



# TOPEX/Poseidon MGRD Quality Assessment Report

**Cycle 470**

**17-06-2005 / 27-06-2005**

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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 is nominal.

For this cycle, the crossover standard deviation is 5.93 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 5.13 cm rms.

The standard deviation of Sea Level Anomalies (SLA) relative to a 7-year Mean Sea Surface is 10.09 cm. When using a selection to remove shallow waters (1000 m), areas of high ocean variability and high latitudes ( $> |50|$  deg), it lowers to 9.02 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 :
  - 7.42% 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

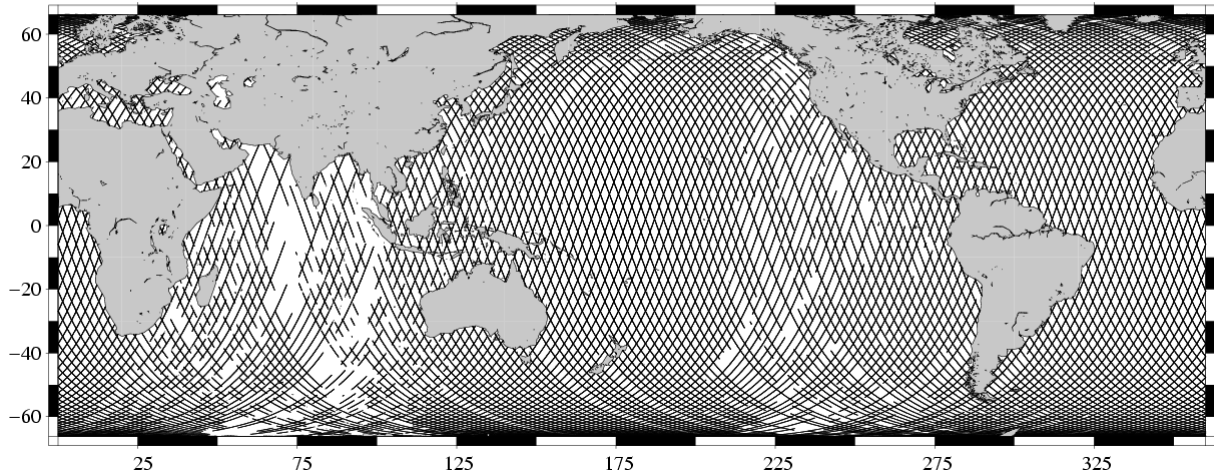
This section presents results that illustrate data quality during this cycle. These verification products are produced operationally so that they allow systematic monitoring of the main relevant parameters.

#### 3.1 Missing measurements

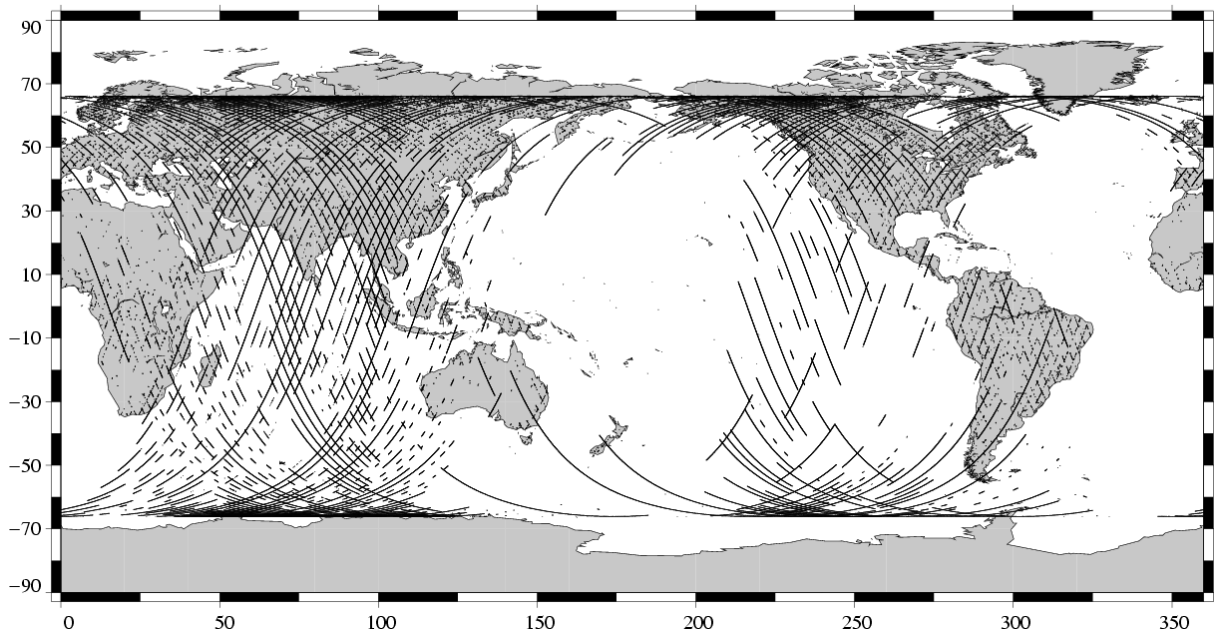
479704 altimeter measurements are present, and 176050 are missing.

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 470 (17/06/2005 / 27/06/2005)



Missing measurements  
TOPEX/Poseidon Cycle 470 (17/06/2005 / 27/06/2005)



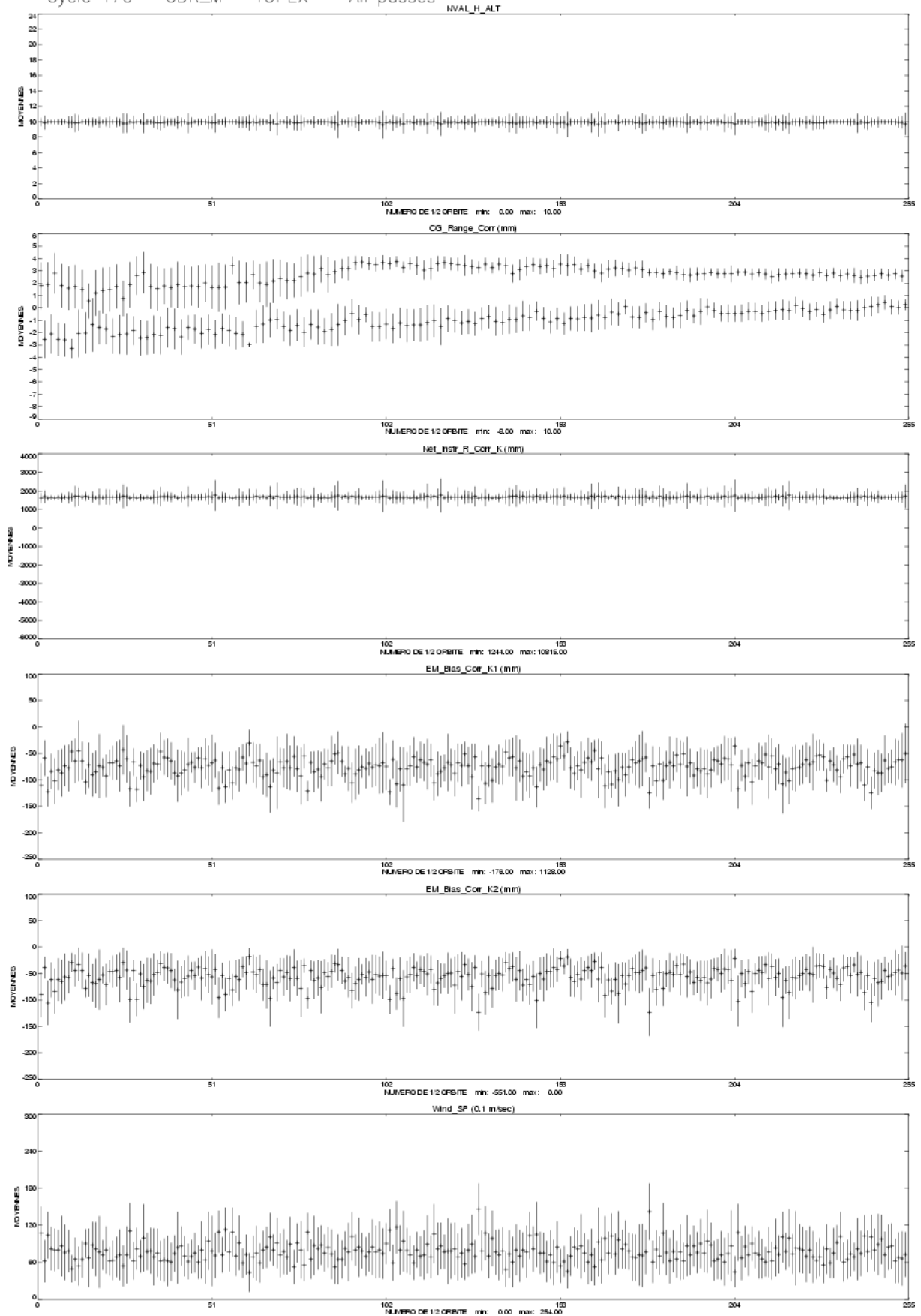
### 3.2 M-GDR quality flags

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

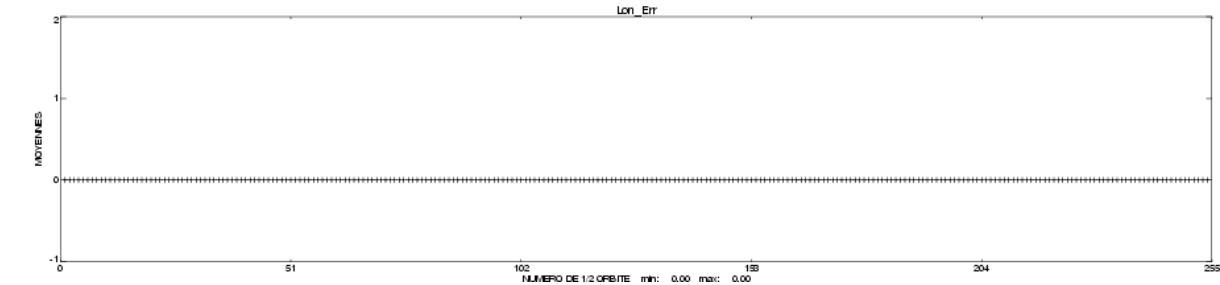
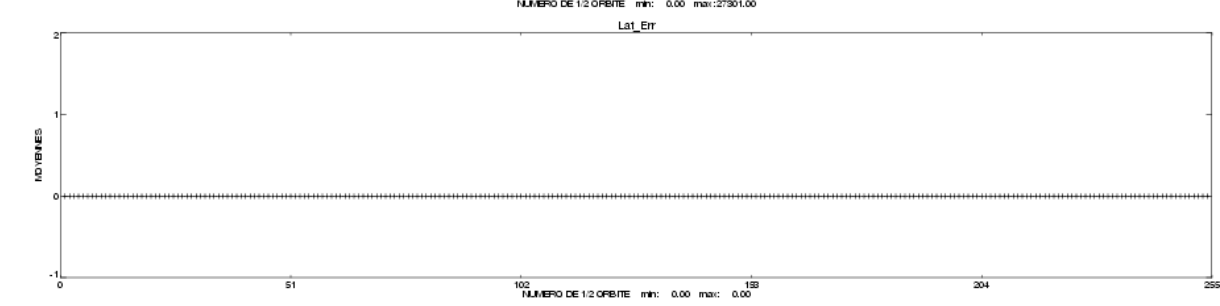
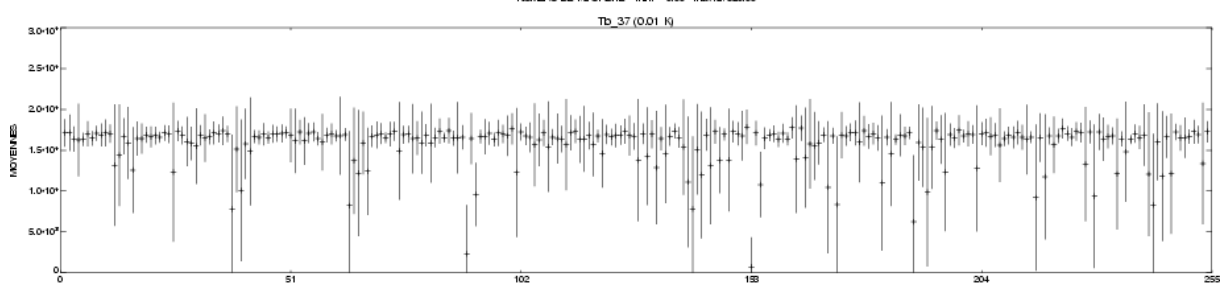
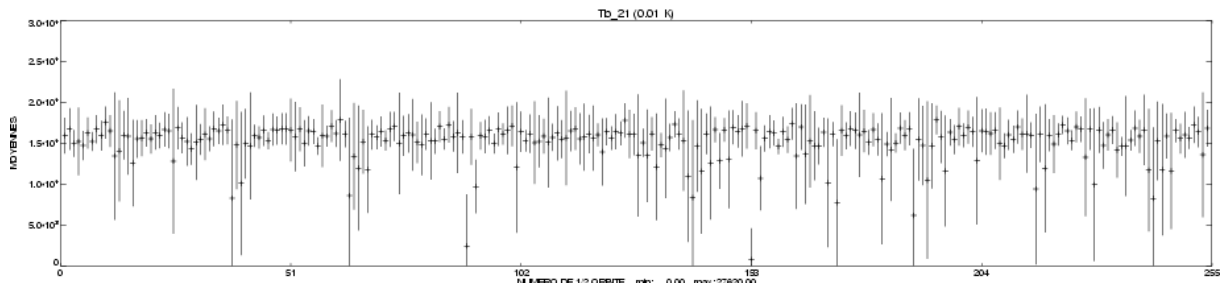
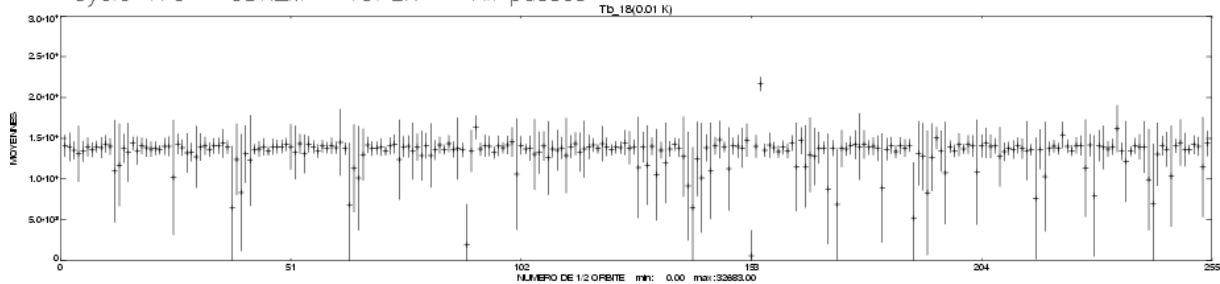
Name	Description	% bad
Geo_Bad_1	altimeter land flag	23.39
Geo_Bad_1	ice flag	7.20
Geo_Bad_1	radiometer land flag	25.25
Alt_Bad_1	conditions 1 altimeter	5.17
Alt_Bad_2	conditions 2 altimeter	5.05
Geo_Bad_2	rain (liquid water in excess)	9.49
Geo_Bad_2	less than 4 points for CSR3.0 tide calculation	0.39
Geo_Bad_2	less than 4 points for FES95.2.1 tide calculation	2.68
TOPEX	TOPEX not valid	0.00
TMR	TMR not valid	0.00
TMR_Bad	Brightness temperatures not valid	11.26
DORIS	DORIS not valid	0.00

### 3.3 M-GDR parameter plots

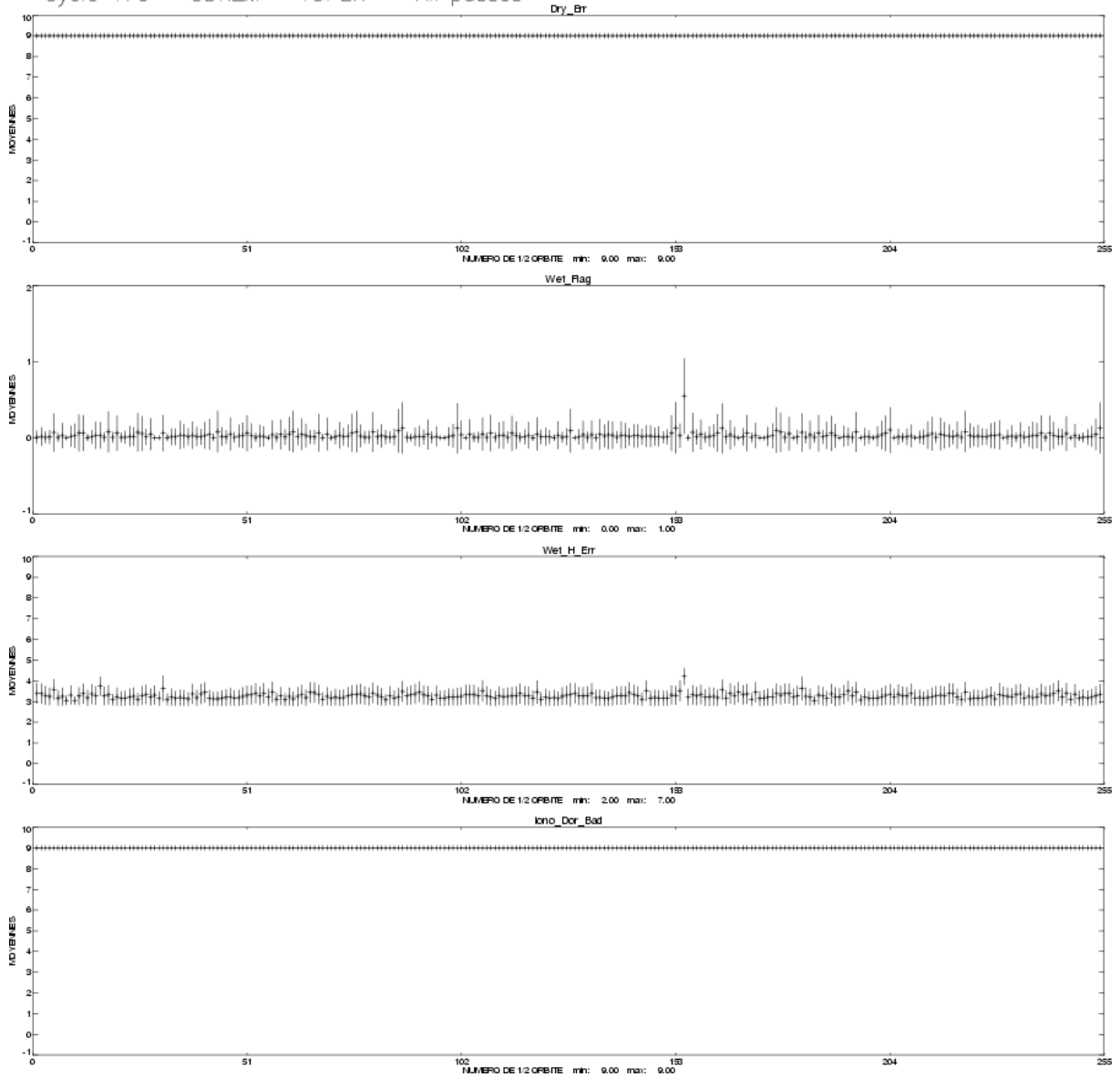
Cycle 470 – GDR\_M – TOPEX – All passes –



Cycle 470 – GDR\_M – TOPEX – All passes –

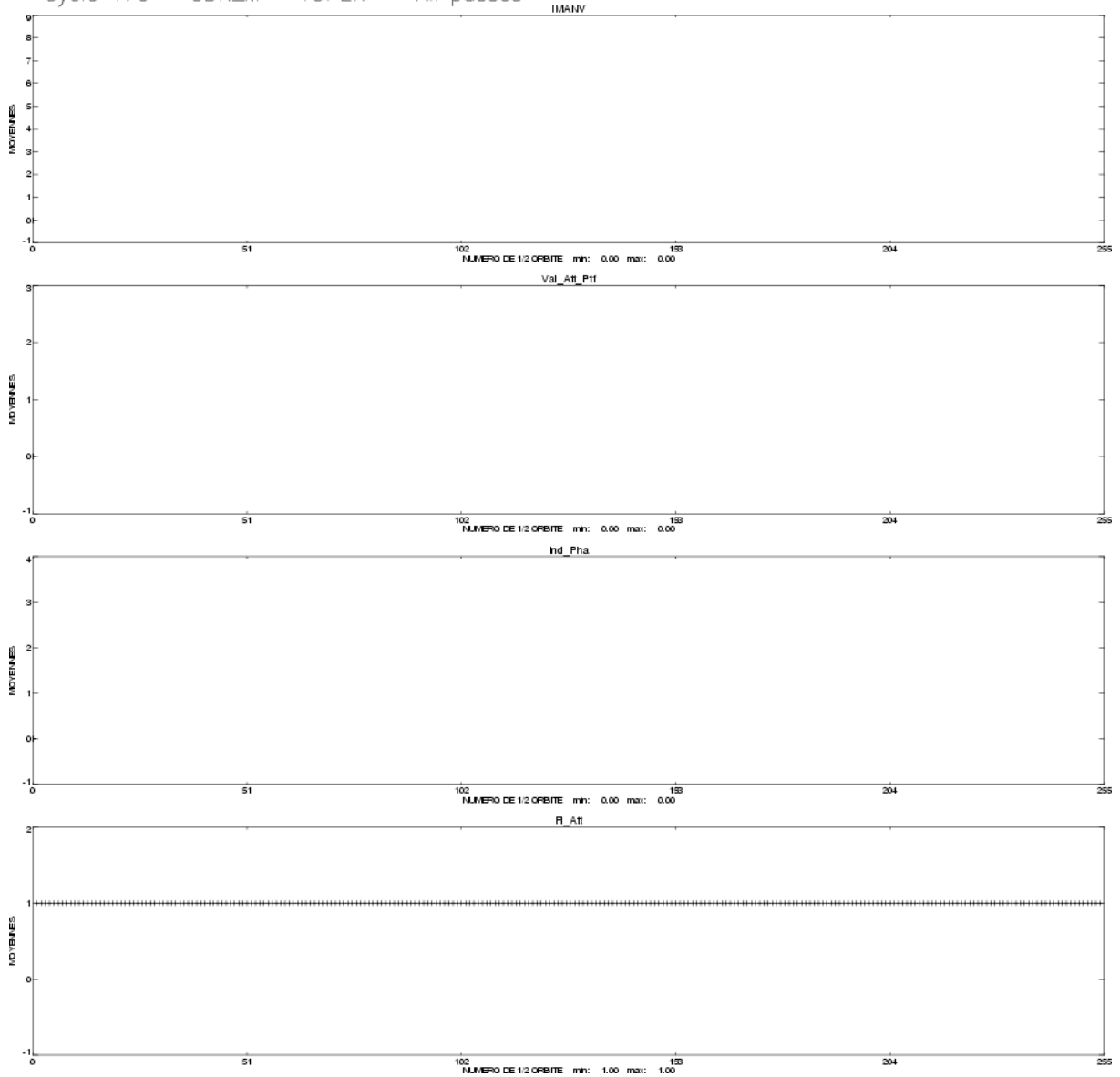


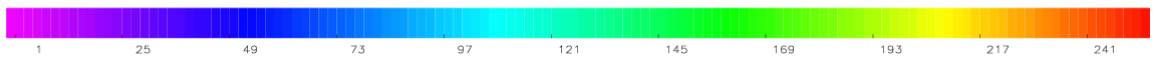
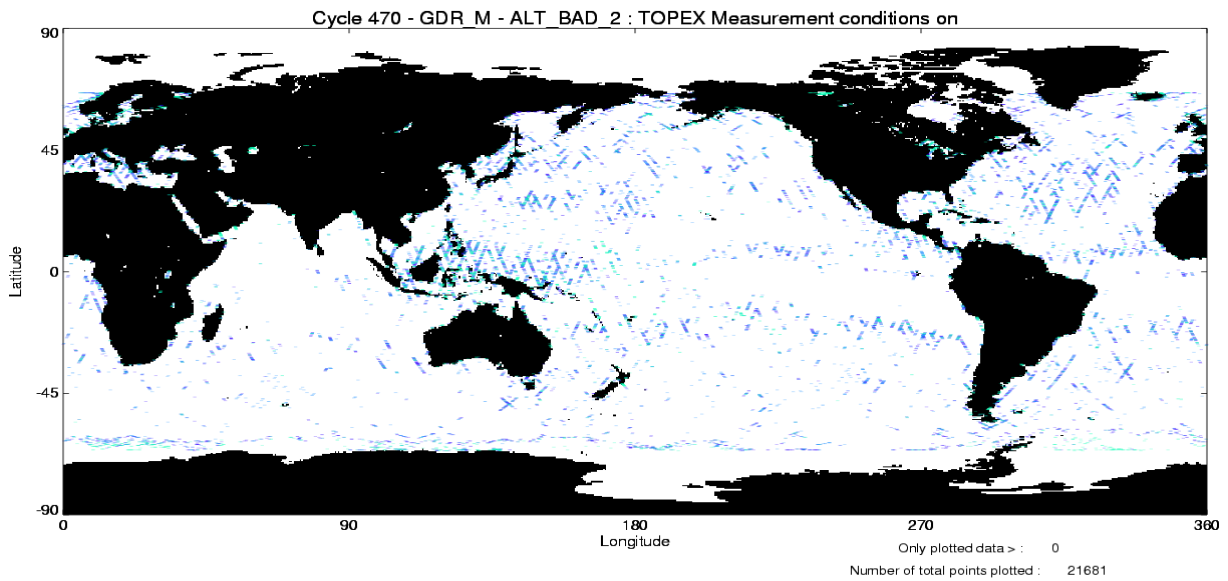
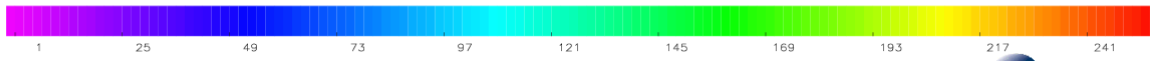
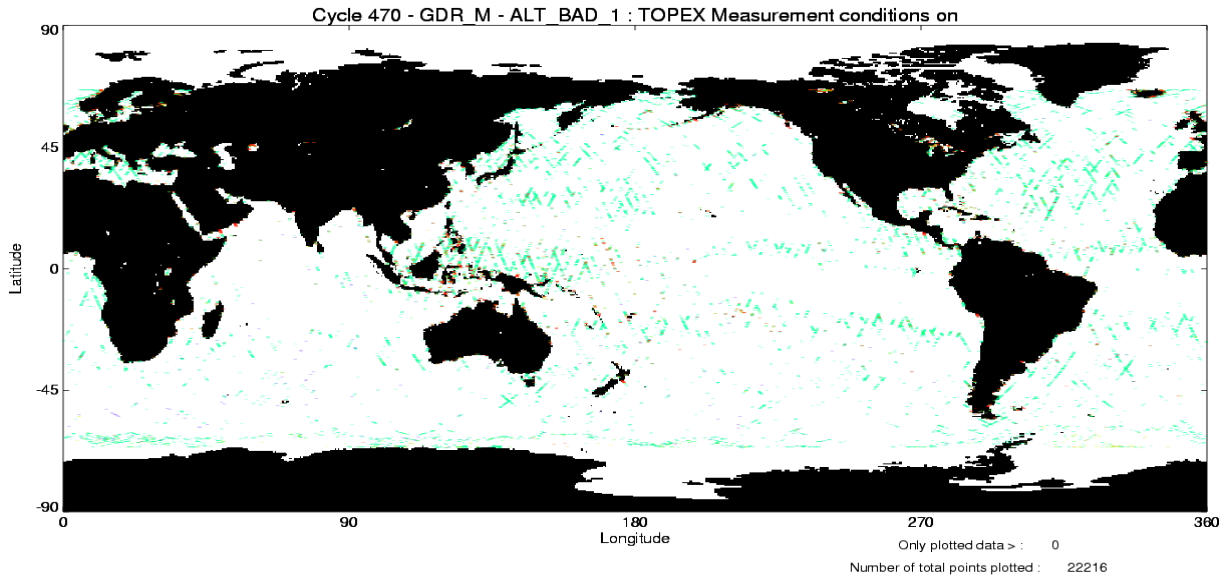
Cycle 470 – GDR\_M – TOPEX – All passes –

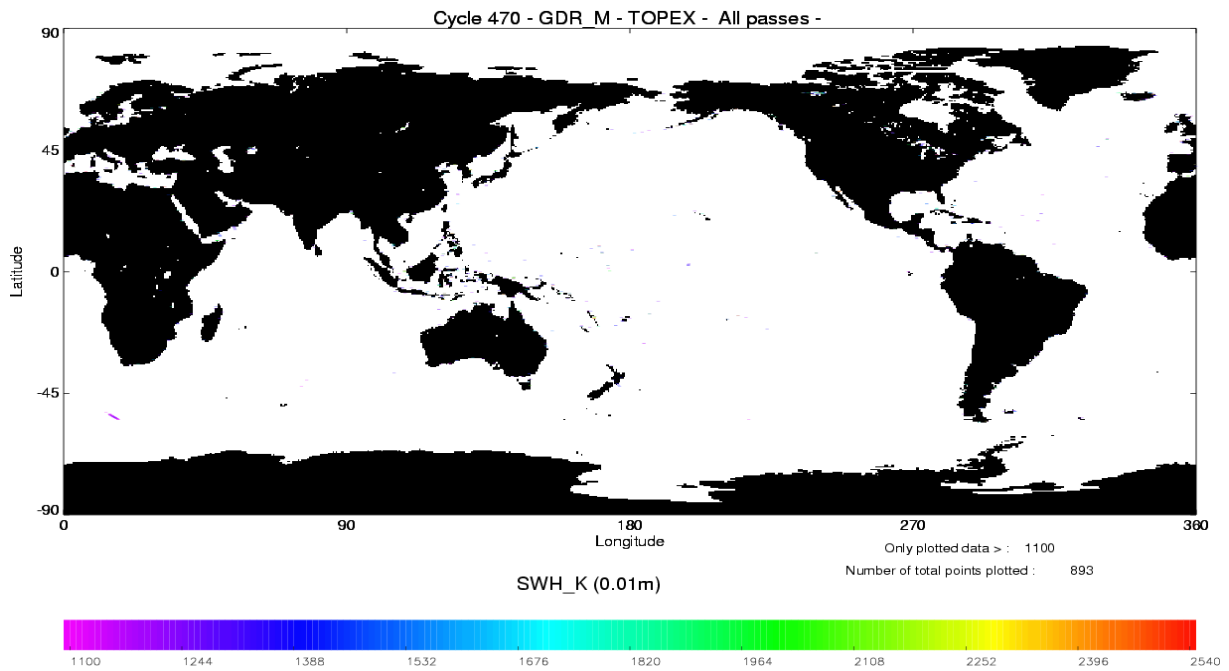
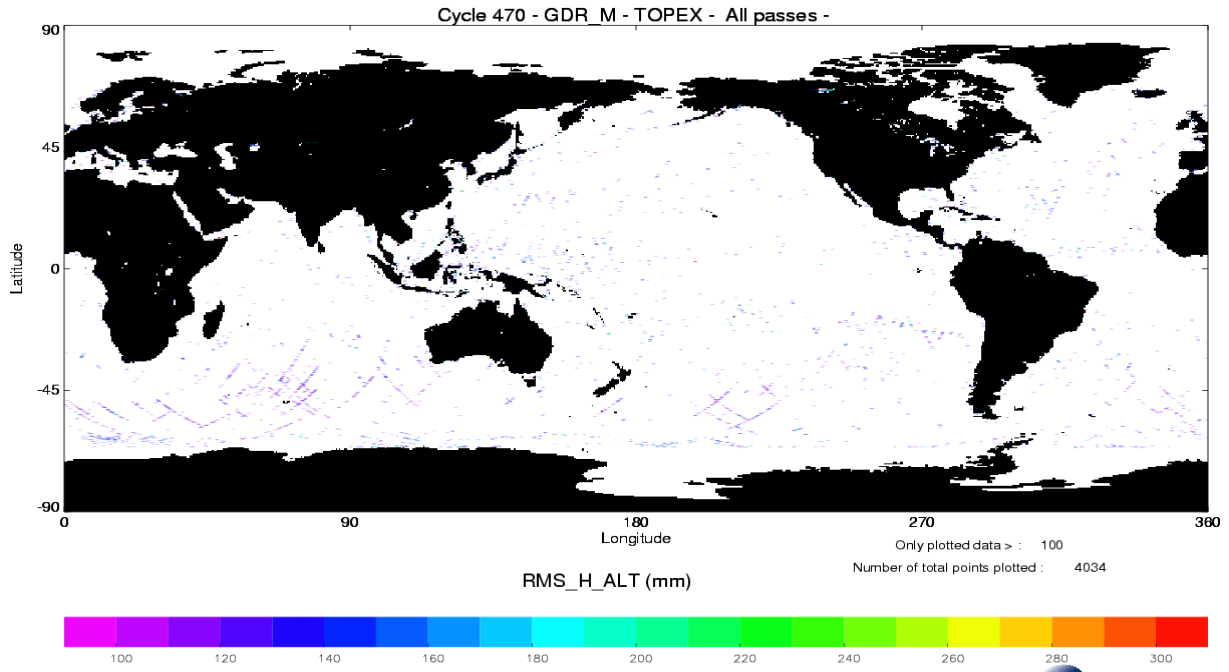


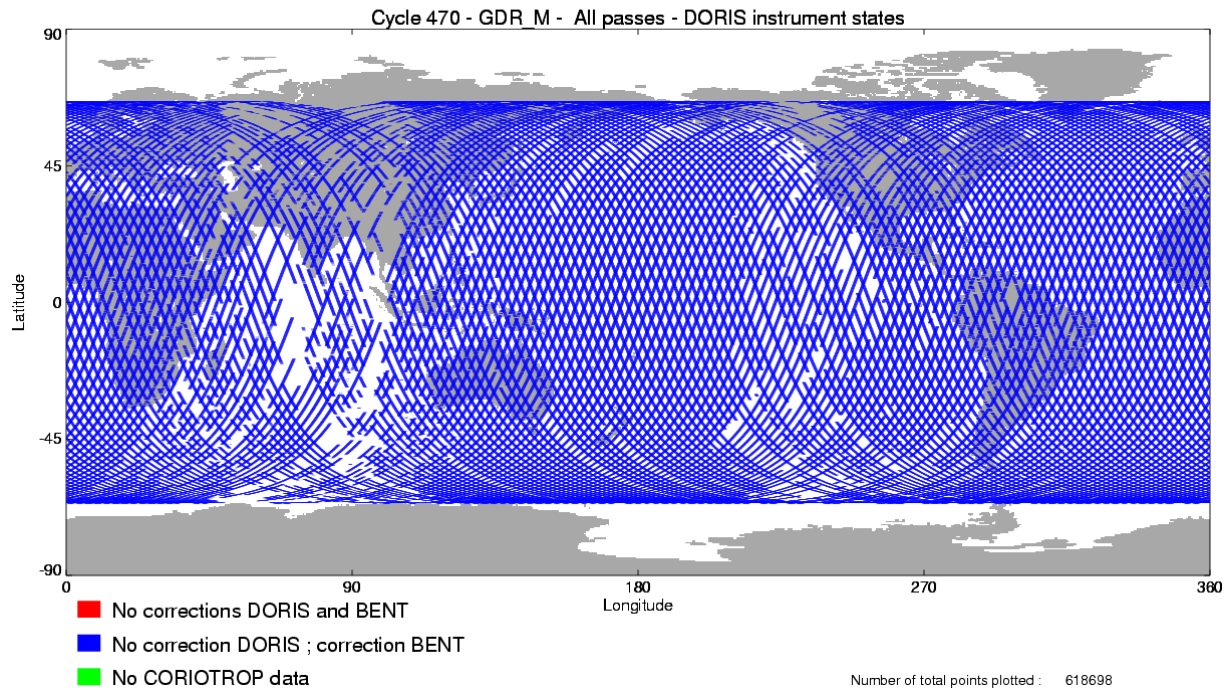


Cycle 470 – GDR\_M – TOPEX – All passes –









### 3.4 Editing

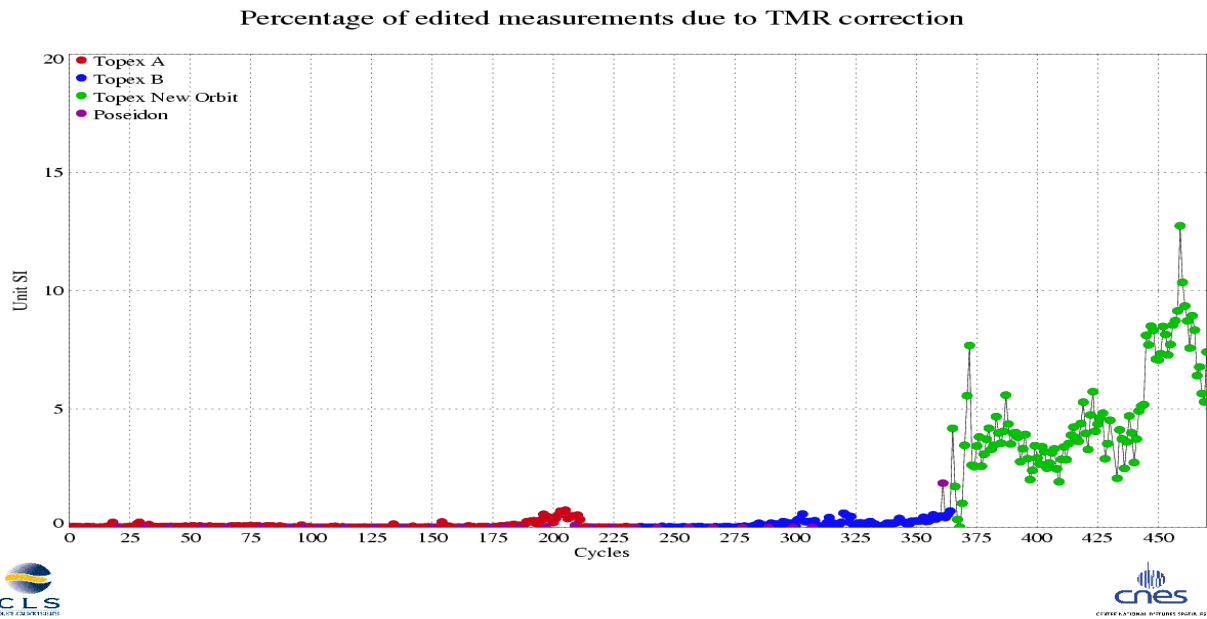
The following table gives for each tested parameter, minimum and maximum thresholds, the number and the percentage of points removed. As a comparison, the mean percentage over a large period of Topex/Poseidon (cycle 1 to 468) is also given.

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 ( 9.22 % of points removed).

Parameters	Min Thres.	Max Thres.	Unit	Mean % usually removed	% removed
Sea surface height	-130.000	100.000	m	0.20	0.08
Sea level anomaly	-2.000	2.000	m	1.91	6.90
Number of 20/10Hz valid points Poseidon/TOPEX	10.000	-		0.34	0.17
Std. deviation of range	0.000	0.200	m	1.11	0.87
Off nadir angle from waveform	0.000	0.400	deg	3.20	3.32
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	7.42
Ionospheric correction (Poseidon:Doris, TOPEX: Dual)	-0.400	0.040	m	0.53	0.19
Significant wave height	0.000	11.000	m	0.19	0.06
Sea state Bias	-0.500	0.000	m	0.54	0.21
Backscatter coefficient	7.000	30.000	dB	0.33	0.11
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

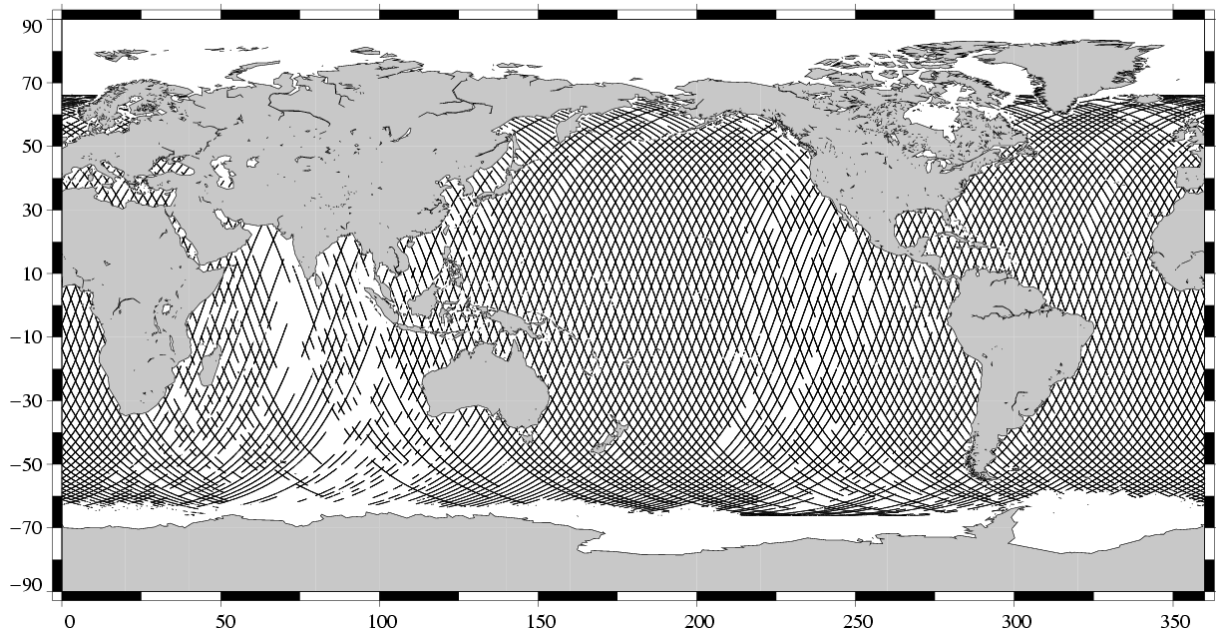
The TMR bad is used to set the TMR parameters to default value when this flag is wrong. This allow us to remove the wrong TMR measurements due to the interpolation anomalies close to the data gaps.

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.

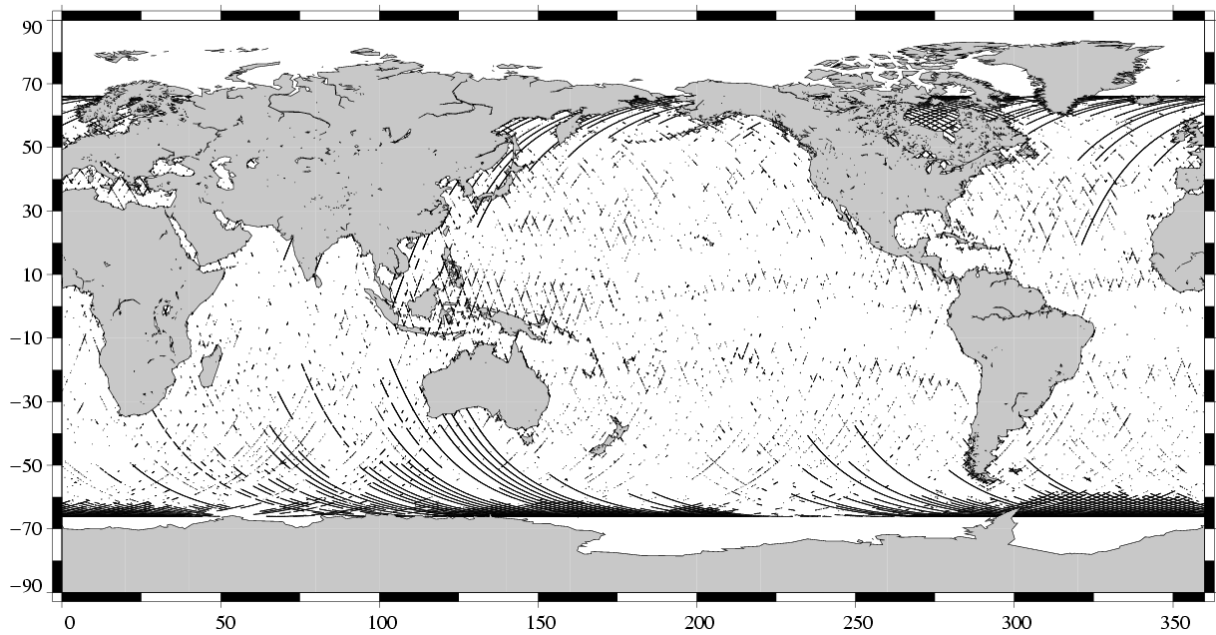


The following three maps are complementary: they show respectively the removed, the selected measurements and the percentage of selected measurements in the editing procedure.

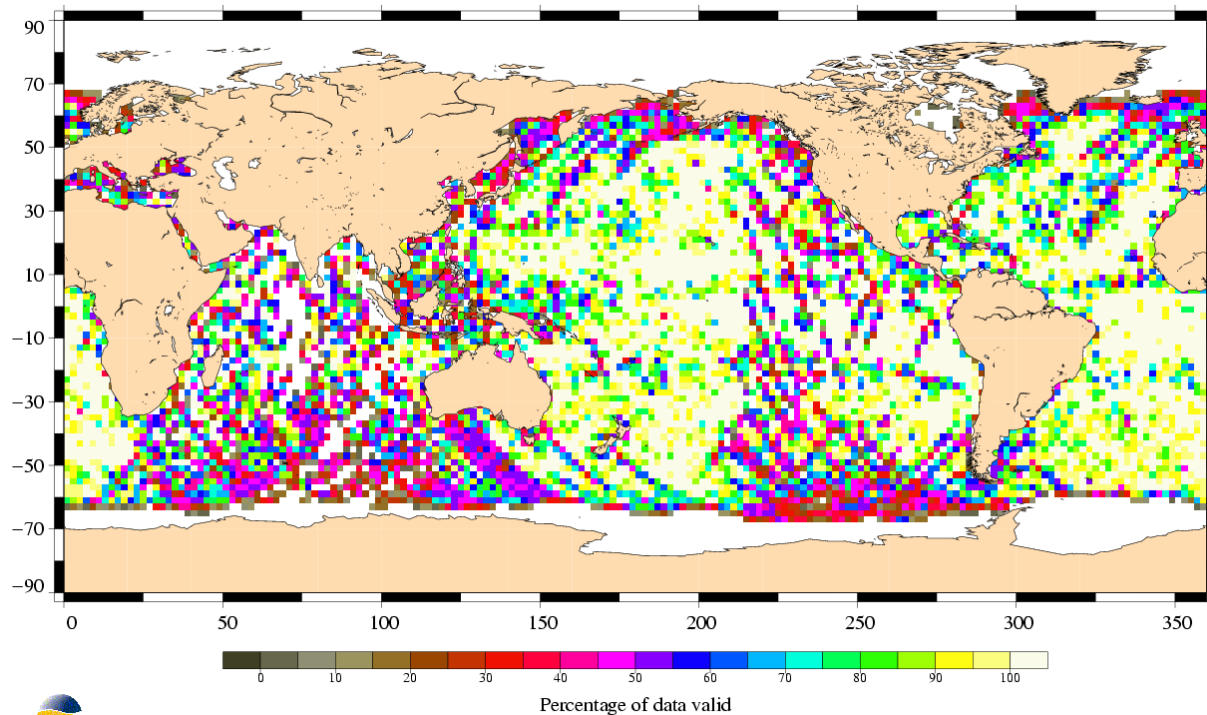
Valid data  
TOPEX/Poseidon Cycle 470 (17/06/2005 / 27/06/2005)



Edited measurements  
TOPEX Cycle 470 (17/06/2005 / 27/06/2005)



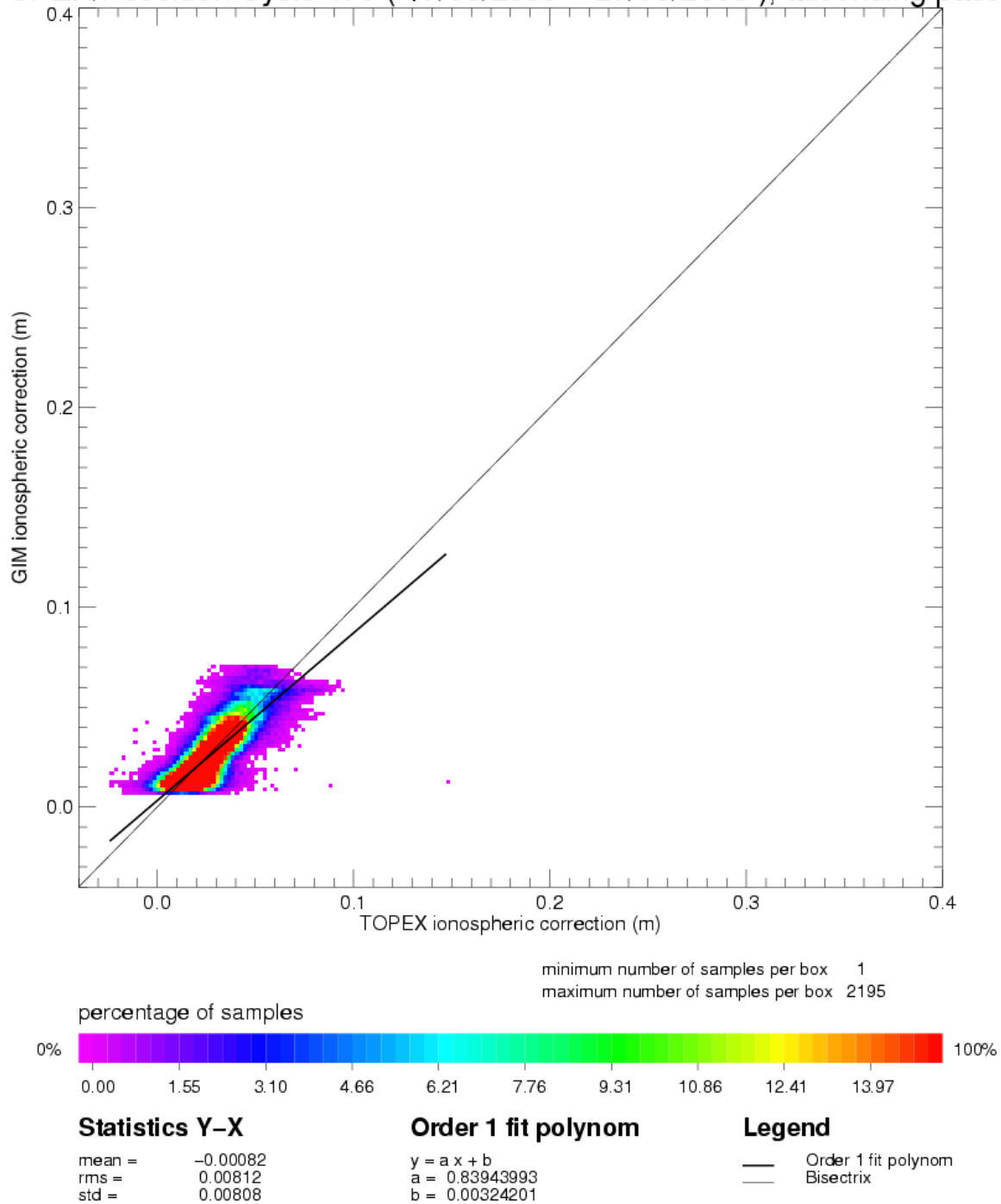
Percentage of valid data relative to the nominal pass  
TOPEX/Poseidon Cycle 470 (17/06/2005 / 27/06/2005)



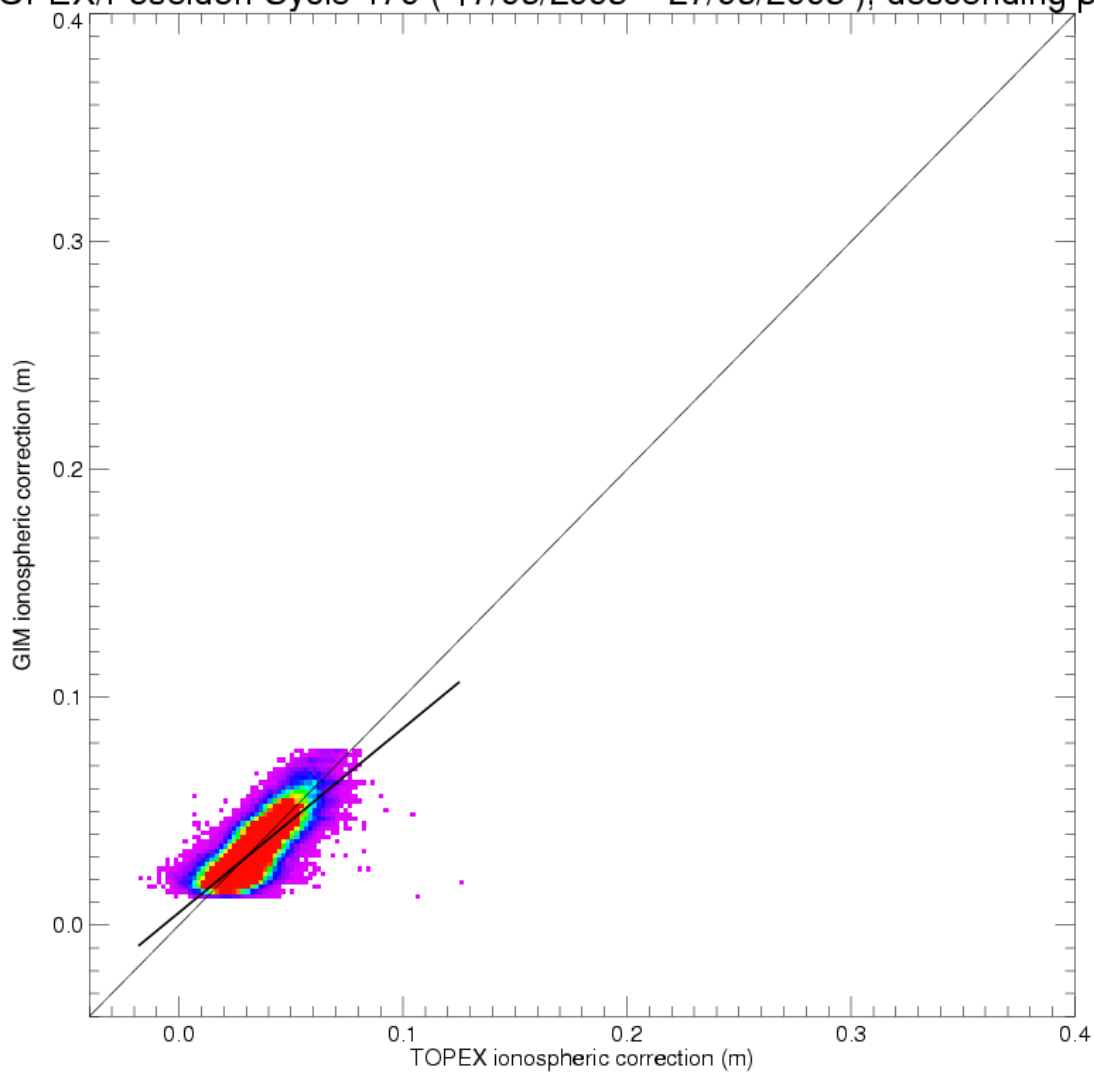


### 3.5 Ionospheric correction

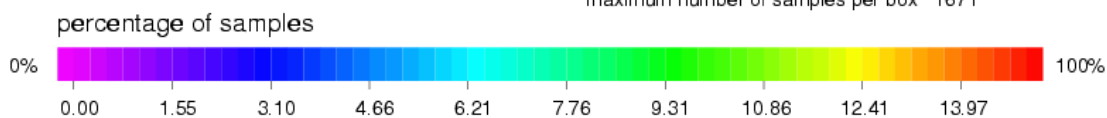
TOPEX/Poseidon Cycle 470 ( 17/06/2005 – 27/06/2005 ), ascending passes



TOPEX/Poseidon Cycle 470 ( 17/06/2005 – 27/06/2005 ), descending passes



minimum number of samples per box 1  
 maximum number of samples per box 1671



**Statistics Y-X**

mean = -0.00059  
 rms = 0.00722  
 std = 0.00719

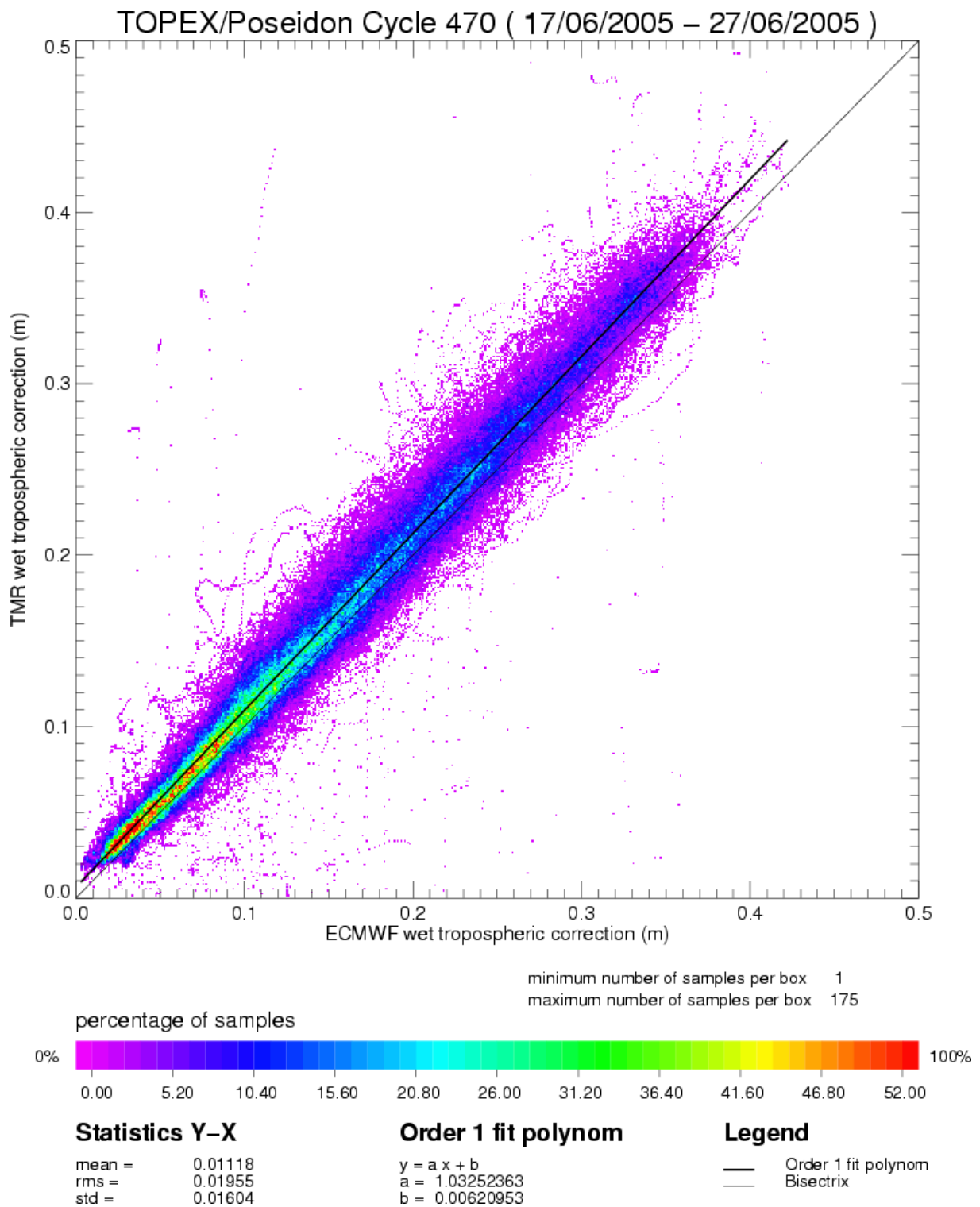
**Order 1 fit polynom**

$y = a x + b$   
 $a = 0.80845416$   
 $b = 0.00556595$

**Legend**

— Order 1 fit polynom  
 — Bisectrix

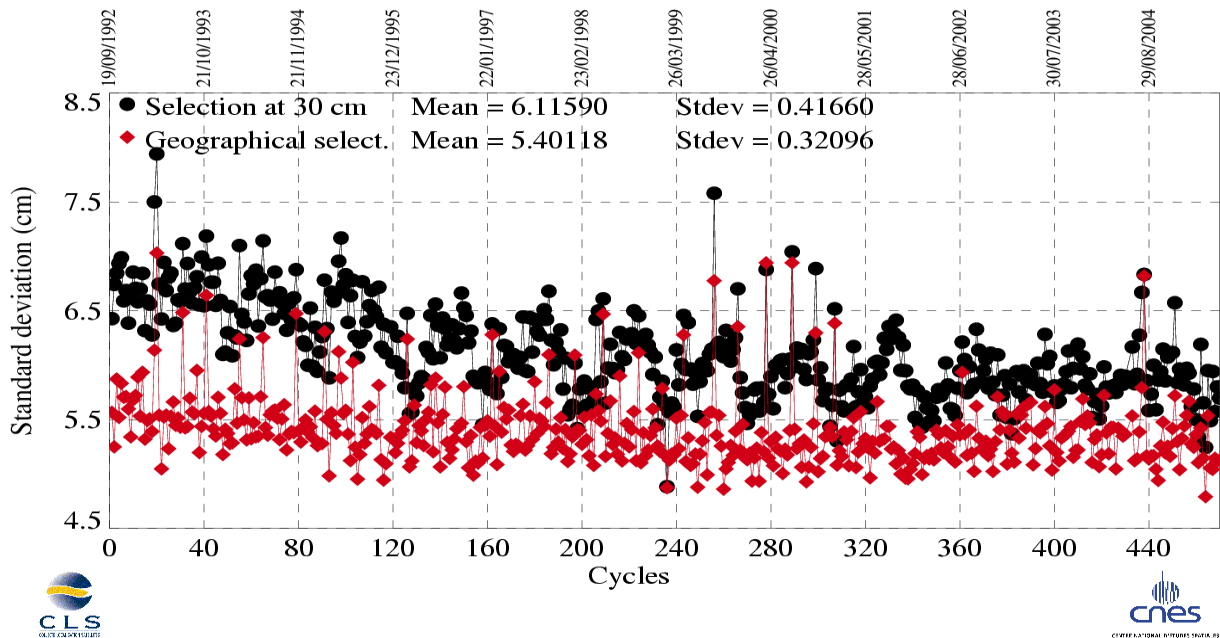
### 3.6 Wet tropospheric corection



### 3.7 Long term monitoring

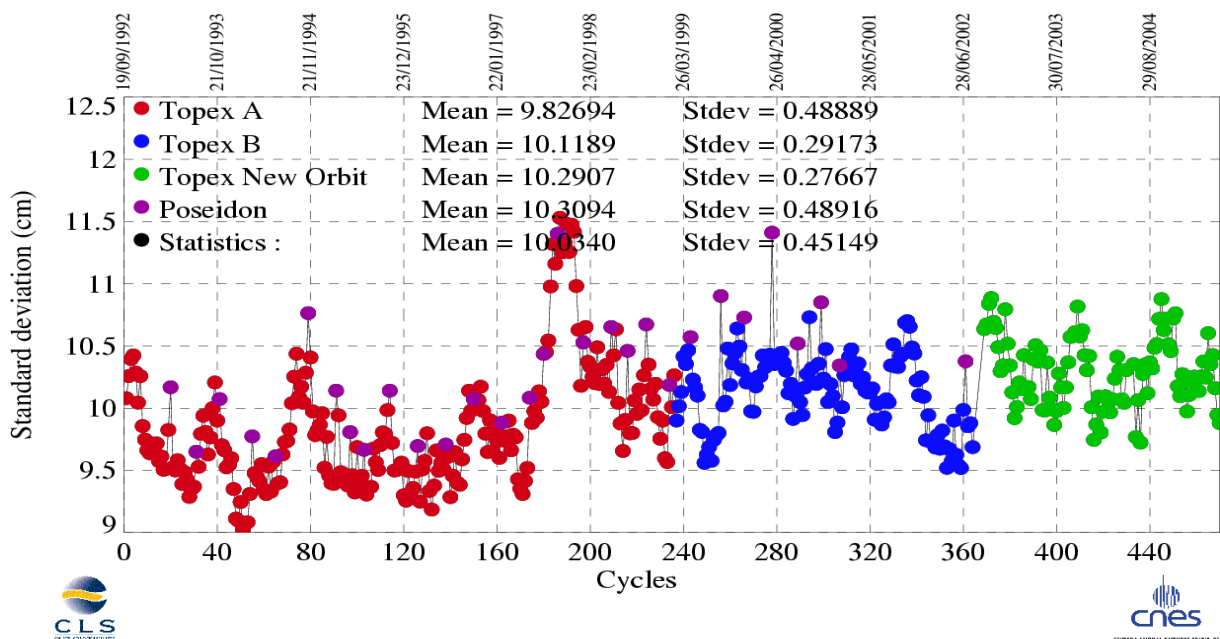
#### 3.7.1 Crossover performances

##### Crossover standard deviation



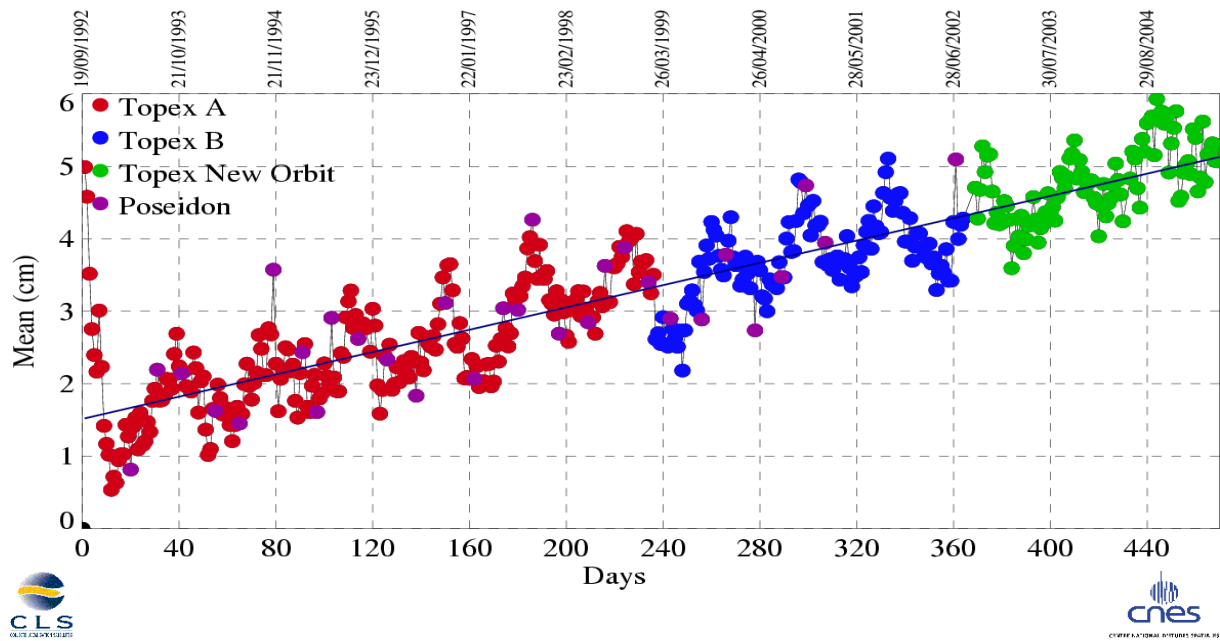
#### 3.7.2 Along-track performances

##### Standard deviation of Sea Level Anomalies



### 3.7.3 Mean Sea Level

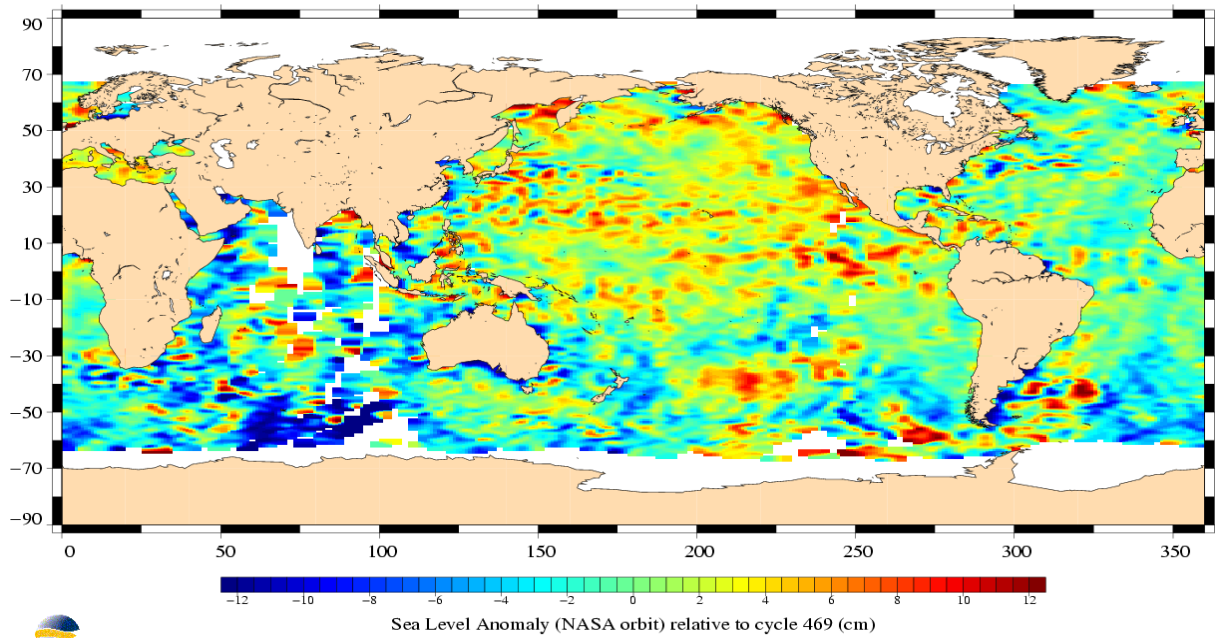
## Mean Sea Level



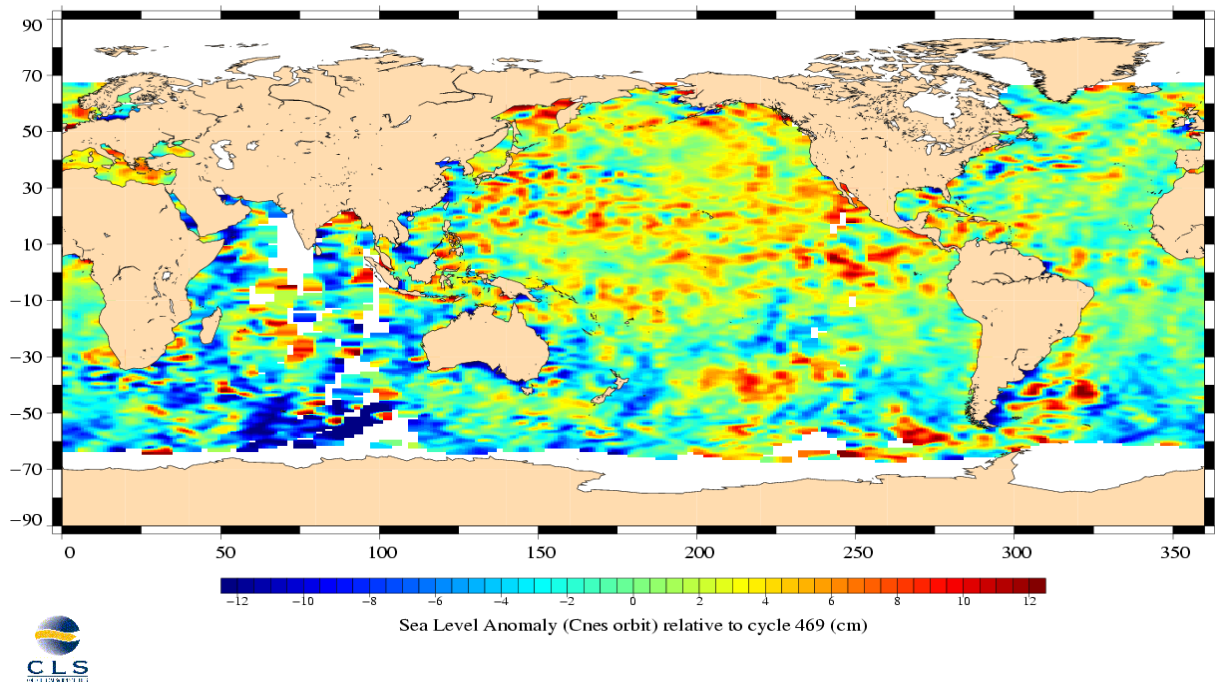
### 3.8 SSH variability

#### 3.8.1 Sea Level Anomaly

TOPEX/Poseidon, cycle 470  
Period : 17/06/2005 – 27/06/2005



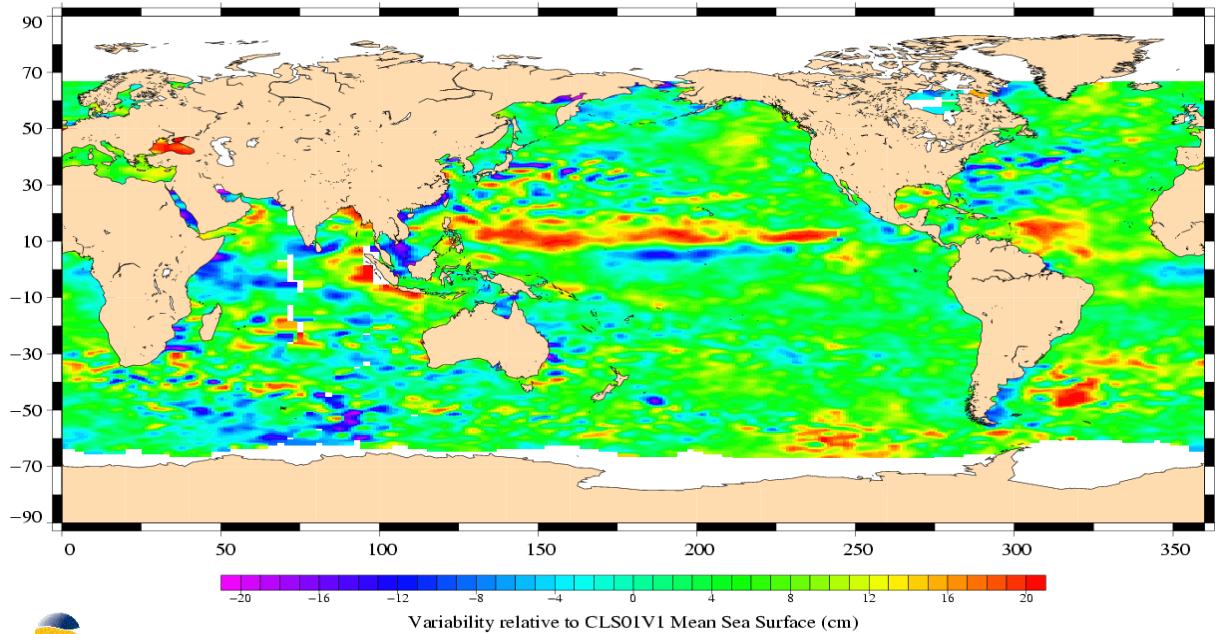
TOPEX/Poseidon, cycle 470  
Period : 17/06/2005 – 27/06/2005



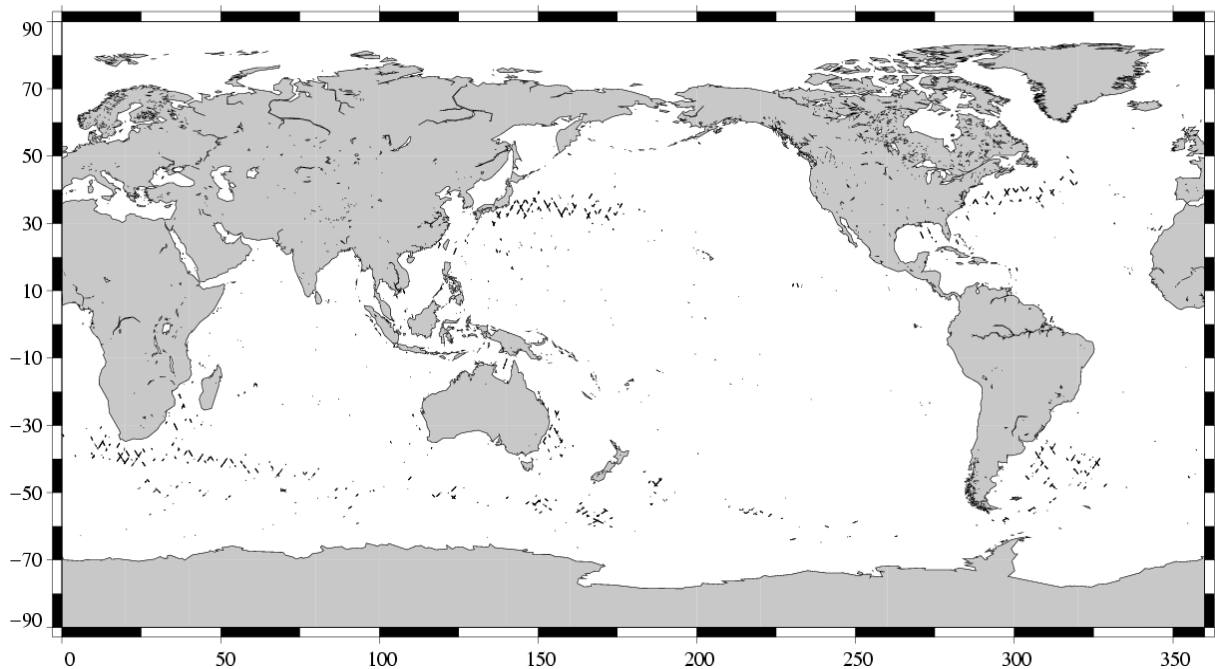
### 3.8.2 Comparison to a precise Mean Sea Surface

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 470  
Period : 17/06/2005 – 27/06/2005

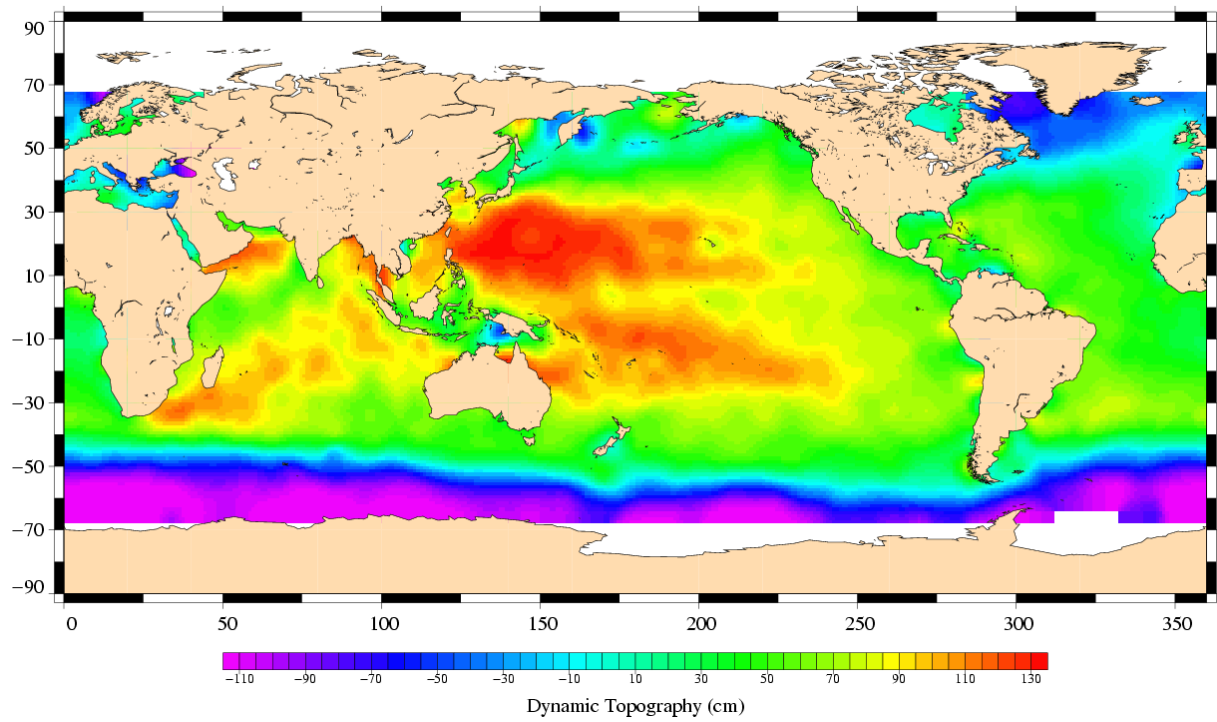


(SSH - MSS) differences greater than 0.3 m  
TOPEX/Poseidon Cycle 470 (17/06/2005 / 27/06/2005)



### 3.9 Dynamic topography

TOPEX/Poseidon, cycle 470  
Period : 17/06/2005 – 27/06/2005

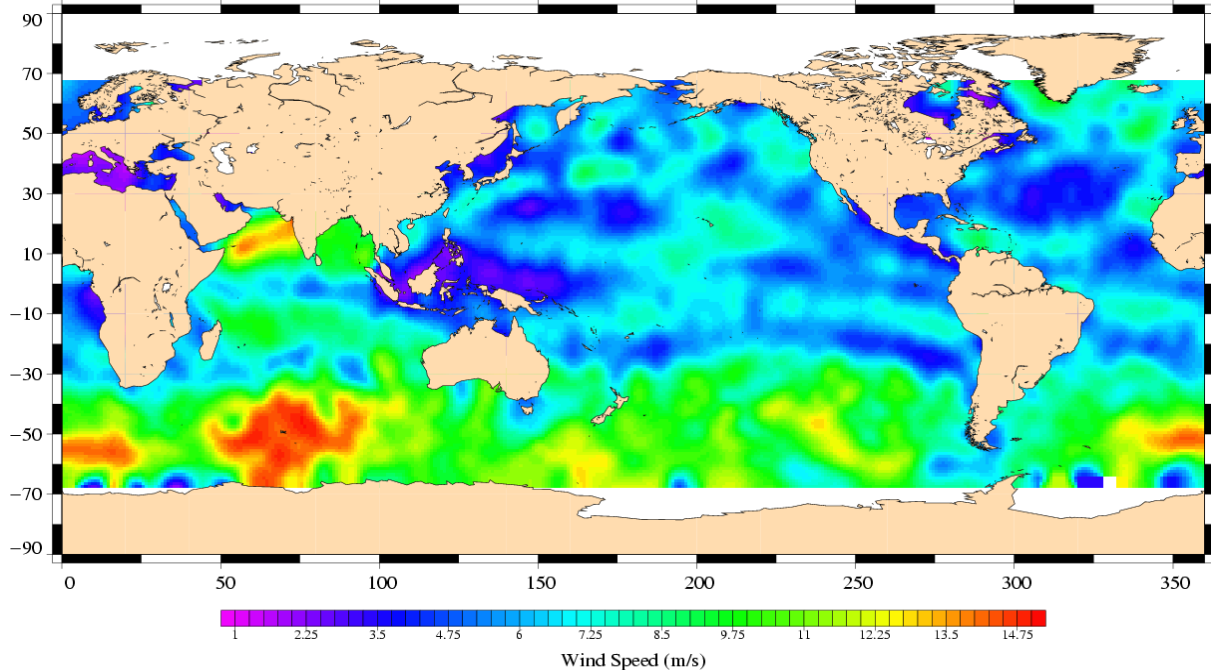




### 3.10 Wind and wave maps

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

TOPEX/Poseidon, cycle 470  
Period : 17/06/2005 – 27/06/2005



TOPEX/Poseidon, cycle 470  
Period : 17/06/2005 – 27/06/2005

