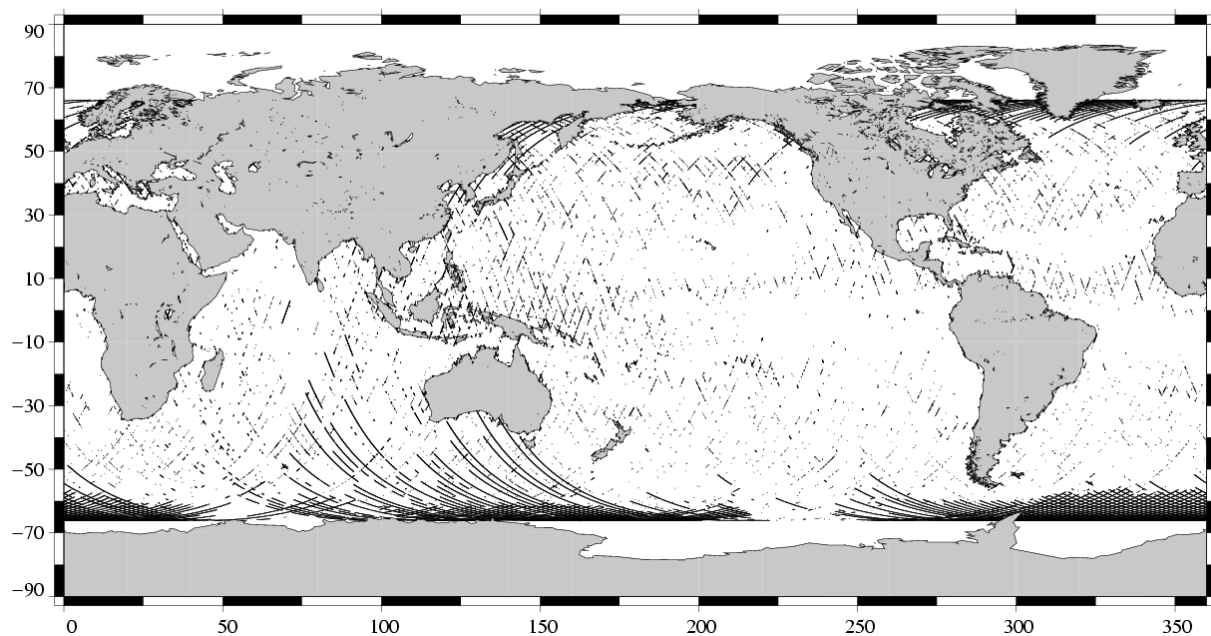Percentage of edited measurements due to TMR correction

The following three maps are complementary: they show respectively the removed, the selected measurements and the percentage of selected measurements in the editing procedure.
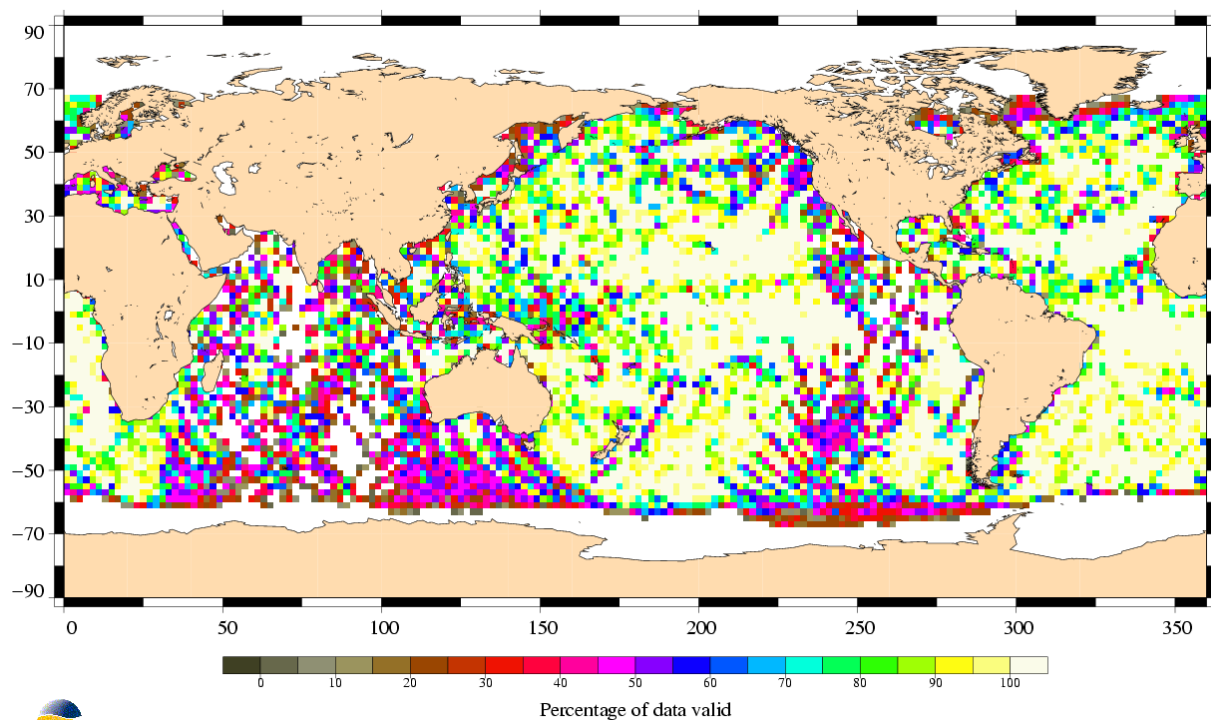
Valid data
TOPEX/Poseidon Cycle 473 (17/07/2005 / 27/07/2005)
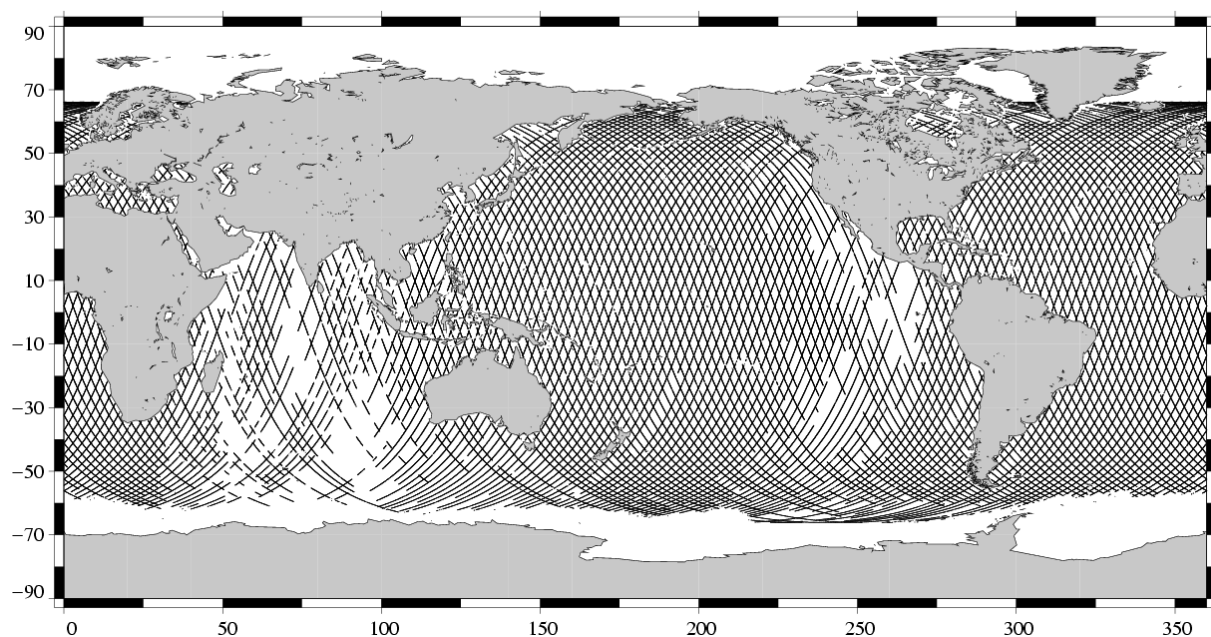
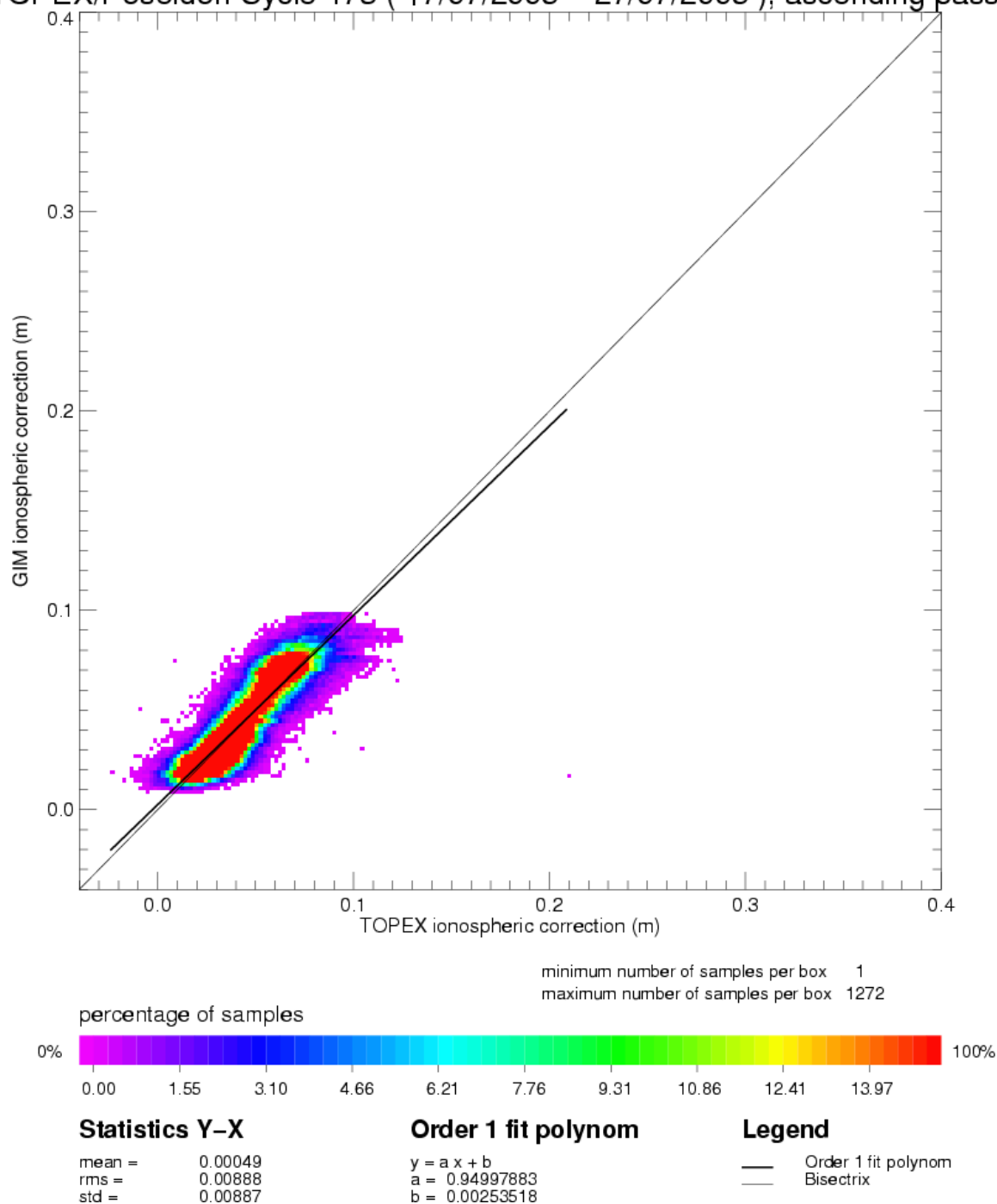

Edited measurements
TOPEX Cycle 473 (17/07/2005 / 27/07/2005)

Percentage of valid data relative to the nominal pass
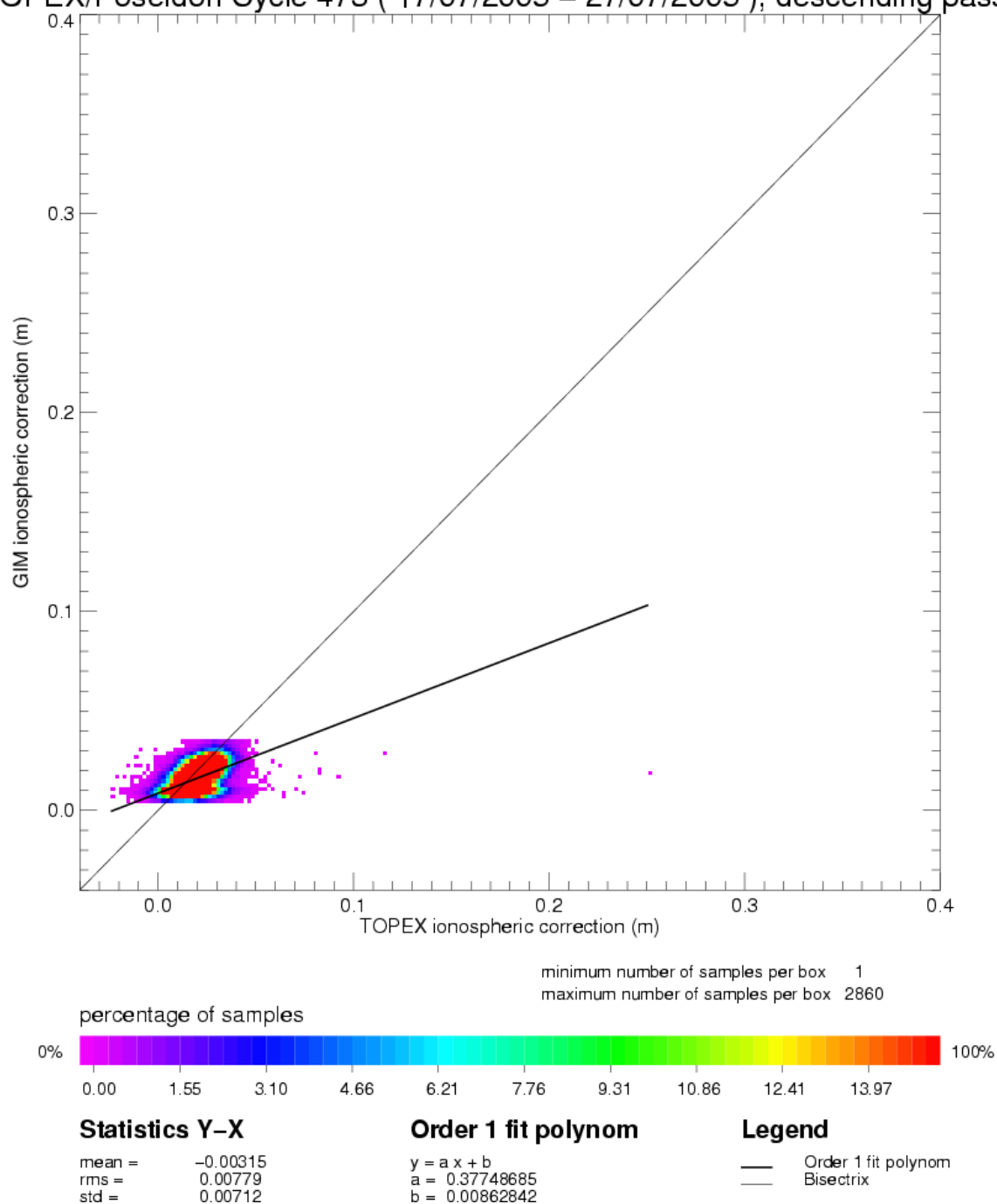## TOPEX/Poseidon Cycle 473 (17/07/2005 / 27/07/2005)

Percentage of data valid
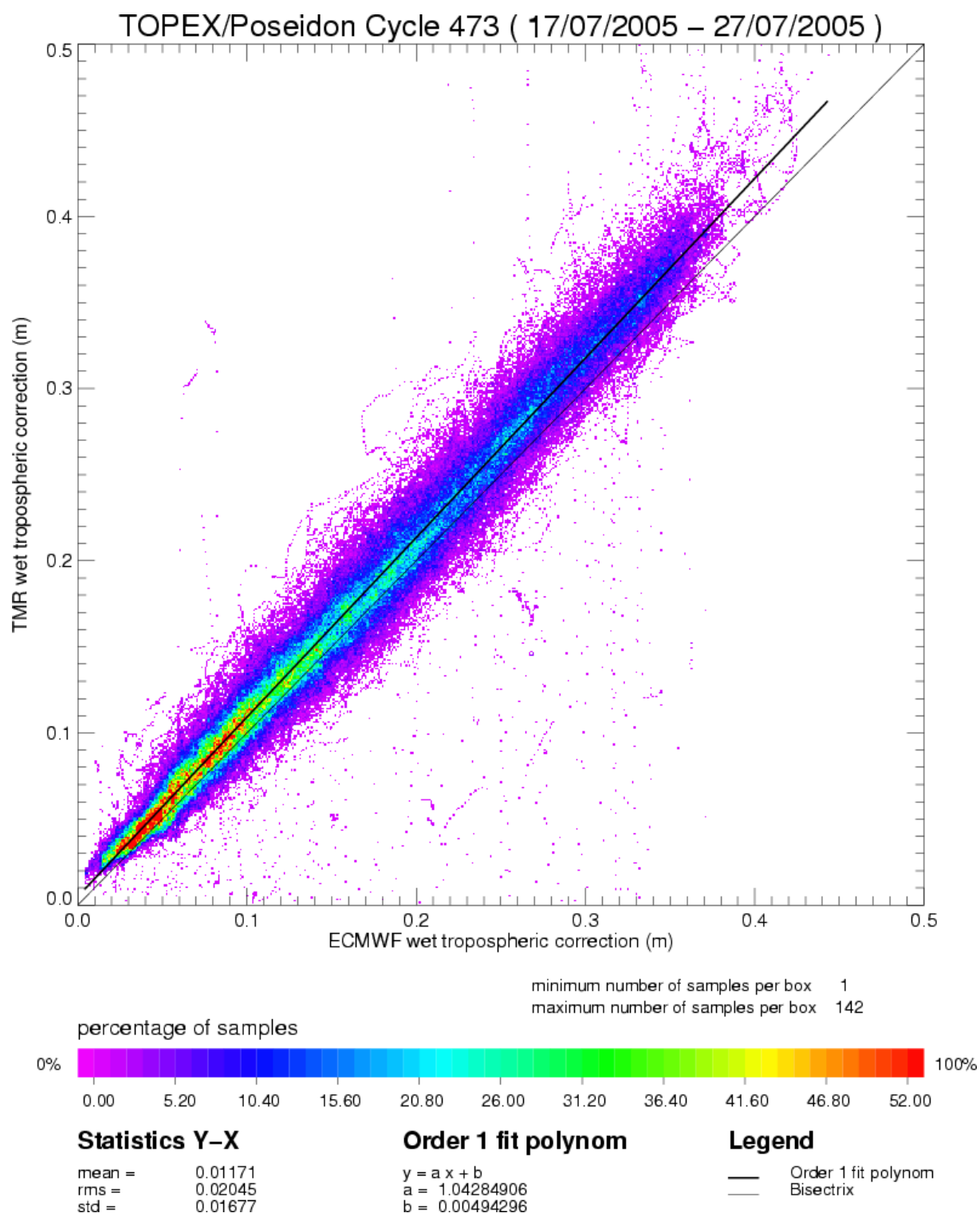
3.5   Ionospheric correction

TOPEX/Poseidon Cycle 473 (17/07/2005 – 27/07/2005), ascending passes

minimum number of samples per box   1
maximum number of samples per box   1272

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   **Order 1 fit polynom**   **Legend**

mean =   0.00049   y = a x + b   —— Order 1 fit polynom
rms =   0.00888   a = 0.94997883   —— Bisectrix
std =   0.00887   b = 0.00253518

minimum number of samples per box   1
maximum number of samples per box   2860

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   **Order 1 fit polynom**   **Legend**

mean =   −0.00315   y = a x + b   ——— Order 1 fit polynom
rms =   0.00779   a = 0.37748685   ——— Bisectrix
std =   0.00712   b = 0.00862842

3.6 Wet tropospheric corection

TOPEX/Poseidon Cycle 473 (17/07/2005 – 27/07/2005)

minimum number of samples per box   1
maximum number of samples per box   142

percentage of samples

0%   100%

0.00   5.20   10.40   15.60   20.80   26.00   31.20   36.40   41.60   46.80   52.00

Statistics Y–X

mean =   0.01171
rms =   0.02045
std =   0.01677

Order 1 fit polynom

y = a x + b
a = 1.04284906
b = 0.00494296

Legend

Order 1 fit polynom
Bisectrix

3.7 Long term monitoring

3.7.1 Crossover performances

Crossover standard deviation
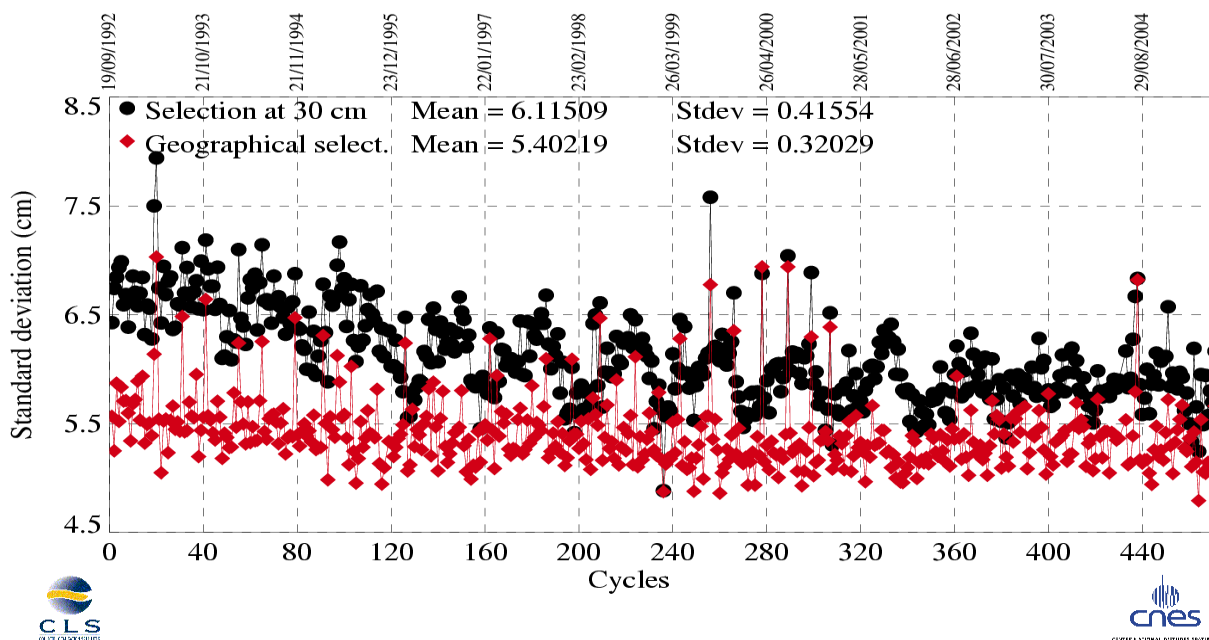
3.7.2 Along-track performances

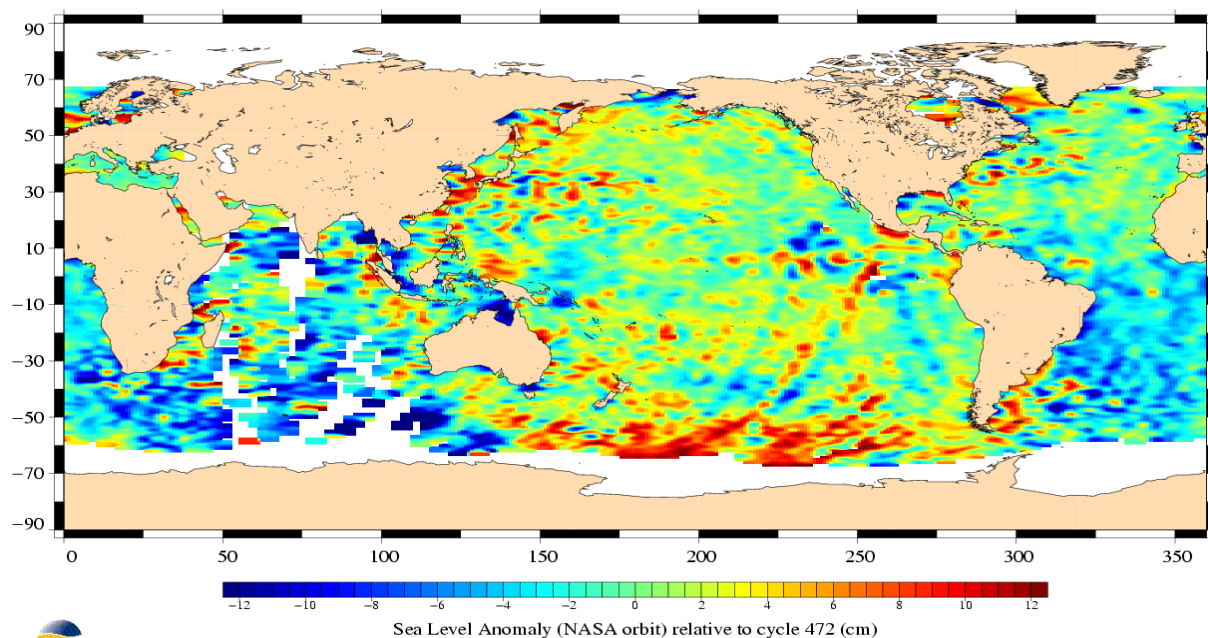## Standard deviation of Sea Level Anomalies
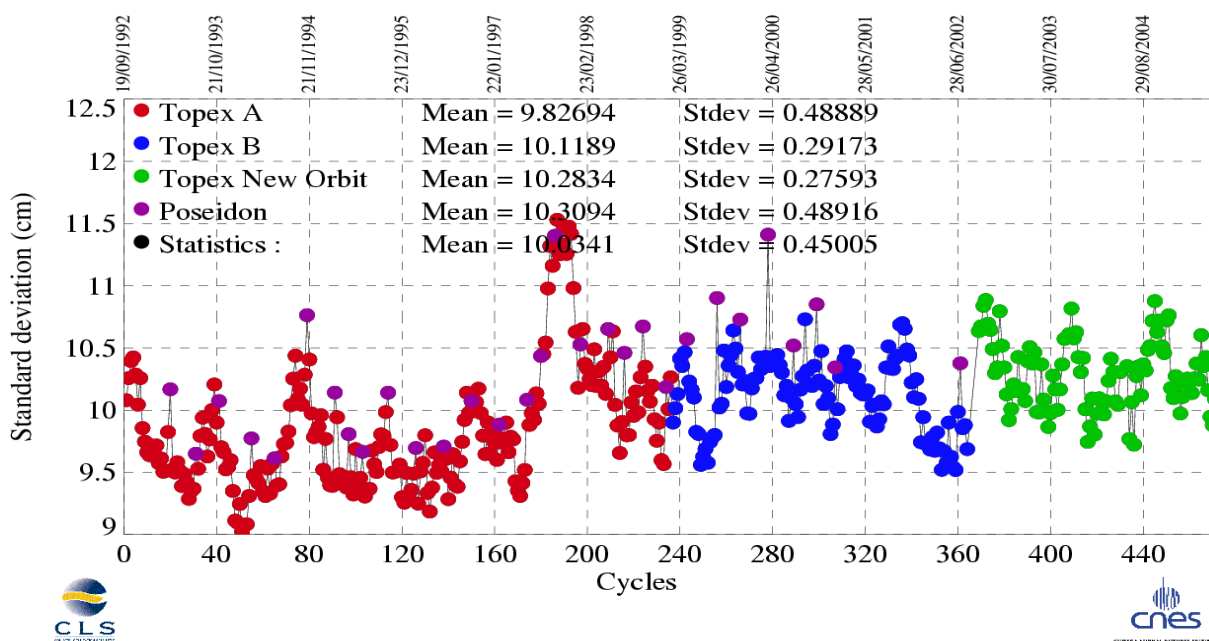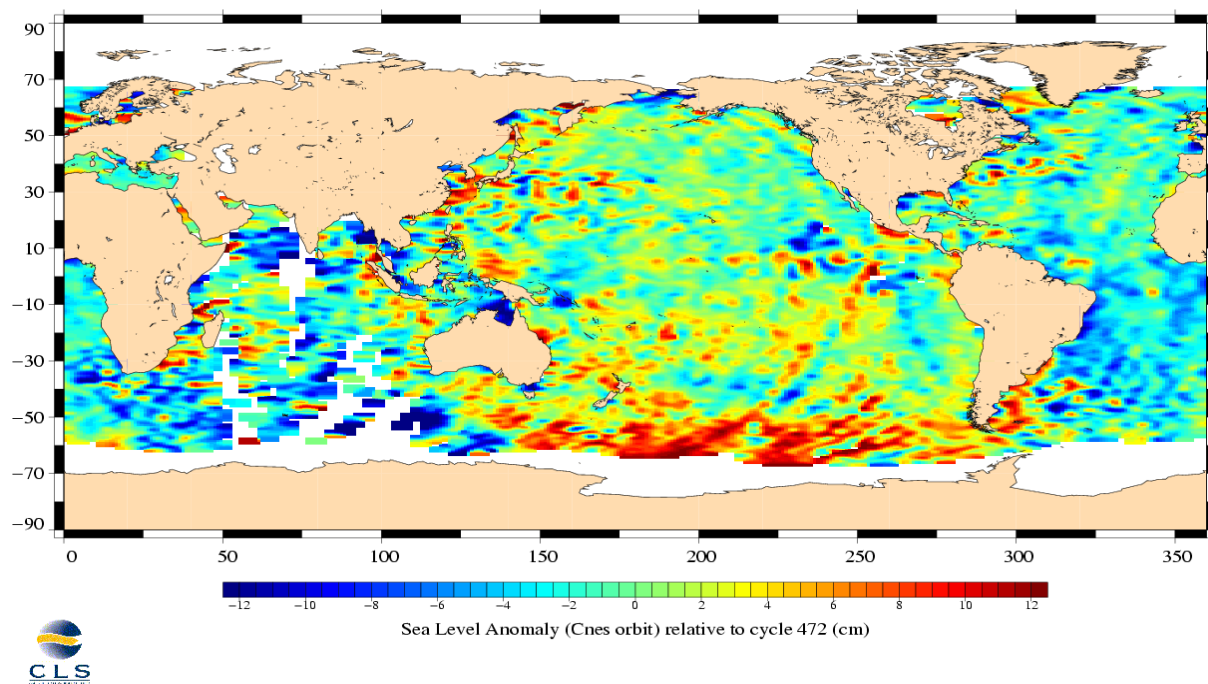
3.7.3   Mean Sea Level

Mean Sea Level
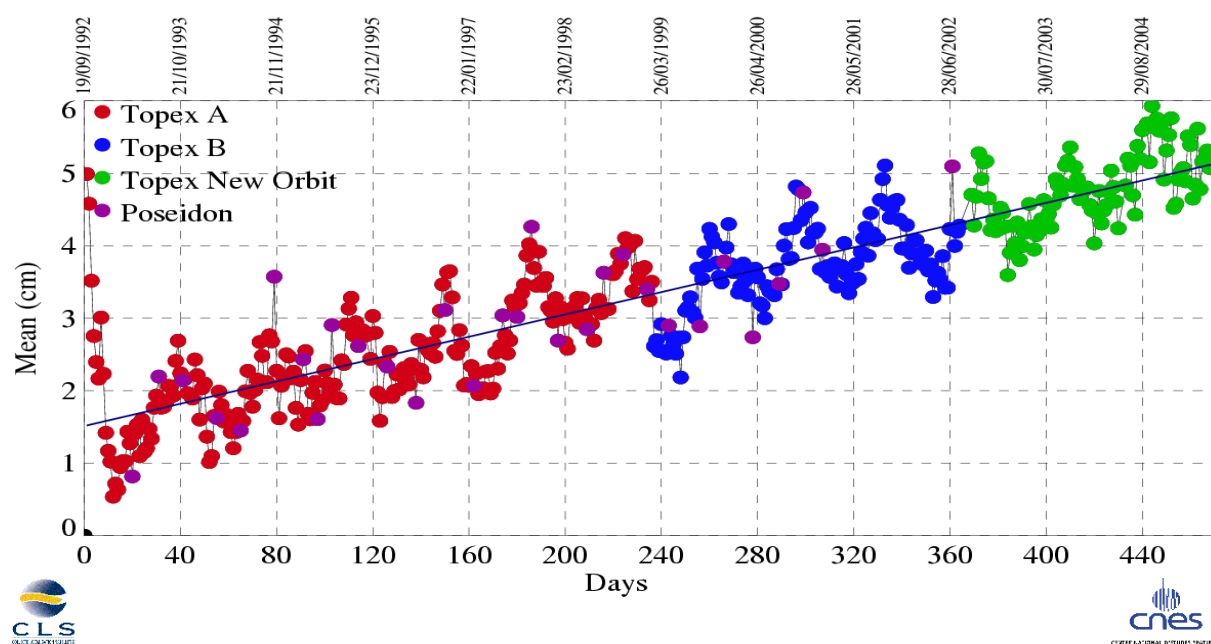
3.8 SSH variability

3.8.1 Sea Level Anomaly
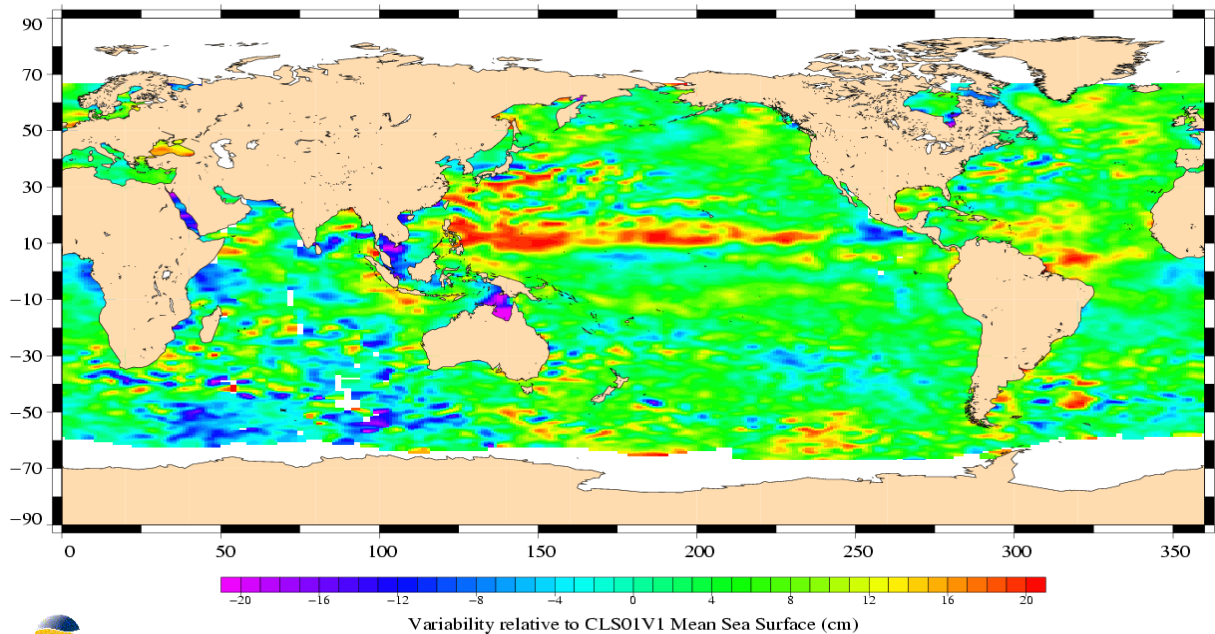
TOPEX/Poseidon, cycle 473
Period : 17/07/2005 − 27/07/2005

Sea Level Anomaly (NASA orbit) relative to cycle 472 (cm)

TOPEX/Poseidon, cycle 473
Period : 17/07/2005 − 27/07/2005

Sea Level Anomaly (Cnes orbit) relative to cycle 472 (cm)

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.

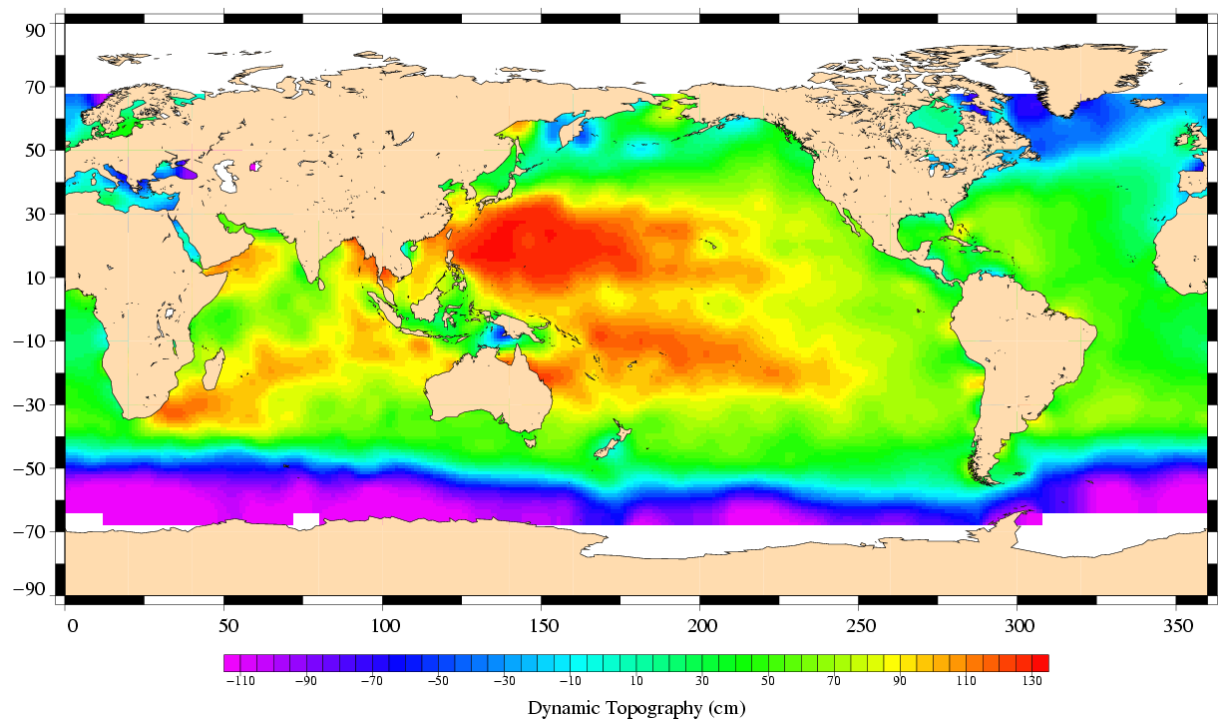TOPEX/Poseidon, cycle 473
Period : 17/07/2005 − 27/07/2005

Variability relative to CLS01V1 Mean Sea Surface (cm)

(SSH − MSS) differences greater than 0.3 m
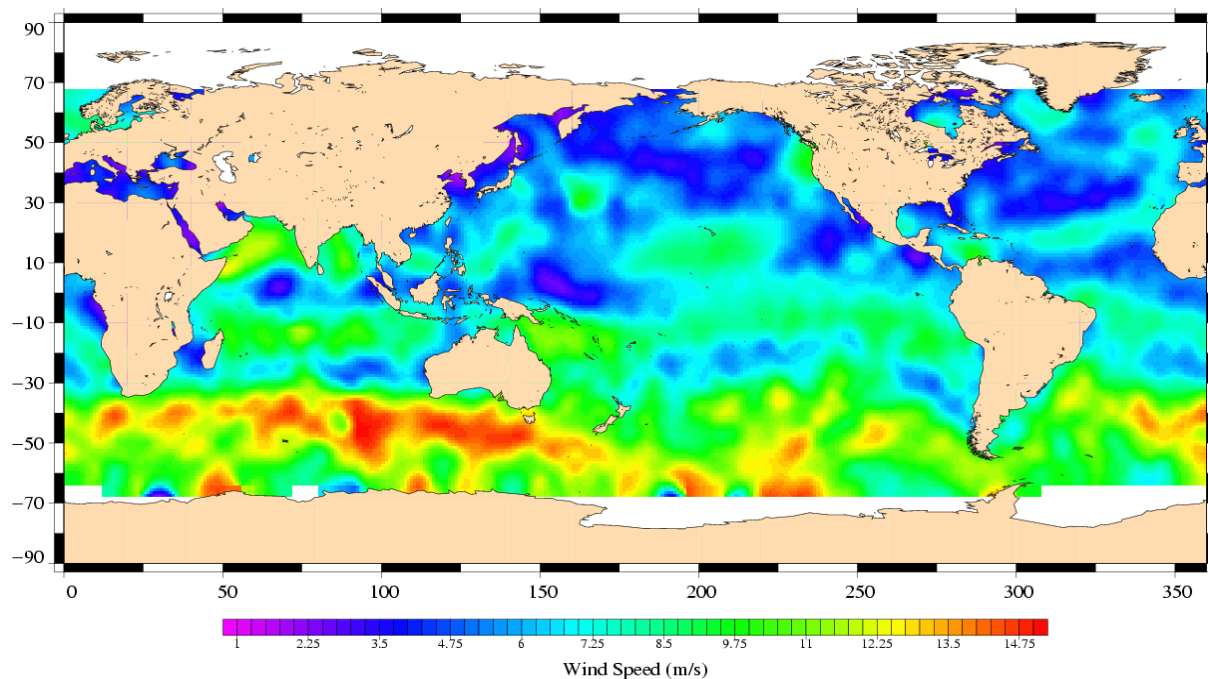TOPEX/Poseidon Cycle 473 (17/07/2005 / 27/07/2005)
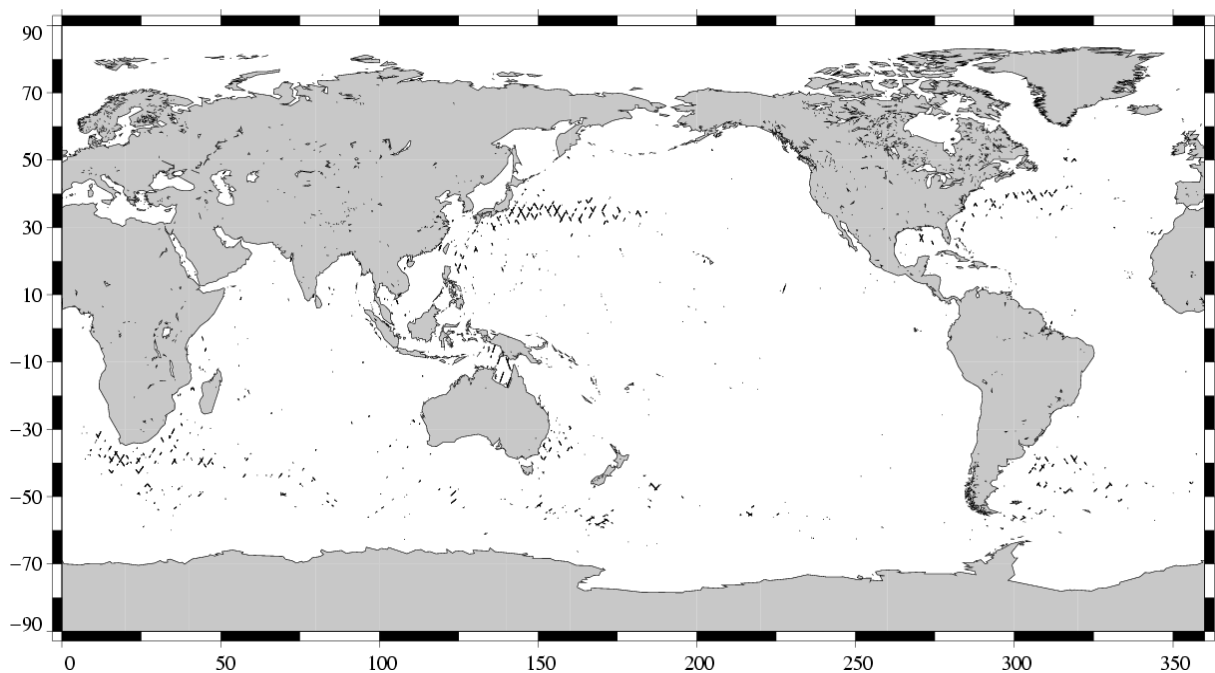
3.9   Dynamic topography

TOPEX/Poseidon, cycle 473
Period : 17/07/2005 − 27/07/2005

Dynamic Topography (cm)

3.10   Wind and wave maps

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

TOPEX/Poseidon, cycle 473
Period : 17/07/2005 − 27/07/2005

TOPEX/Poseidon, cycle 473
Period : 17/07/2005 − 27/07/2005