

# Wet Tropo Correction: ECMWF vs Radiometer

Study variable	<b>ECMWF</b>
Reference variable	<b>Radiometer</b>
Missions	ERS-2 ( <i>e2</i> ), Envisat ( <i>en</i> )
Period	[18232, 22280]

Creation date : 2011/08/30

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## Study overview

In this study, the ECMWF wet tropospheric correction model has been compared with the composite correction used in CNES/AVISO products to compute the ERS-2 and Envisat sea-level height (SSH).

The impact of using these both wet tropospheric corrections on the SSH computation has been analyzed for ERS-2 and Envisat missions :

- for ERS-2 : from December 1999 (cycle 49) to December 2010 (Cycle 163)
- for Envisat : from September 2002 (cycle 9) to October 2010 (Cycle 94)

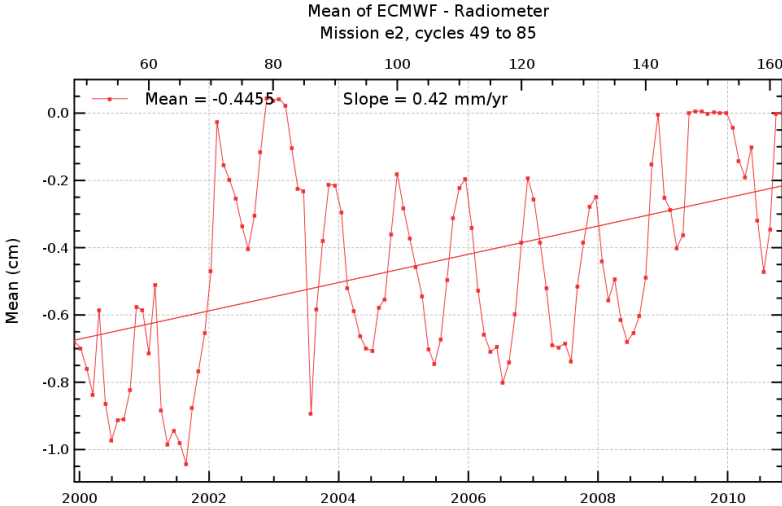
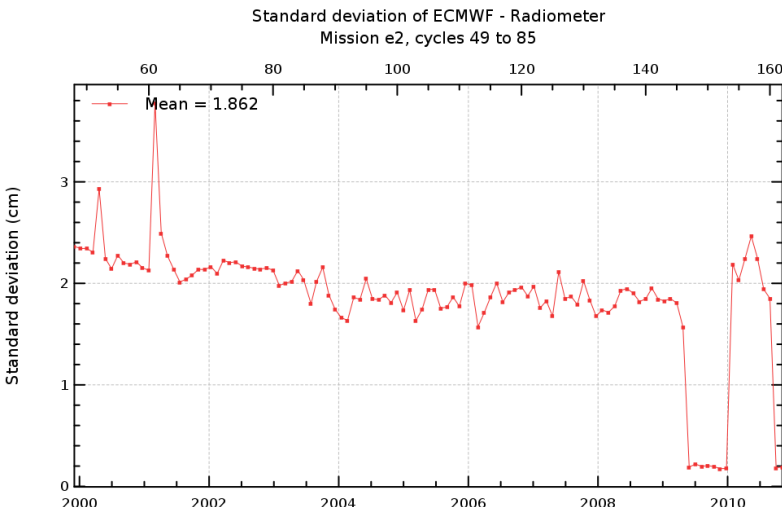
The ECMWF wet tropospheric correction is produced by EUMETSAT using 3D data from the ECMWF model to generate wet tropospheric values.

The reference wet tropospheric corrections are composite ones:

- for ERS-2: a neuronal correction is used offshore and the ECMWF operational model is used close to the coasts (coastal distance lower than 50 km)
- for ENVISAT: the radiometric wet tropospheric correction present in GDR products is used for coastal distances greater than 50 km while the ECMWF operational correction model is used for coastal distances lower than 50 km.

For both satellites, the ECMWF operational correction is adjusted on the radiometric correction to provide the continuity in the wet tropospheric correction dataset.

All the validation diagnostics displayed in this report have been performed in agreement with the Sea-Level CCI Product Validation Plan (PVP).

Diagnostic A001 (mission e2)	
Name : Temporal evolution of differences between both altimetric components	
Input data : Along-track altimetric components	
Description : The temporal evolution of global statistics (mean, variance, slope) of differences between 2 different standards of a same altimetric component (sea surface height correction, altimeter parameter, orbit) are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) . These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements.	
<div><div><div>Mean of ECMWF - Radiometer Mission e2, cycles 49 to 85</div><div></div></div><div><div>Standard deviation of ECMWF - Radiometer Mission e2, cycles 49 to 85</div><div></div></div></div>	



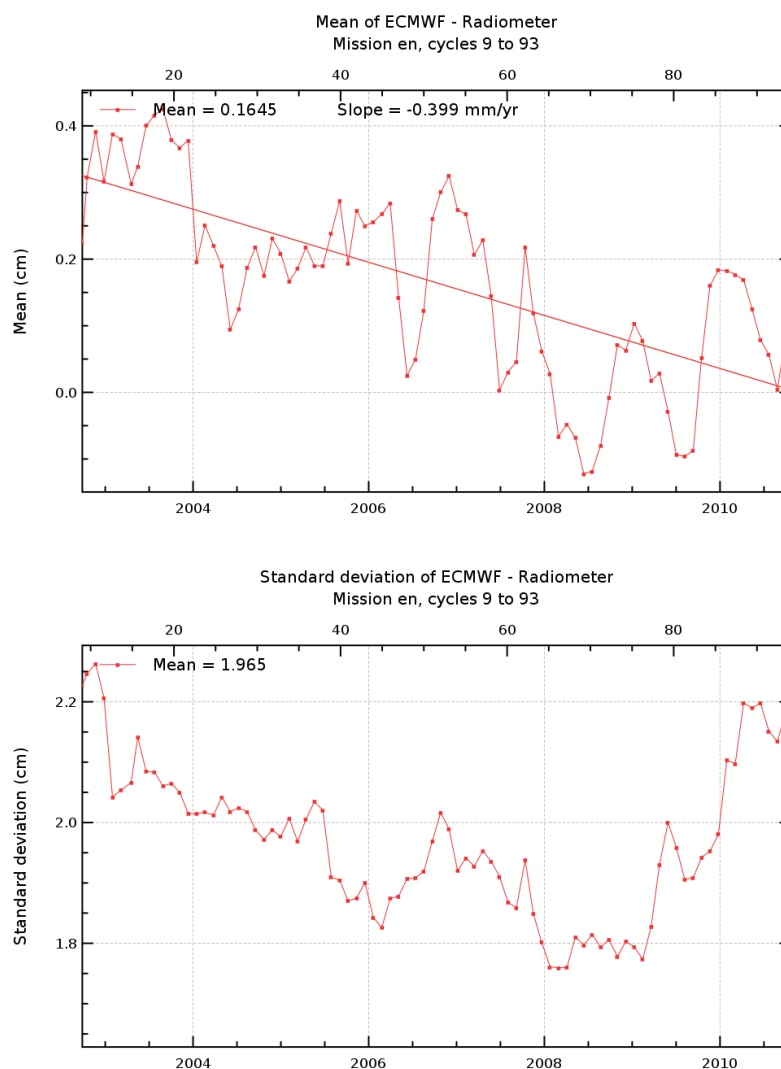
## Diagnostic A001 (mission en)

**Name :** Temporal evolution of differences between both altimetric components

**Input data :** Along-track altimetric components

**Description :** The temporal evolution of global statistics (mean, variance, slope) of differences between 2 different standards of a same altimetric component (sea surface height correction, altimeter parameter, orbit) are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) . These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements.

Diagnostic type : Global internal analyses



Diagnostic A002 (mission e2)	
Name : Map of differences between both altimetric components over all the period	
Input data : Along-track altimetric components	
<p><b>Description :</b> The map of global statistics (mean, standard deviation) of differences between 2 different standards of a same altimetric component (sea surface height correction, altimeter parameter, orbit) are calculated over a given period which is the longer as possible to have obtain reliable statically results. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements.</p>	
<div><div>Mean of ECMWF – Radiometer Mission e2, cycles 49 to 85</div><div>Mean ( cm )</div><div>Standard deviation of ECMWF – Radiometer Mission e2, cycles 49 to 85</div><div>Standard deviation ( cm )</div></div>	

## Diagnostic A002 (mission en)

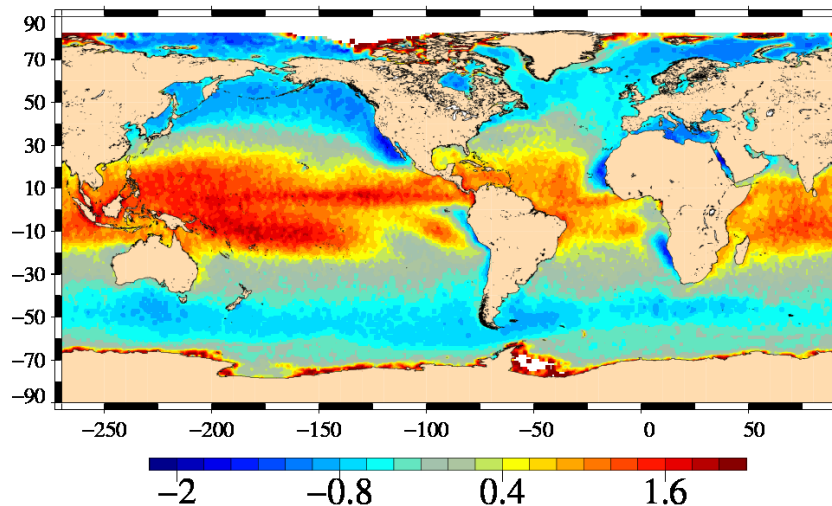
**Name :** Map of differences between both altimetric components over all the period

**Input data :** Along-track altimetric components

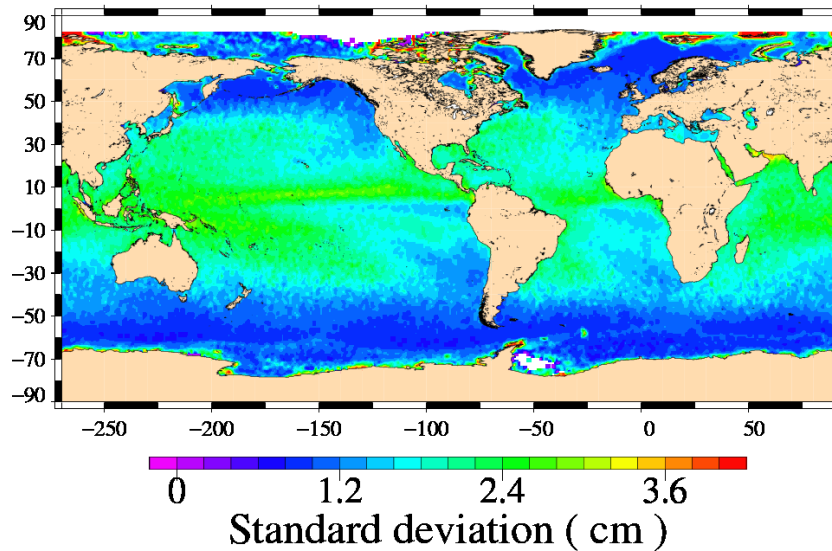
**Description :** The map of global statistics (mean, standard deviation) of differences between 2 different standards of a same altimetric component (sea surface height correction, altimeter parameter, orbit) are calculated over a given period which is the longer as possible to have obtain reliable statically results. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements.

Diagnostic type : Global internal analyses

Mean of ECMWF – Radiometer  
Mission en, cycles 9 to 93



Standard deviation of ECMWF – Radiometer  
Mission en, cycles 9 to 93



Diagnostic A003_a (mission e2)	
Name : Periodogram derived from temporal evolution of altimetric component differences	
Input data : Along-track altimetric components	
<p><b>Description :</b> The periodogram derived from temporal and global altimetric component differences is calculated from cycle by cycle monitoring of altimetric component differences (derived from diagnostic A001). It is calculated from the mean or the variance differences. The Periodogram can be calculated for all the periods, but it can be focused on a dedicated period.</p>	
<div><p>Periodogram of the mean of ECMWF - Radiometer (reference period = 1 year) Mission e2, cycles 49 to 85</p><p>Periodogram of the standard deviation of ECMWF - Radiometer (reference period = 1 year) Mission e2, cycles 49 to 85</p></div>	

## Diagnostic A003\_b (mission e2)

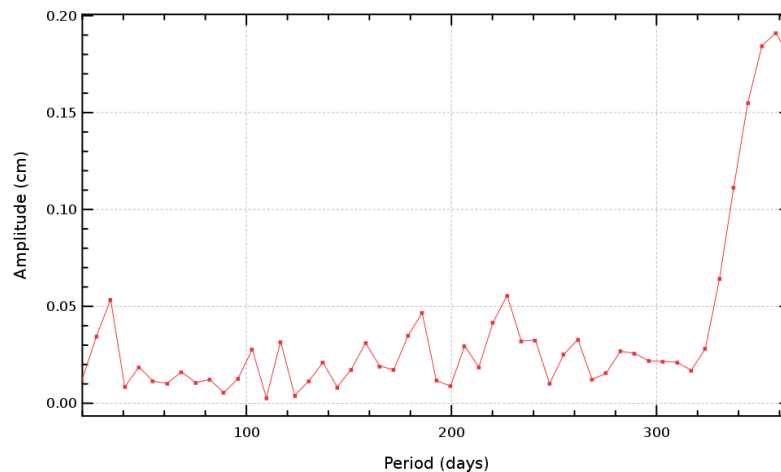
**Name :** Periodogram derived from temporal evolution of altimetric component differences

**Input data :** Along-track altimetric components

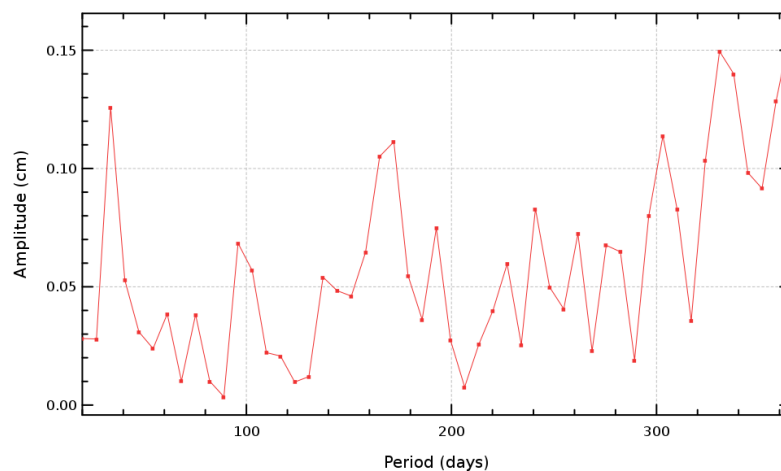
**Description :** The periodogram derived from temporal and global altimetric component differences is calculated from cycle by cycle monitoring of altimetric component differences (derived from diagnostic A001). It is calculated from the mean or the variance differences. The Periodogram can be calculated for all the periods, but it can be focused on a dedicated period.

Diagnostic type : Global internal analyses

Periodogram of the mean of ECMWF - Radiometer (period = [0, 1 year])  
Mission e2, cycles 49 to 85



Periodogram of the standard deviation of ECMWF - Radiometer (period = [0, 1 year])  
Mission e2, cycles 49 to 85



## Diagnostic A003.a (mission en)

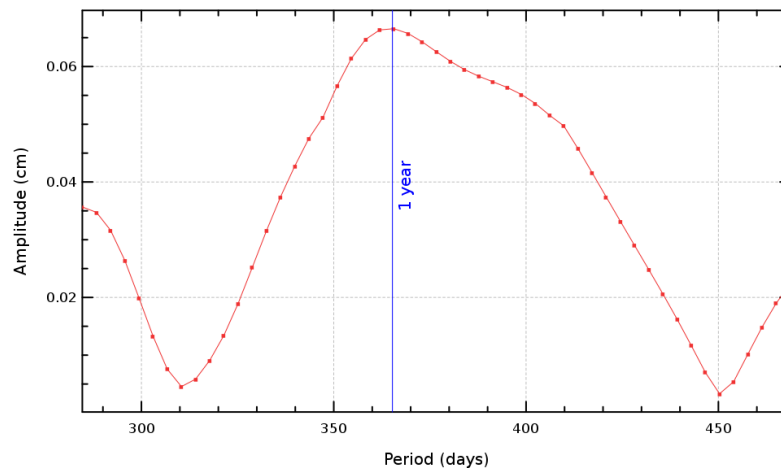
**Name :** Periodogram derived from temporal evolution of altimetric component differences

**Input data :** Along-track altimetric components

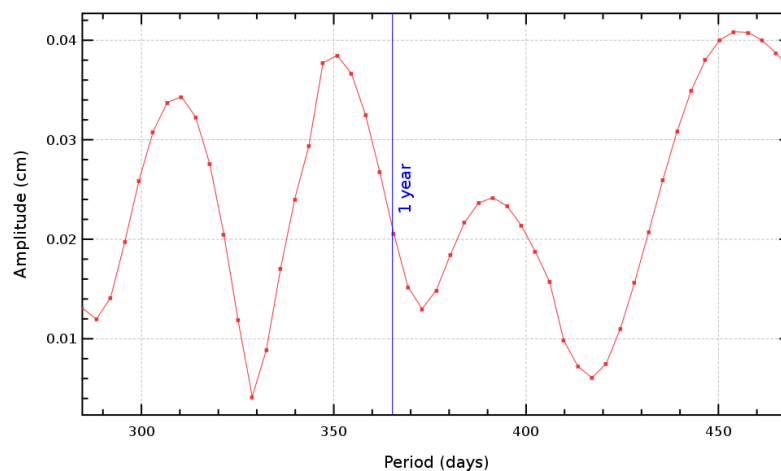
**Description :** The periodogram derived from temporal and global altimetric component differences is calculated from cycle by cycle monitoring of altimetric component differences (derived from diagnostic A001). It is calculated from the mean or the variance differences. The Periodogram can be calculated for all the periods, but it can be focused on a dedicated period.

Diagnostic type : Global internal analyses

Periodogram of the mean of ECMWF - Radiometer (reference period = 1 year)  
Mission en, cycles 9 to 93



Periodogram of the standard deviation of ECMWF - Radiometer (reference period = 1 year)  
Mission en, cycles 9 to 93

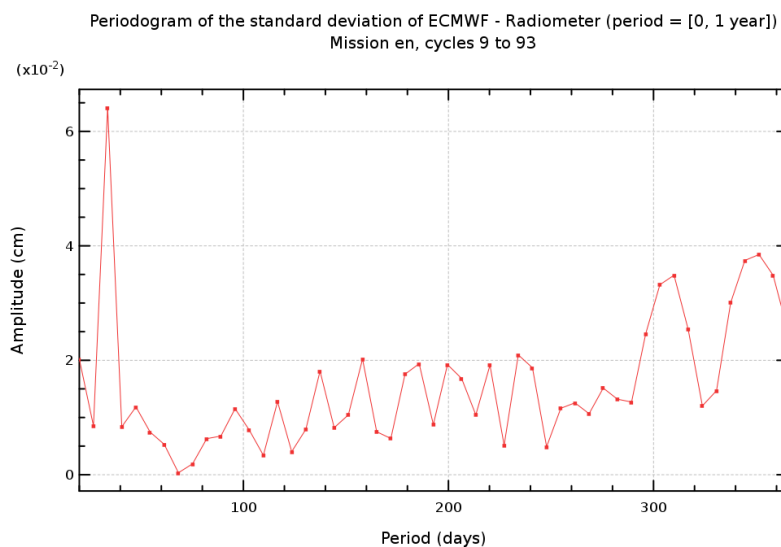
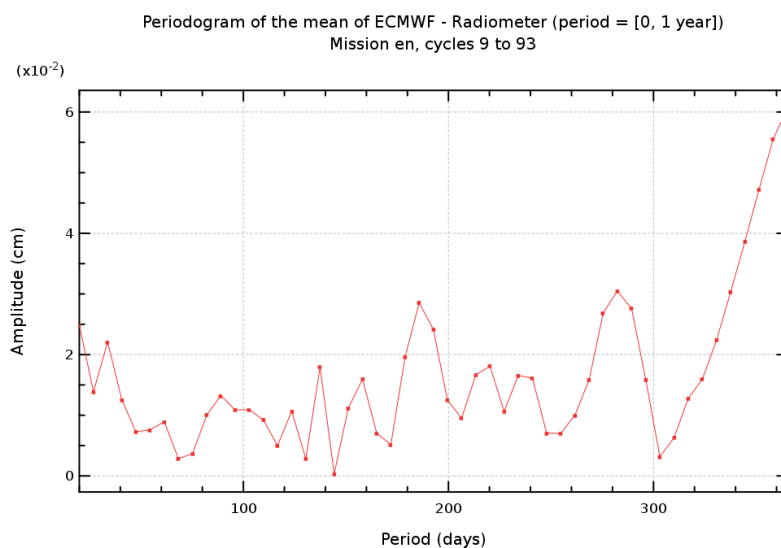


**Diagnostic A003\_b (mission en)**

**Name :** Periodogram derived from temporal evolution of altimetric component differences

**Input data :** Along-track altimetric components

**Description :** The periodogram derived from temporal and global altimetric component differences is calculated from cycle by cycle monitoring of altimetric component differences (derived from diagnostic A001). It is calculated from the mean or the variance differences. The Periodogram can be calculated for all the periods, but it can be focused on a dedicated period.



Diagnostic A101 (mission e2)	
Name : Temporal evolution of SSH crossovers	
Input data : Sea Surface Height (SSH) crossovers	
<p><b>Description :</b> The temporal evolution of global statistics (mean, standard deviation) of SSH differences are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) using successively both altimetric components in the SSH calculation. SSH crossovers are the differences between ascending and descending passes for time differences between both passes lower than 10 days (in order to reduce the effect of the oceanic variability).</p>	
<div><div><div>Mean of SSH crossovers Mission e2, cycles 49 to 85</div><div><div>200120022003</div><div><div>SSH with ECMWF</div><div>SSH with Radiometer</div></div><div>Mean = -0.05711</div><div>Mean = 0.1058</div><div>1.5</div><div>1.0</div><div>0.5</div><div>0.0</div><div>-0.5</div><div>-1.0</div></div><div>50607080</div></div></div> <div><div><div>Standard deviations of SSH crossovers Mission e2, cycles 49 to 85</div><div><div>200120022003</div><div><div>SSH with ECMWF</div><div>SSH with Radiometer</div></div><div>Mean = 9.625</div><div>Mean = 9.479</div><div>14</div><div>12</div><div>10</div><div>8</div></div><div>50607080</div></div></div>	



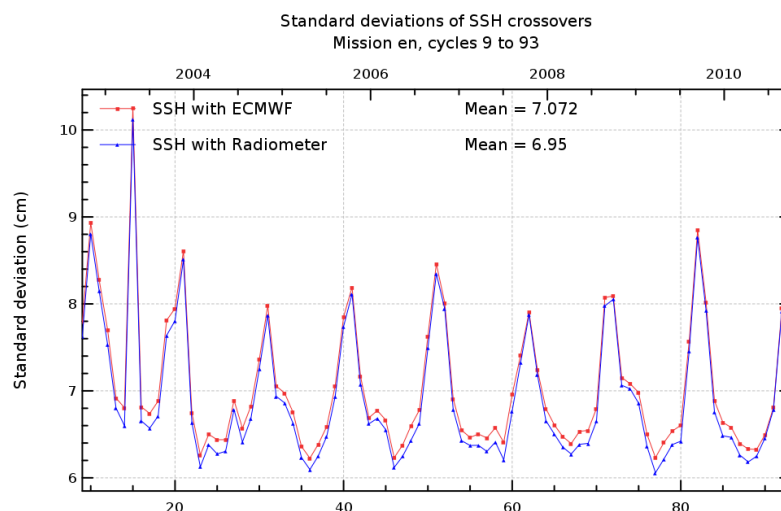
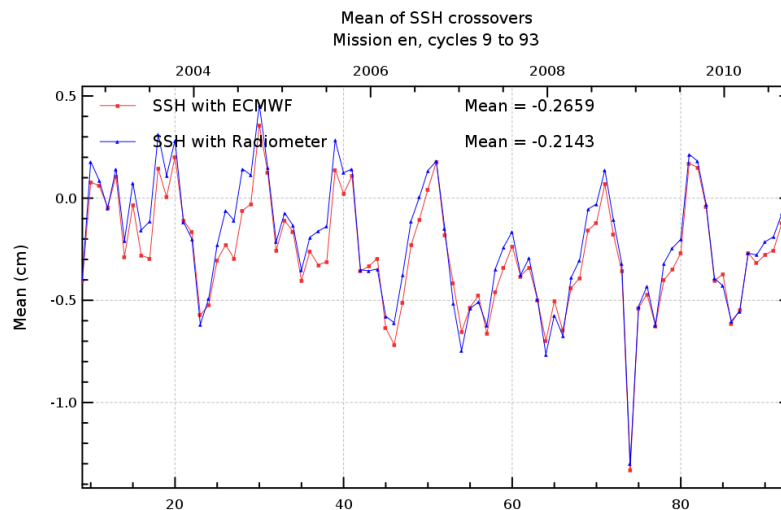
## Diagnostic A101 (mission en)

**Name :** Temporal evolution of SSH crossovers

**Input data :** Sea Surface Height (SSH) crossovers

**Description :** The temporal evolution of global statistics (mean, standard deviation) of SSH differences are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) using successively both altimetric components in the SSH calculation. SSH crossovers are the differences between ascending and descending passes for time differences between both passes lower than 10 days (in order to reduce the effect of the oceanic variability).

Diagnostic type : Global internal analyses



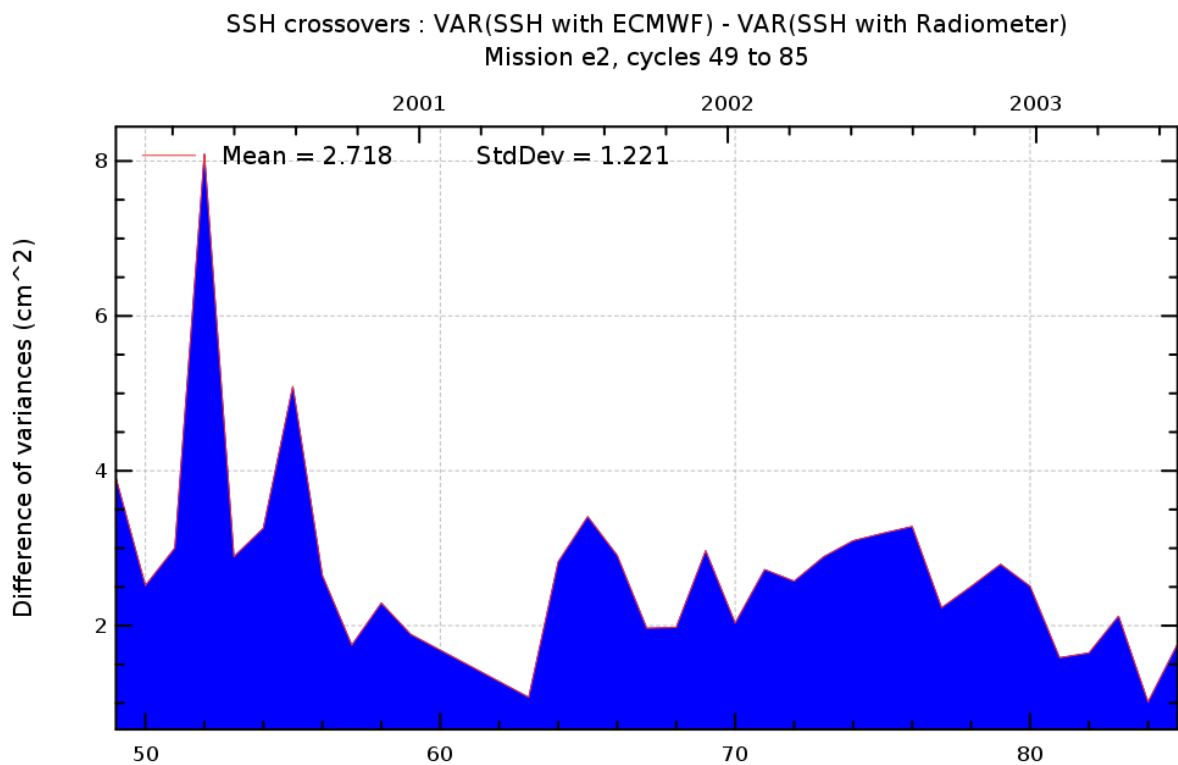
**Diagnostic A102 (mission e2)**

**Name :** Differences between temporal evolution of SSH crossovers

**Input data :** Sea Surface Height (SSH) crossovers

**Description :** The difference of temporal evolution between the global statistics (mean, standard deviation) of SSH differences are calculated using successively both altimetric components in the SSH calculation. SSH crossovers are the differences between ascending and descending passes for time differences between both passes lower than 10 days (in order to reduce the effect of the oceanic variability).

Diagnostic type : Global internal analyses



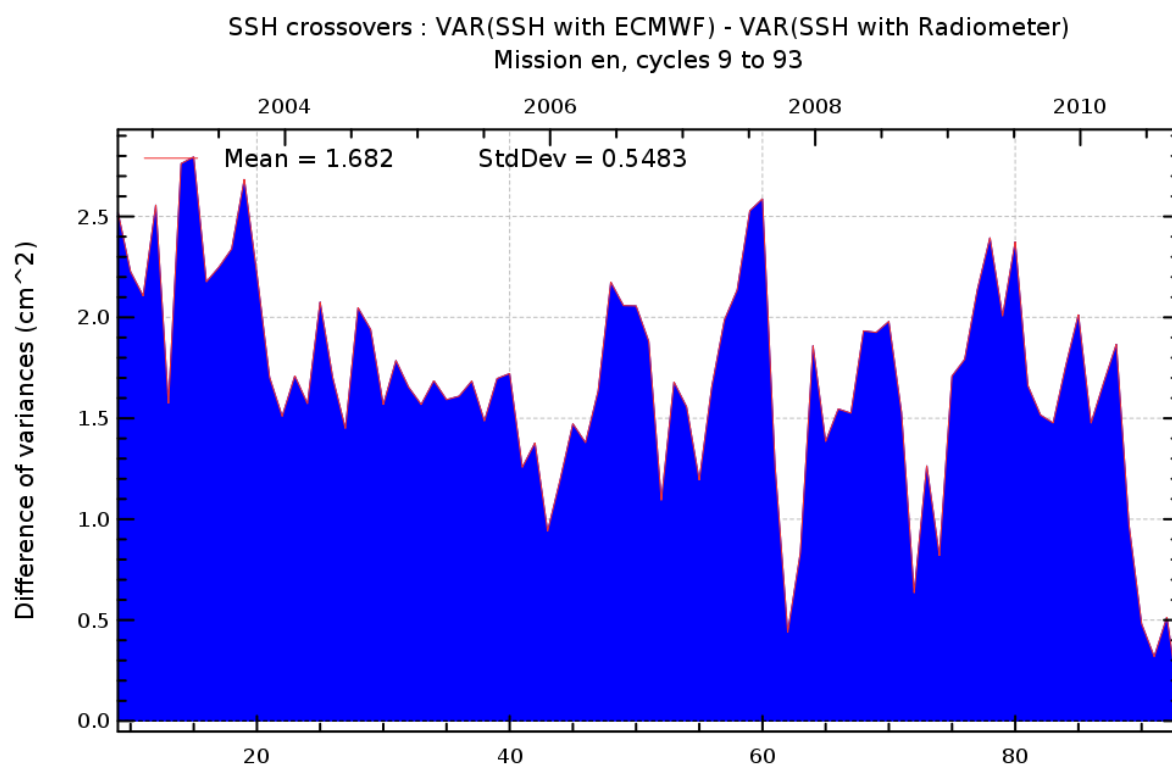
## Diagnostic A102 (mission en)

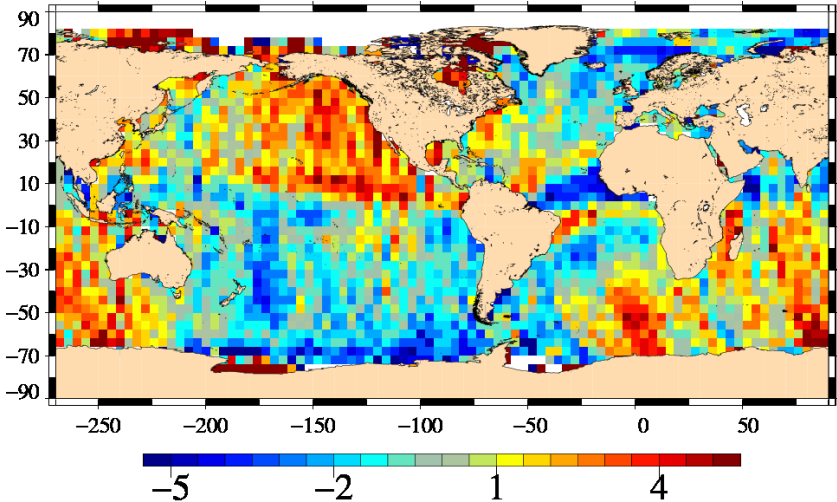
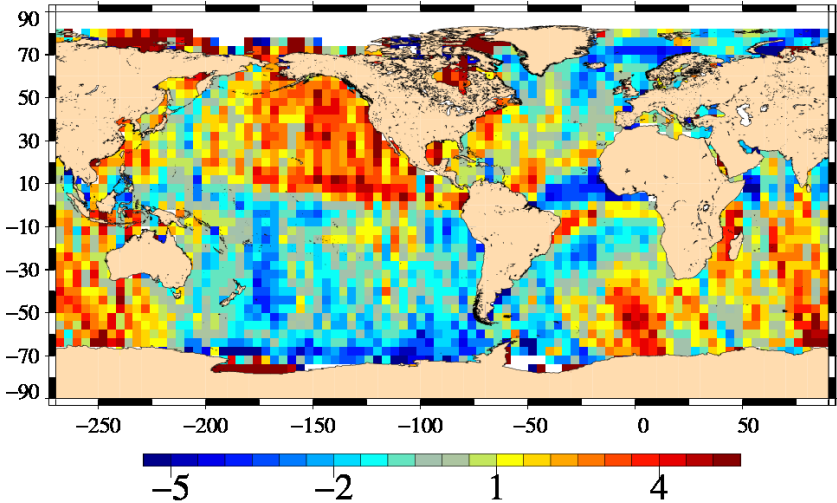
**Name :** Differences between temporal evolution of SSH crossovers

**Input data :** Sea Surface Height (SSH) crossovers

**Description :** The difference of temporal evolution between the global statistics (mean, standard deviation) of SSH differences are calculated using successively both altimetric components in the SSH calculation. SSH crossovers are the differences between ascending and descending passes for time differences between both passes lower than 10 days (in order to reduce the effect of the oceanic variability).

Diagnostic type : Global internal analyses



Diagnostic A103 (mission e2)	
Name : Map of SSH crossovers	
Input data : Sea Surface Height (SSH) crossovers	
<p><b>Description :</b> The differences between maps of SSH crossovers differences (mean, variance) are calculated using successively both altimetric components in the SSH calculation. SSH crossovers are the differences between ascending and descending passes for time differences between both passes lower than 10 days (in order to reduce the effect of the oceanic variability).</p>	
<div>Mean of SSH with ECMWF Mission e2, cycles 49 to 85</div>  <div>Mean ( cm )</div> <div>Mean of SSH with Radiometer Mission e2, cycles 49 to 85</div>  <div>Mean ( cm )</div>	

## Diagnostic A103 (mission en)

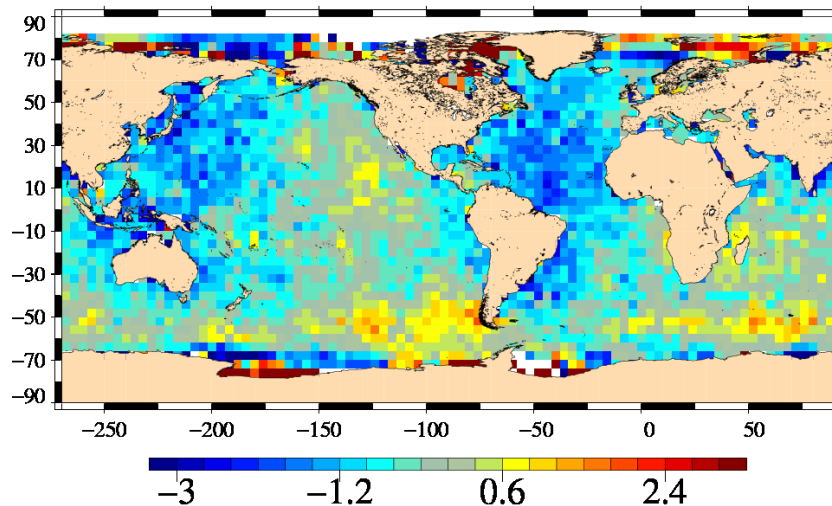
**Name :** Map of SSH crossovers

**Input data :** Sea Surface Height (SSH) crossovers

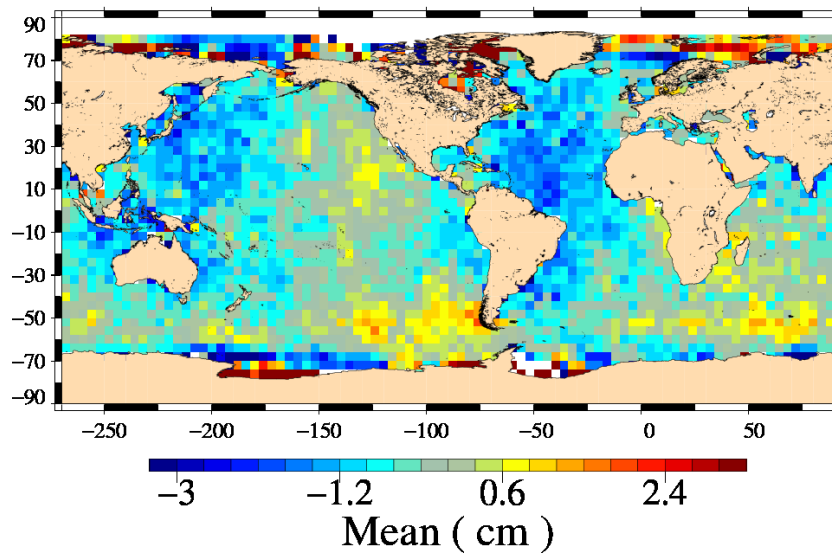
**Description :** The differences between maps of SSH crossovers differences (mean, variance) are calculated using successively both altimetric components in the SSH calculation. SSH crossovers are the differences between ascending and descending passes for time differences between both passes lower than 10 days (in order to reduce the effect of the oceanic variability).

Diagnostic type : Global internal analyses

Mean of SSH with ECMWF  
Mission en, cycles 9 to 93



Mean ( cm )  
Mean of SSH with Radiometer  
Mission en, cycles 9 to 93



## Diagnostic A104 (mission e2)

**Name :** Differences between maps of SSH crossovers

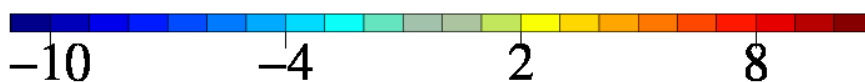
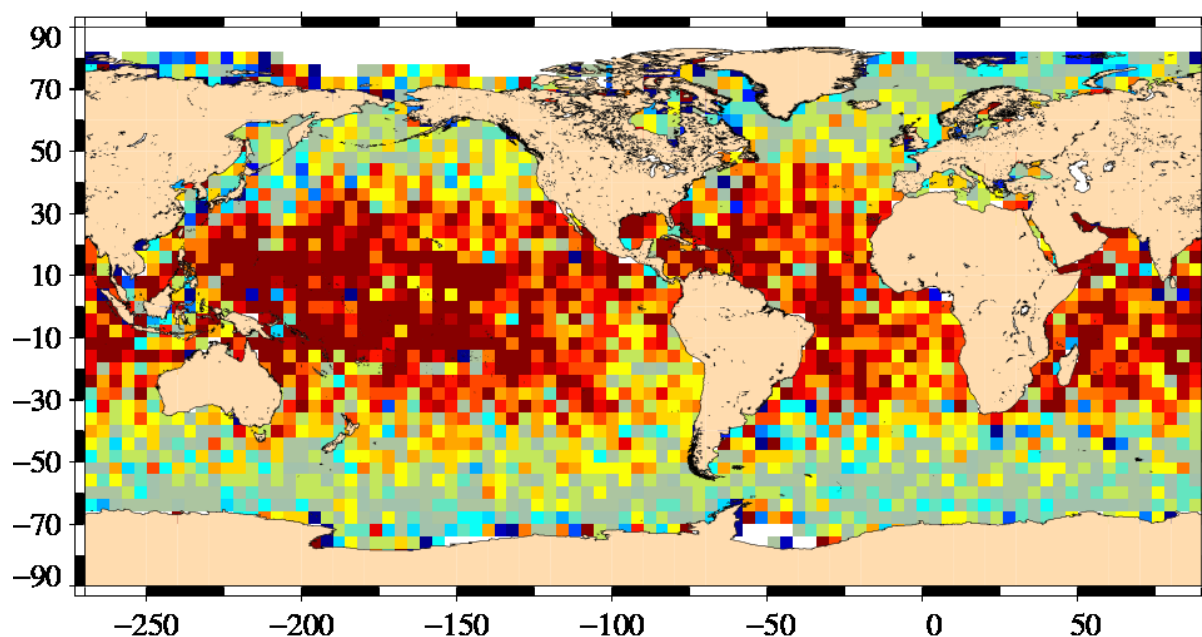
**Input data :** Sea Surface Height (SSH) crossovers

**Description :** The differences between maps of SSH crossovers (derived from diagnostic A103) are calculated from the SSH crossover differences (mean, standard deviation) using successively both altimetric components in the SSH calculation. SSH crossovers are the differences between ascending and descending passes for time differences between both passes lower than 10 days (in order to reduce the effect of the oceanic variability).

Diagnostic type : Global internal analyses

**VAR(SSH with ECMWF) – VAR(SSH with Radiometer)**

**Mission e2, cycles 49 to 85**



**SSH crossovers : difference of variances ( cm<sup>2</sup> )**

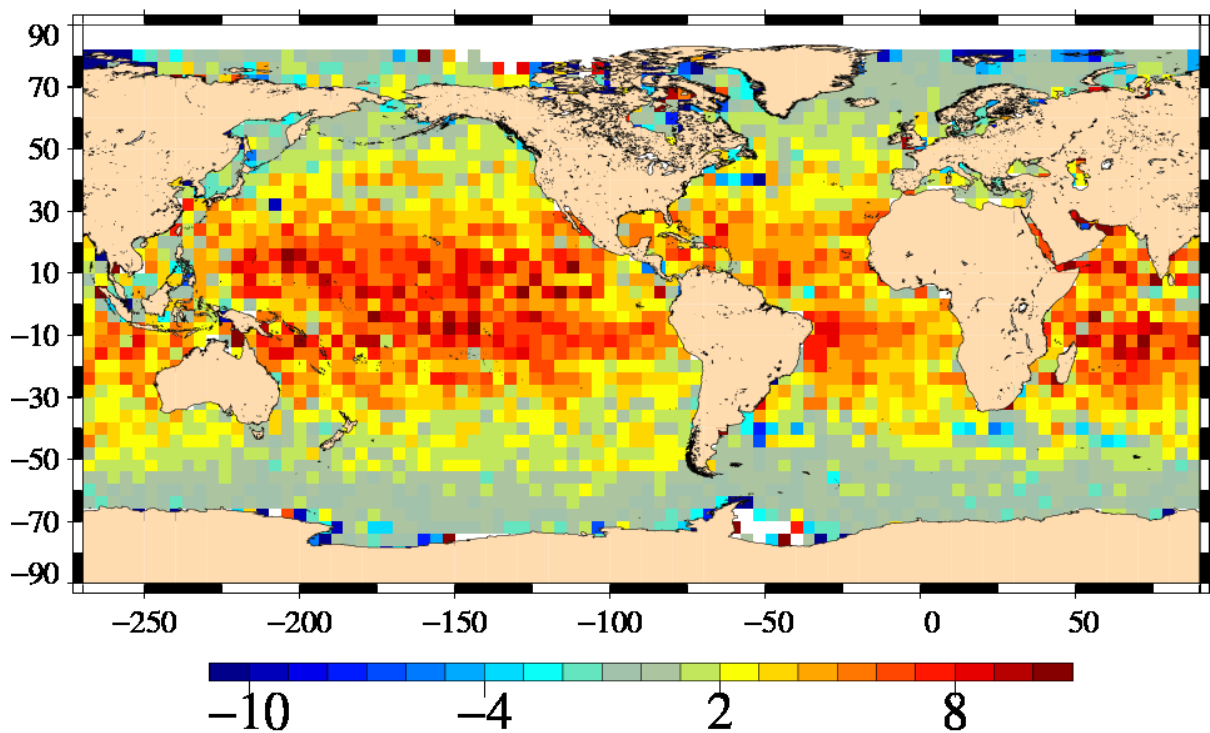
## Diagnostic A104 (mission en)

**Name :** Differences between maps of SSH crossovers

**Input data :** Sea Surface Height (SSH) crossovers

**Description :** The differences between maps of SSH crossovers (derived from diagnostic A103) are calculated from the SSH crossover differences (mean, standard deviation) using successively both altimetric components in the SSH calculation. SSH crossovers are the differences between ascending and descending passes for time differences between both passes lower than 10 days (in order to reduce the effect of the oceanic variability).

**VAR(SSH with ECMWF) – VAR(SSH with Radiometer)**  
**Mission en, cycles 9 to 93**



**SSH crossovers : difference of variances ( cm<sup>2</sup> )**

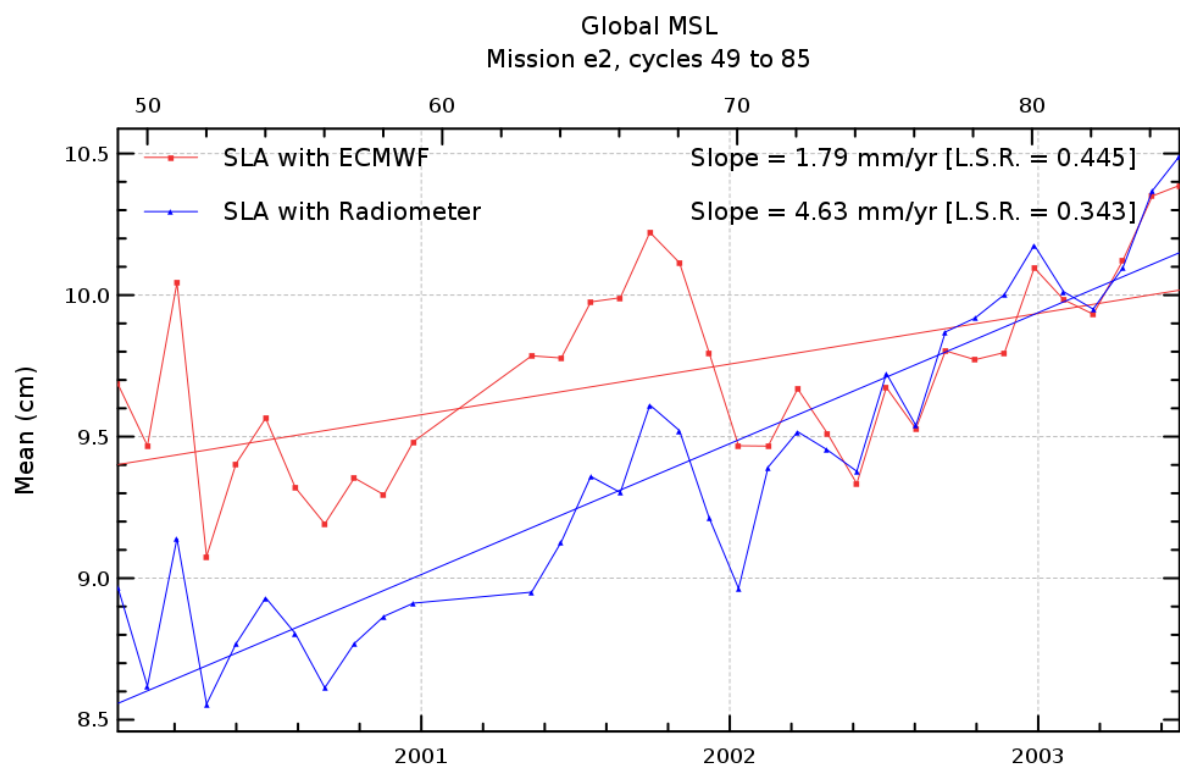
## Diagnostic A201\_a (mission e2)

**Name :** Temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

**Description :** The temporal evolution of SLA statistics (mean, standard deviation) are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) using successively both altimetric components in the SLA calculation. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements. They are calculated globally, but also separating ascending and descending passes (except for SLA Grids) , or separating North and South hemispheres.

Diagnostic type : Global internal analyses





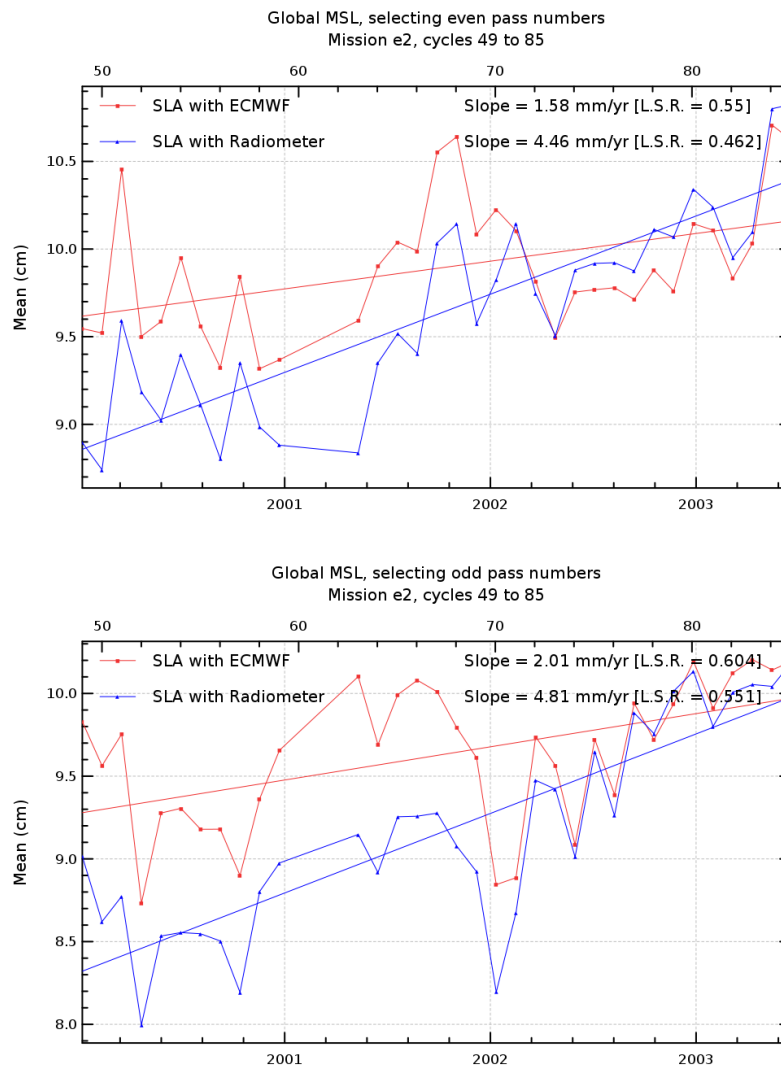
## Diagnostic A201\_b (mission e2)

**Name :** Temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

**Description :** The temporal evolution of SLA statistics (mean, standard deviation) are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) using successively both altimetric components in the SLA calculation. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements. They are calculated globally, but also separating ascending and descending passes (except for SLA Grids) , or separating North and South hemispheres.

Diagnostic type : Global internal analyses



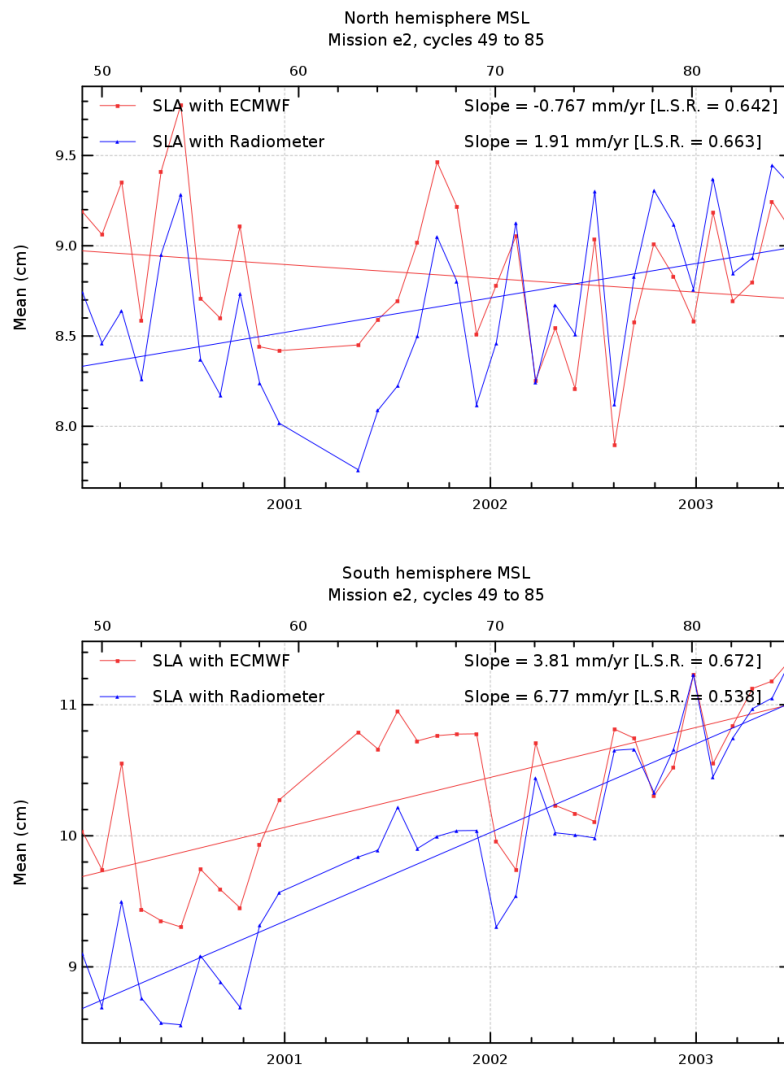
## Diagnostic A201\_c (mission e2)

**Name :** Temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

**Description :** The temporal evolution of SLA statistics (mean, standard deviation) are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) using successively both altimetric components in the SLA calculation. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements. They are calculated globally, but also separating ascending and descending passes (except for SLA Grids) , or separating North and South hemispheres.

Diagnostic type : Global internal analyses



## Diagnostic A201\_d (mission e2)

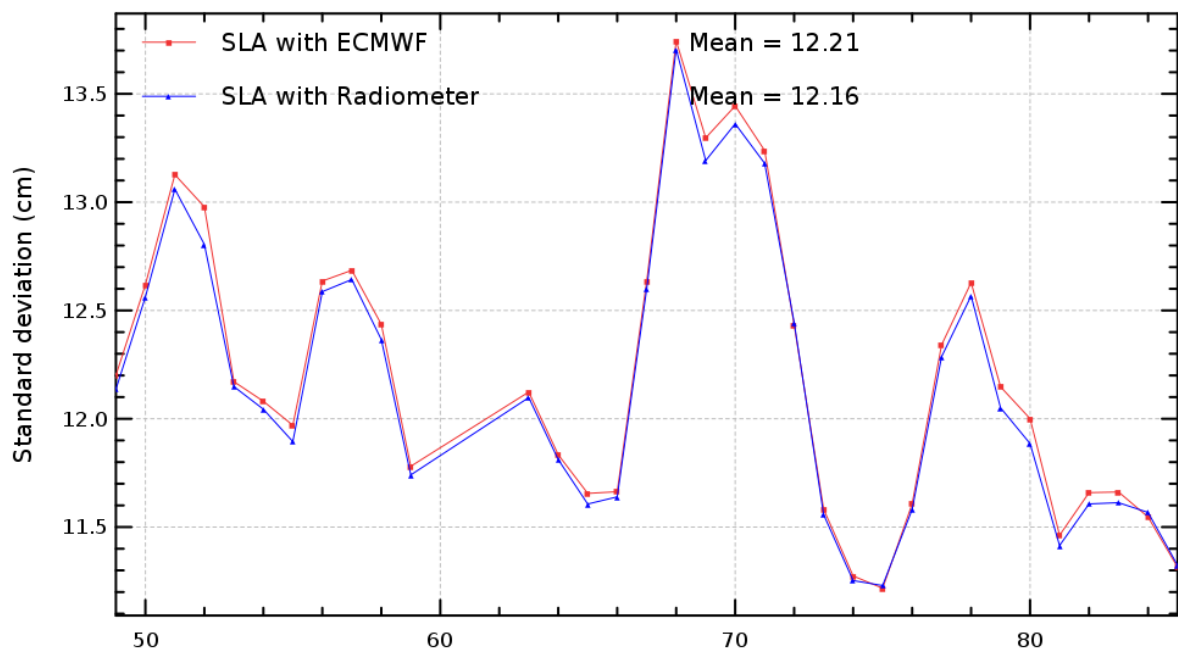
**Name :** Temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

**Description :** The temporal evolution of SLA statistics (mean, standard deviation) are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) using successively both altimetric components in the SLA calculation. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements. They are calculated globally, but also separating ascending and descending passes (except for SLA Grids) , or separating North and South hemispheres.

Diagnostic type : Global internal analyses

Global MSL  
Mission e2, cycles 49 to 85



## Diagnostic A201\_e (mission e2)

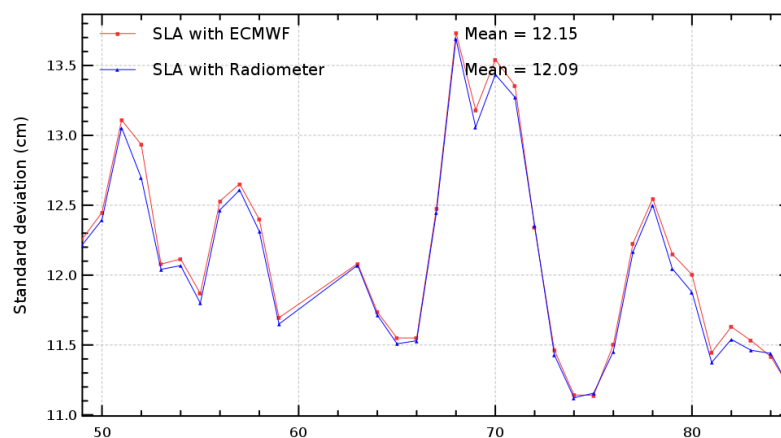
**Name :** Temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

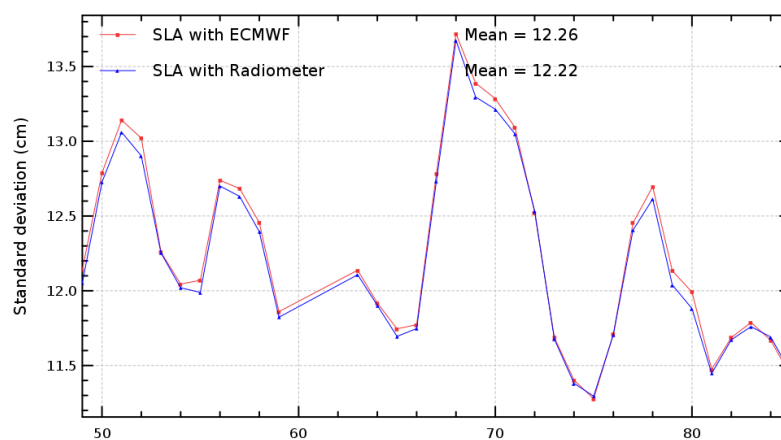
**Description :** The temporal evolution of SLA statistics (mean, standard deviation) are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) using successively both altimetric components in the SLA calculation. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements. They are calculated globally, but also separating ascending and descending passes (except for SLA Grids) , or separating North and South hemispheres.

Diagnostic type : Global internal analyses

Global MSL, selecting even pass numbers  
Mission e2, cycles 49 to 85



Global MSL, selecting odd pass numbers  
Mission e2, cycles 49 to 85



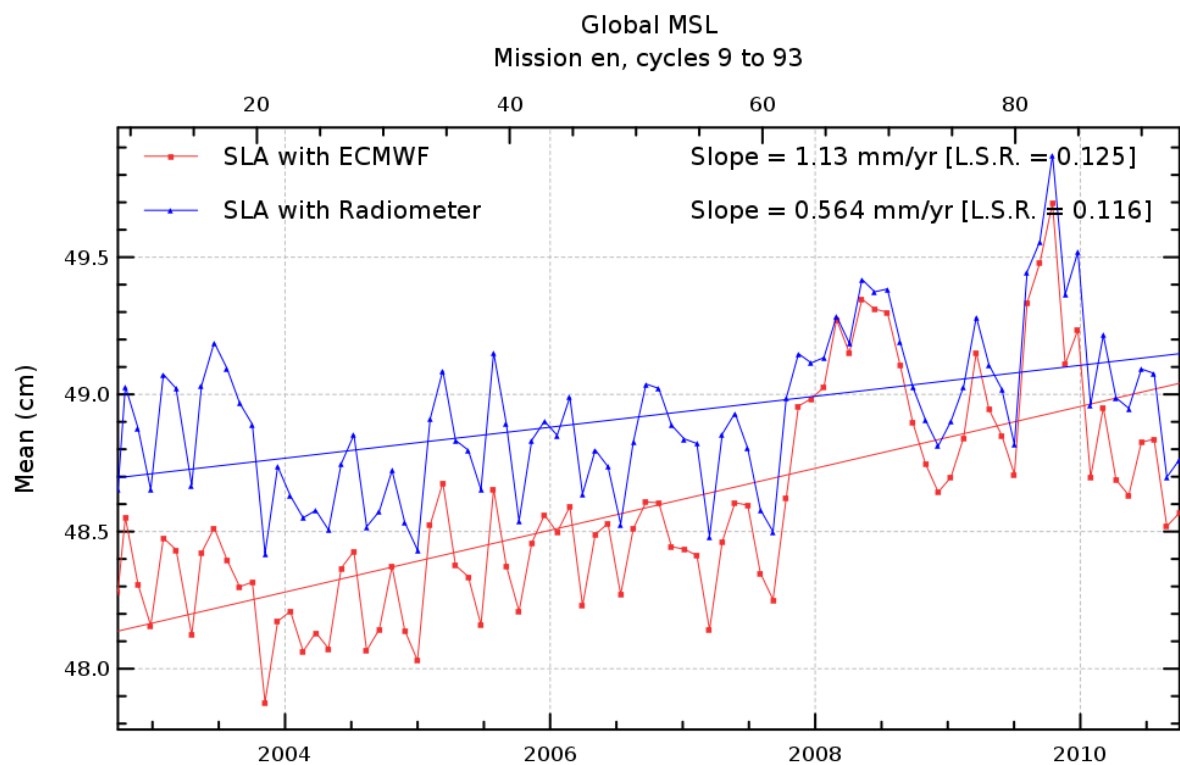
## Diagnostic A201.a (mission en)

**Name :** Temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

**Description :** The temporal evolution of SLA statistics (mean, standard deviation) are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) using successively both altimetric components in the SLA calculation. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements. They are calculated globally, but also separating ascending and descending passes (except for SLA Grids) , or separating North and South hemispheres.

Diagnostic type : Global internal analyses



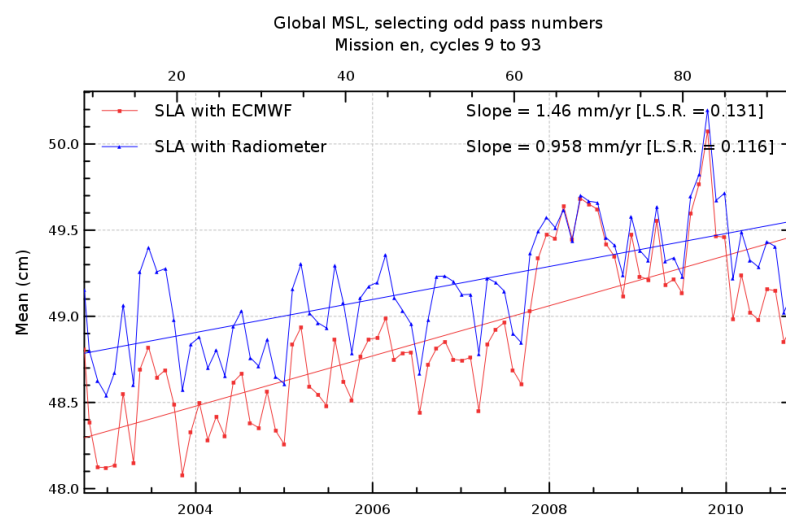
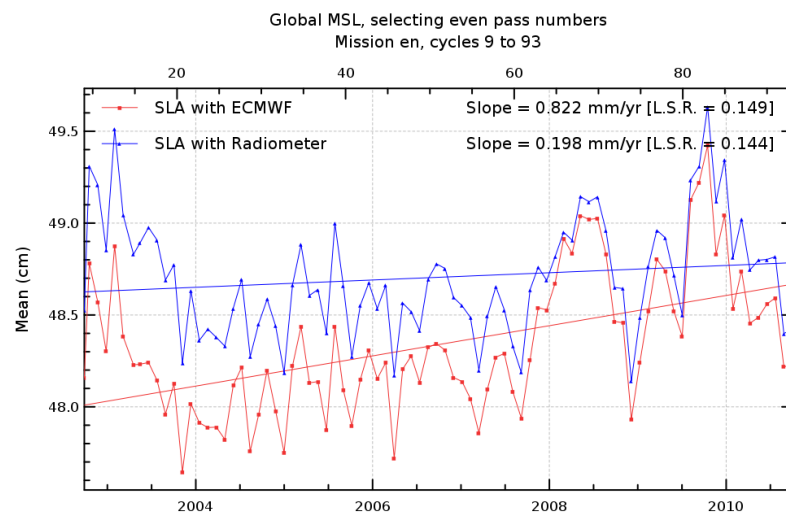
## Diagnostic A201\_b (mission en)

**Name :** Temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

**Description :** The temporal evolution of SLA statistics (mean, standard deviation) are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) using successively both altimetric components in the SLA calculation. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements. They are calculated globally, but also separating ascending and descending passes (except for SLA Grids) , or separating North and South hemispheres.

Diagnostic type : Global internal analyses



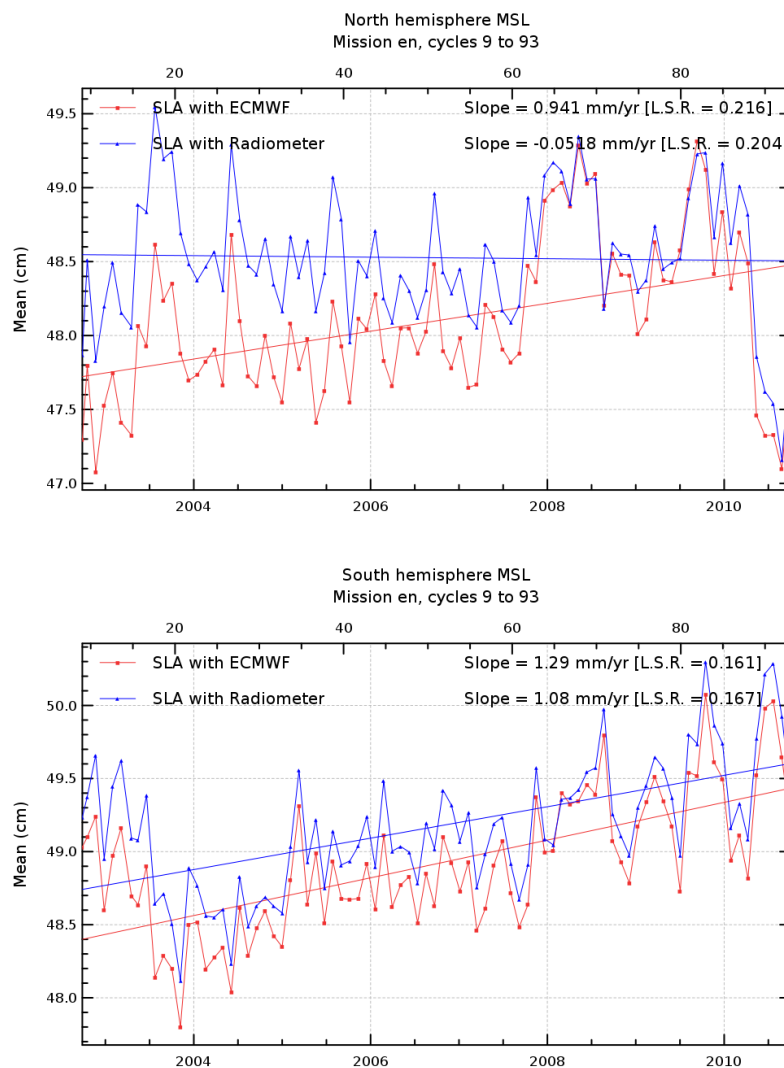
## Diagnostic A201\_c (mission en)

**Name :** Temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

**Description :** The temporal evolution of SLA statistics (mean, standard deviation) are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) using successively both altimetric components in the SLA calculation. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements. They are calculated globally, but also separating ascending and descending passes (except for SLA Grids) , or separating North and South hemispheres.

Diagnostic type : Global internal analyses



## Diagnostic A201\_d (mission en)

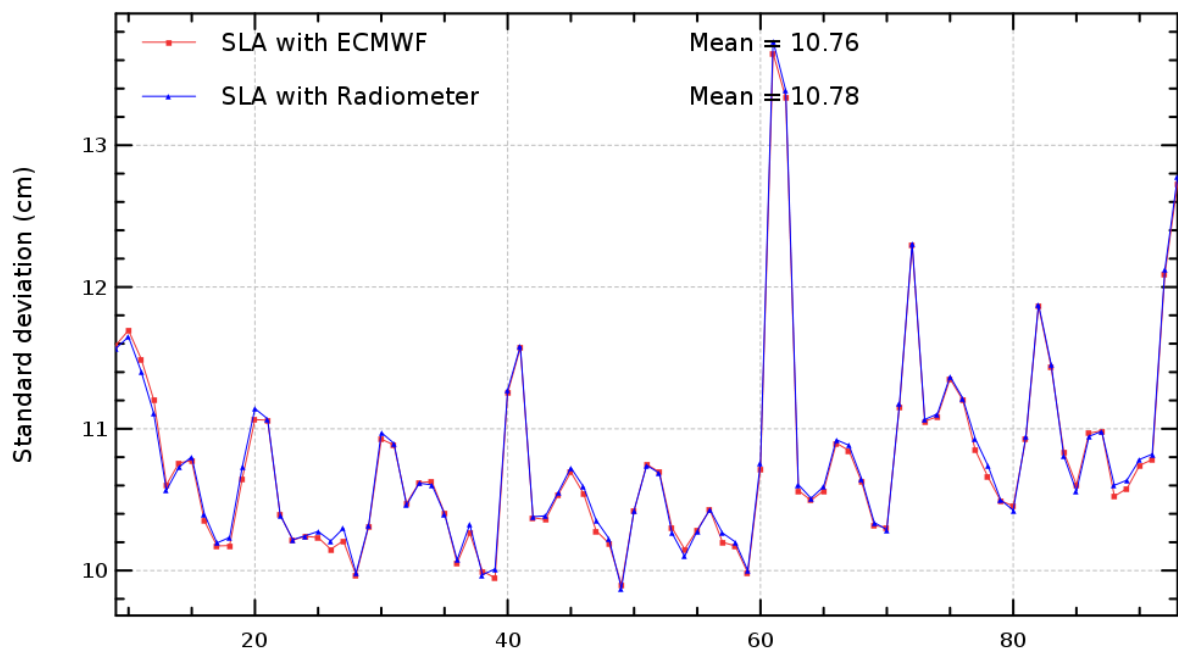
**Name :** Temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

**Description :** The temporal evolution of SLA statistics (mean, standard deviation) are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) using successively both altimetric components in the SLA calculation. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements. They are calculated globally, but also separating ascending and descending passes (except for SLA Grids) , or separating North and South hemispheres.

Diagnostic type : Global internal analyses

Global MSL  
Mission en, cycles 9 to 93





## Diagnostic A201\_e (mission en)

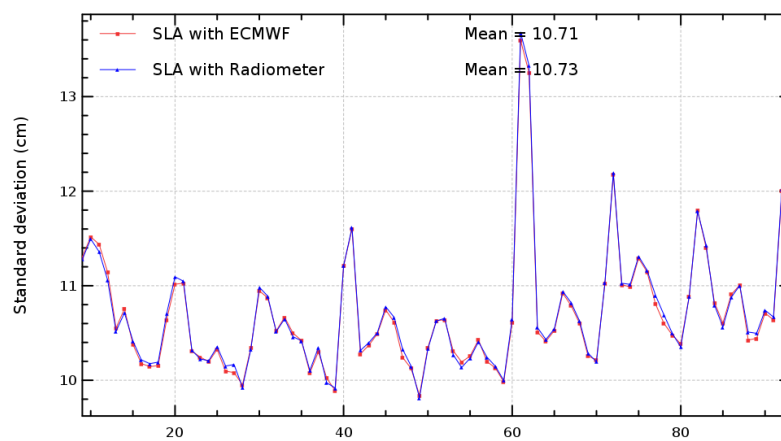
**Name :** Temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

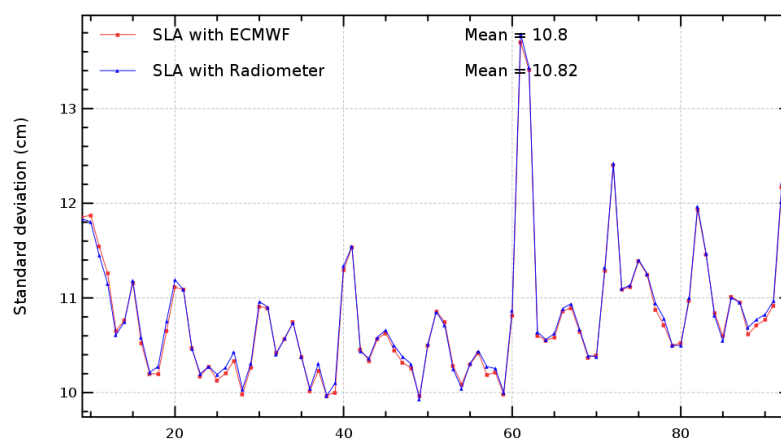
**Description :** The temporal evolution of SLA statistics (mean, standard deviation) are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) using successively both altimetric components in the SLA calculation. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements. They are calculated globally, but also separating ascending and descending passes (except for SLA Grids) , or separating North and South hemispheres.

Diagnostic type : Global internal analyses

Global MSL, selecting even pass numbers  
Mission en, cycles 9 to 93



Global MSL, selecting odd pass numbers  
Mission en, cycles 9 to 93



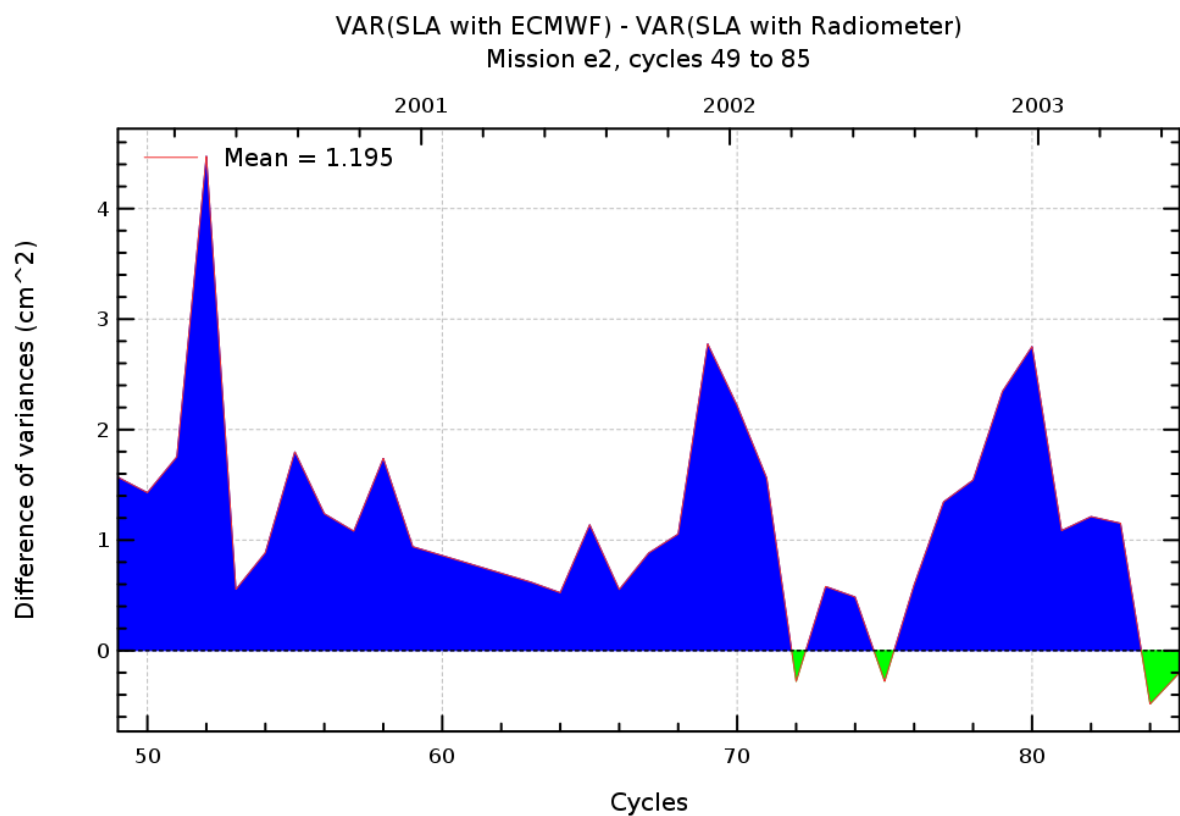
**Diagnostic A202\_a (mission e2)**

**Name :** Differences between temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

**Description :** The differences between temporal evolution of SLA are calculated from statistics derived from diagnostic A201 (mean, variance) using 2 different components in the SLA calculation. They are calculated globally, but also separating ascending and descending passes (except for SLA Grids) or separating North and South hemispheres.

Diagnostic type : Global internal analyses



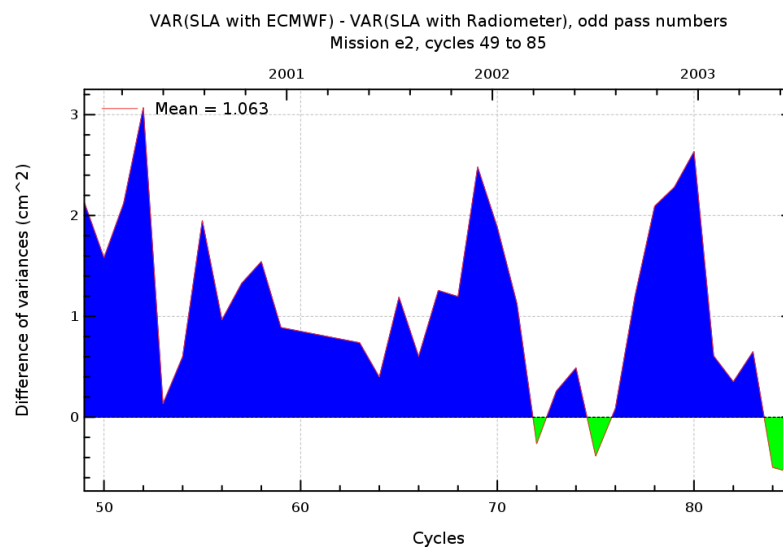
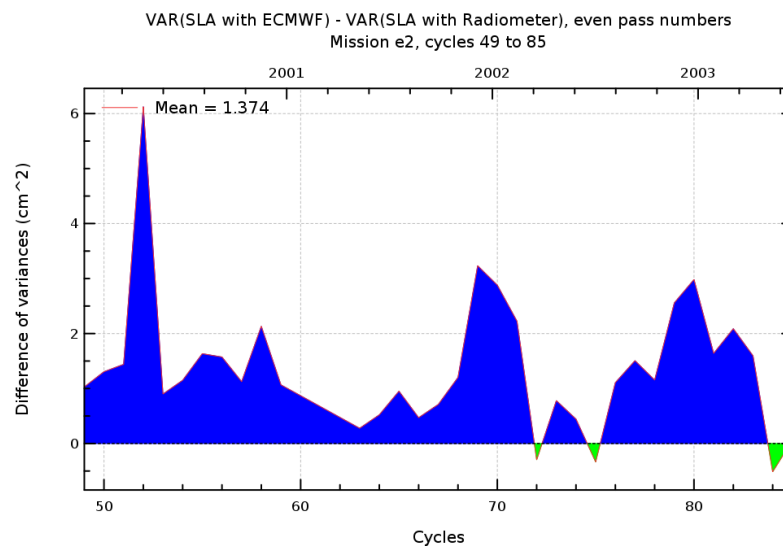
## Diagnostic A202\_b (mission e2)

**Name :** Differences between temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

**Description :** The differences between temporal evolution of SLA are calculated from statistics derived from diagnostic A201 (mean, variance) using 2 different components in the SLA calculation. They are calculated globally, but also separating ascending and descending passes (except for SLA Grids) or separating North and South hemispheres.

Diagnostic type : Global internal analyses



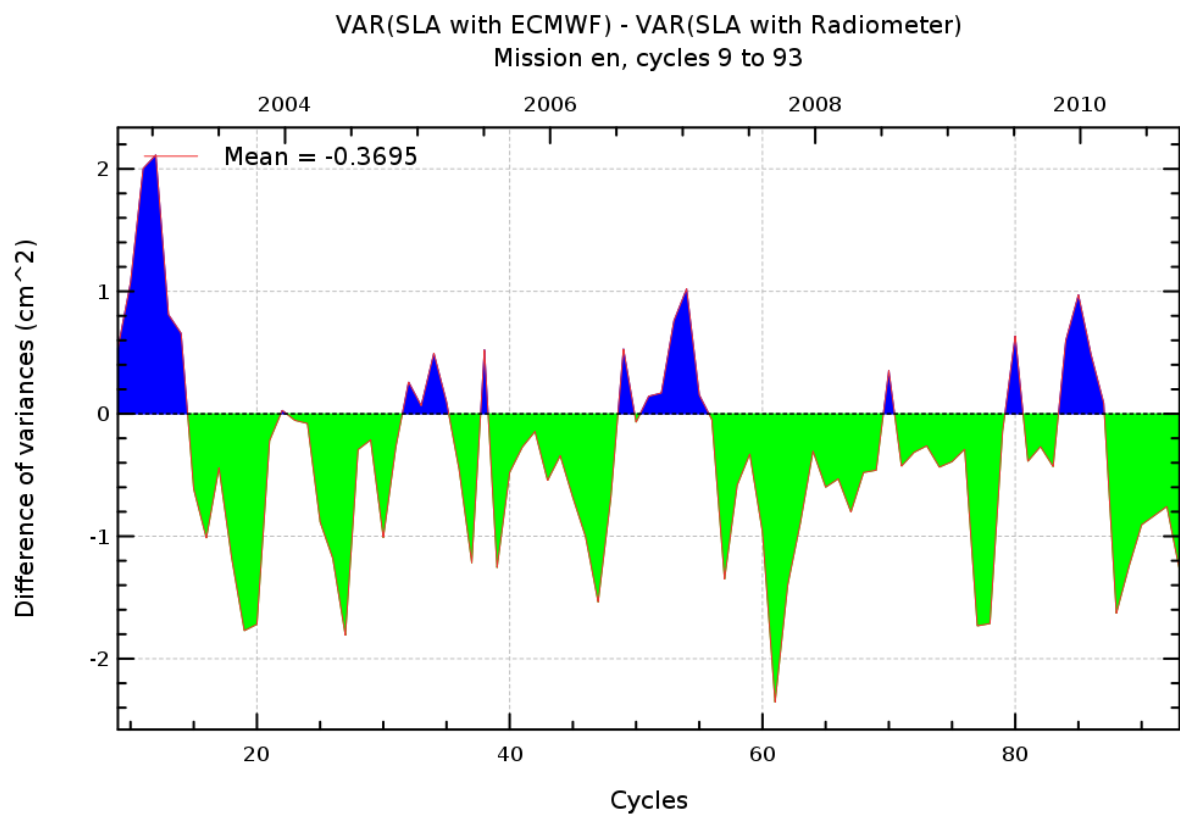
## Diagnostic A202.a (mission en)

**Name :** Differences between temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

**Description :** The differences between temporal evolution of SLA are calculated from statistics derived from diagnostic A201 (mean, variance) using 2 different components in the SLA calculation. They are calculated globally, but also separating ascending and descending passes (except for SLA Grids) or separating North and South hemispheres.

Diagnostic type : Global internal analyses



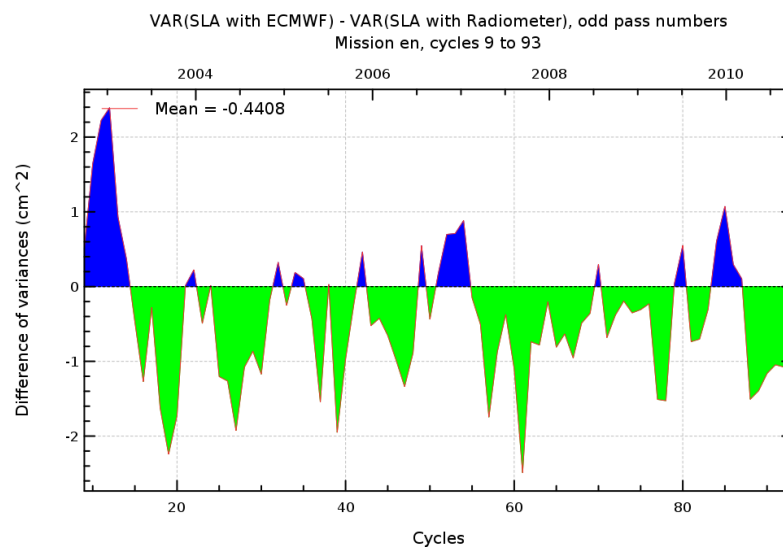
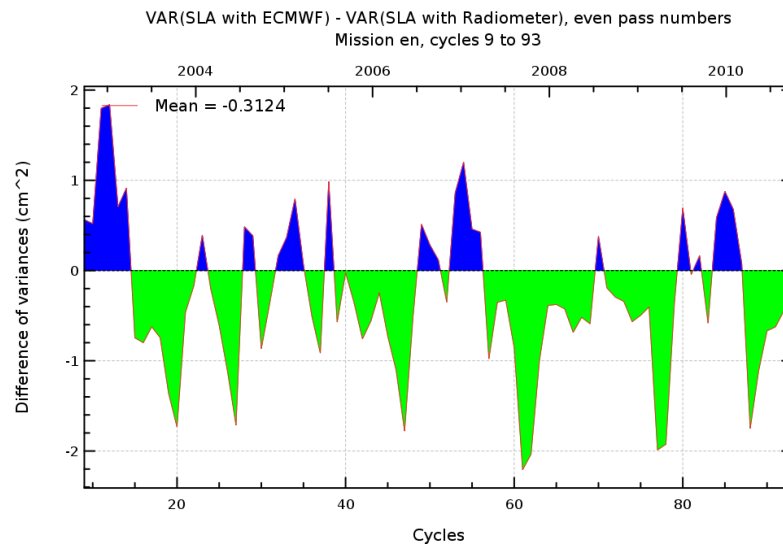
## Diagnostic A202\_b (mission en)

**Name :** Differences between temporal evolution of Sea Level Anomaly (SLA)

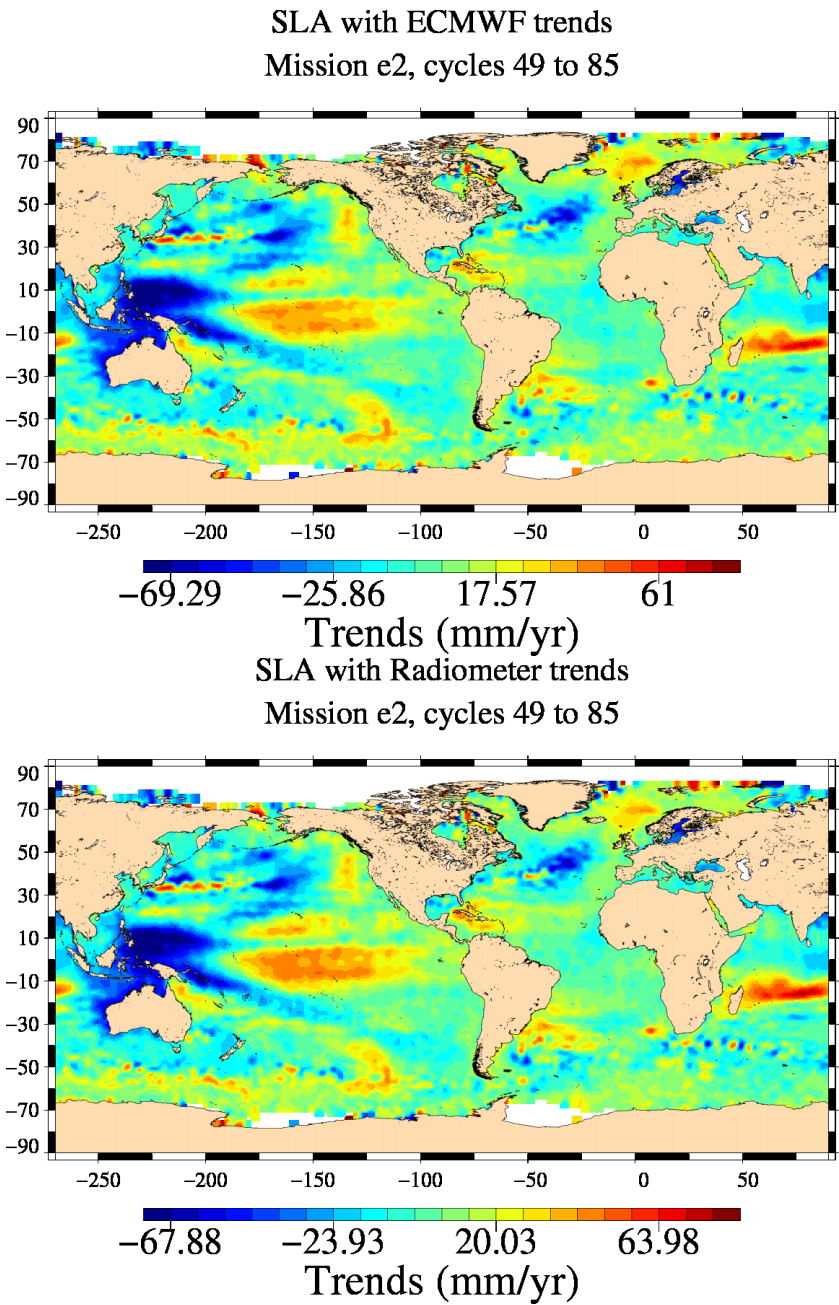
**Input data :** Along track SLA

**Description :** The differences between temporal evolution of SLA are calculated from statistics derived from diagnostic A201 (mean, variance) using 2 different components in the SLA calculation. They are calculated globally, but also separating ascending and descending passes (except for SLA Grids) or separating North and South hemispheres.

Diagnostic type : Global internal analyses



Diagnostic A203_a (mission e2)	
Name : Map of Sea Level Anomaly (SLA) over all the period	
Input data : Along track SLA	
Description : The map of global statistics (mean, standard deviation) of SLA are calculated using successively both altimetric components in the SLA calculation over a large period. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements.	



## Diagnostic A203\_b (mission e2)

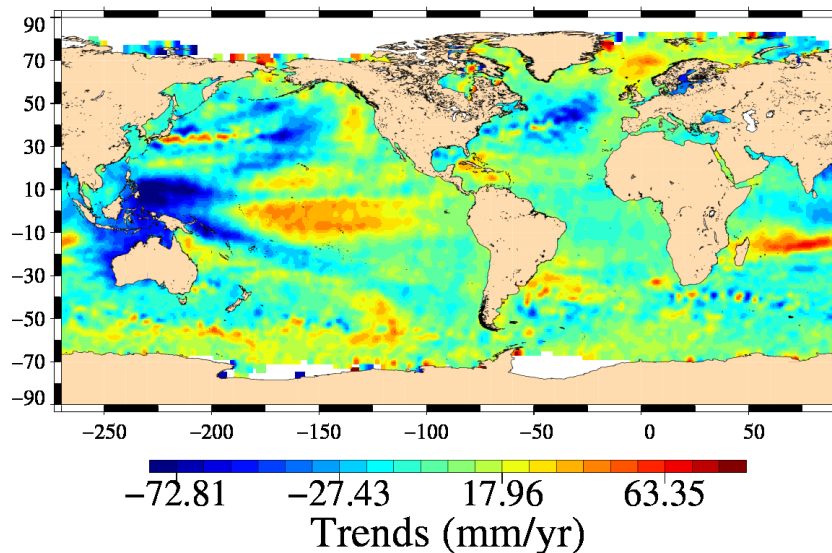
**Name :** Map of Sea Level Anomaly (SLA) over all the period

**Input data :** Along track SLA

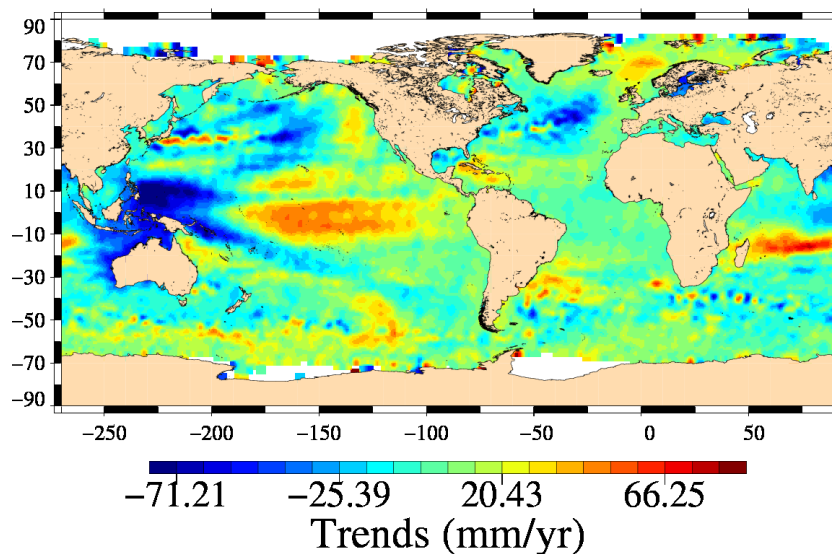
**Description :** The map of global statistics (mean, standard deviation) of SLA are calculated using successively both altimetric components in the SLA calculation over a large period. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements.

Diagnostic type : Global internal analyses

SLA with ECMWF trends : even pass numbers  
Mission e2, cycles 49 to 85



SLA with Radiometer trends : even pass numbers  
Mission e2, cycles 49 to 85



## Diagnostic A203\_c (mission e2)

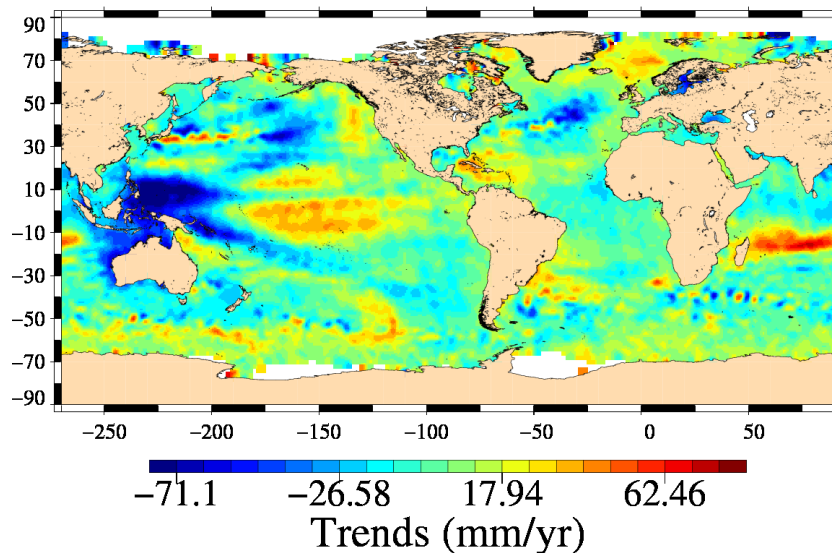
**Name :** Map of Sea Level Anomaly (SLA) over all the period

**Input data :** Along track SLA

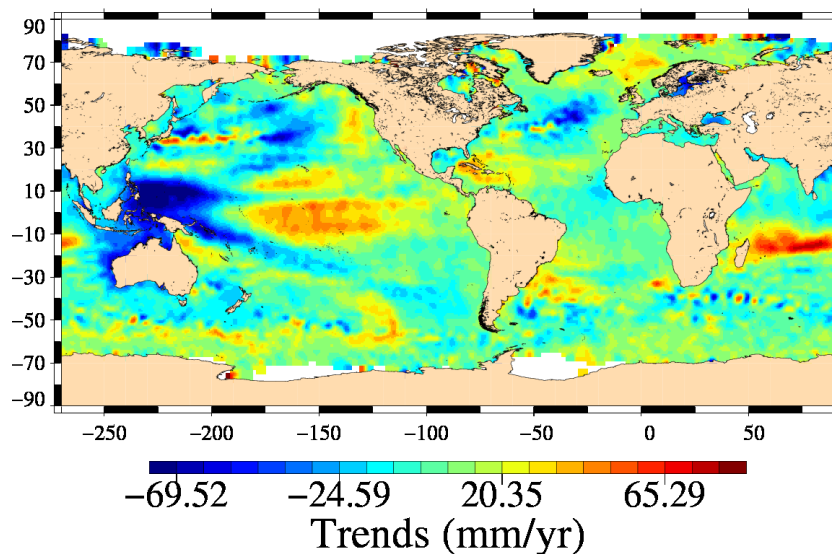
**Description :** The map of global statistics (mean, standard deviation) of SLA are calculated using successively both altimetric components in the SLA calculation over a large period. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements.

Diagnostic type : Global internal analyses

SLA with ECMWF trends : odd pass numbers  
Mission e2, cycles 49 to 85



SLA with Radiometer trends : odd pass numbers  
Mission e2, cycles 49 to 85





## Diagnostic A203.a (mission en)

**Name :** Map of Sea Level Anomaly (SLA) over all the period

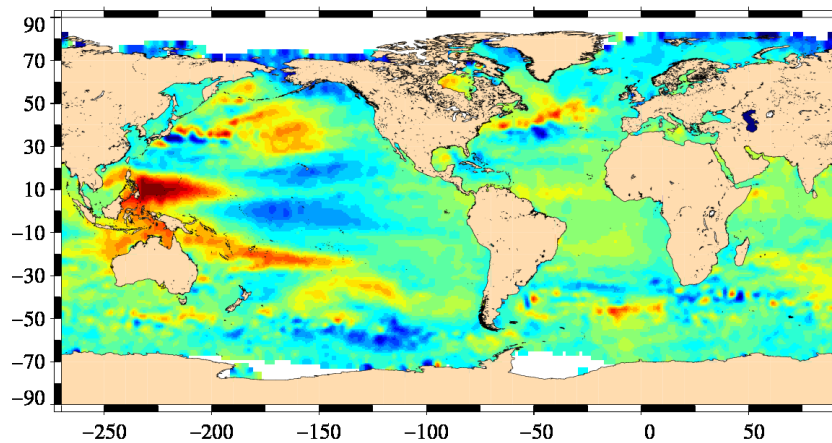
**Input data :** Along track SLA

**Description :** The map of global statistics (mean, standard deviation) of SLA are calculated using successively both altimetric components in the SLA calculation over a large period. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements.

Diagnostic type : Global internal analyses

SLA with ECMWF trends

Mission en, cycles 9 to 93

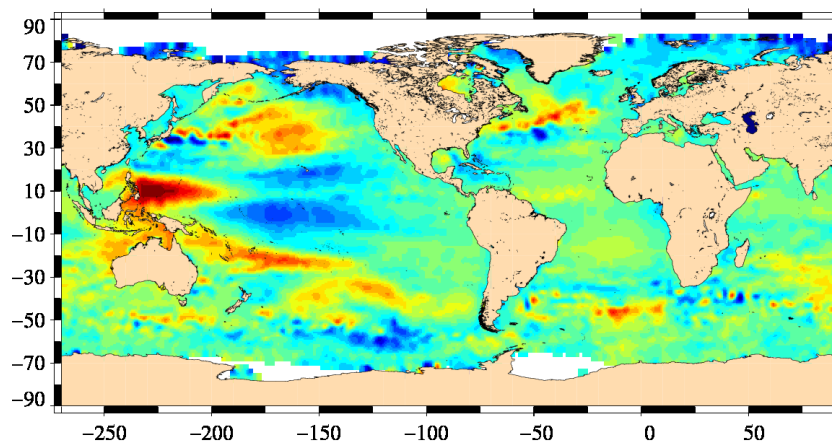


-21.35436 -8.25113 4.8521 17.95534

Trends (mm/yr)

SLA with Radiometer trends

Mission en, cycles 9 to 93



-21.95335 -8.77027 4.41282 17.5959

Trends (mm/yr)

## Diagnostic A203\_b (mission en)

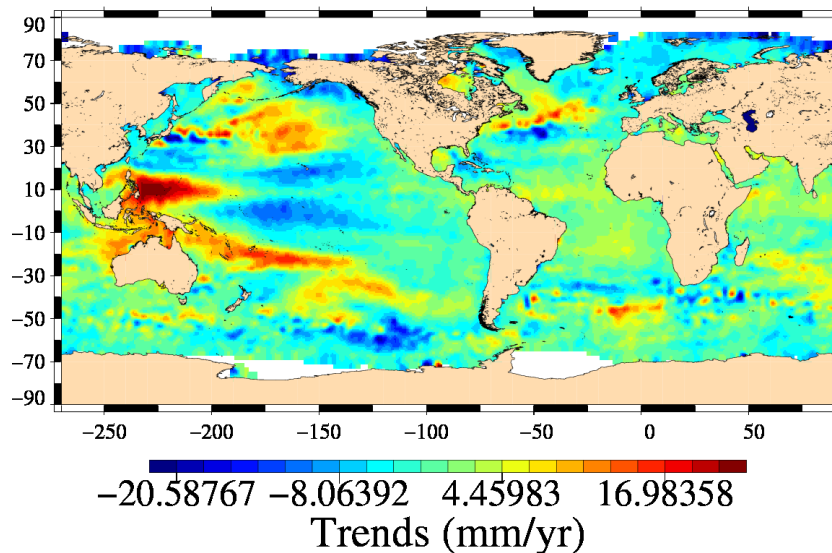
**Name :** Map of Sea Level Anomaly (SLA) over all the period

**Input data :** Along track SLA

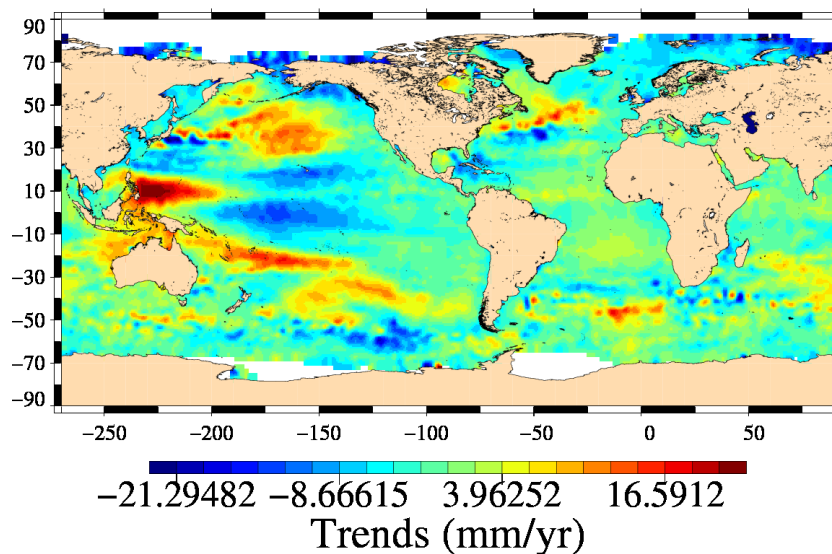
**Description :** The map of global statistics (mean, standard deviation) of SLA are calculated using successively both altimetric components in the SLA calculation over a large period. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements.

Diagnostic type : Global internal analyses

SLA with ECMWF trends : even pass numbers  
Mission en, cycles 9 to 93



SLA with Radiometer trends : even pass numbers  
Mission en, cycles 9 to 93



## Diagnostic A203\_c (mission en)

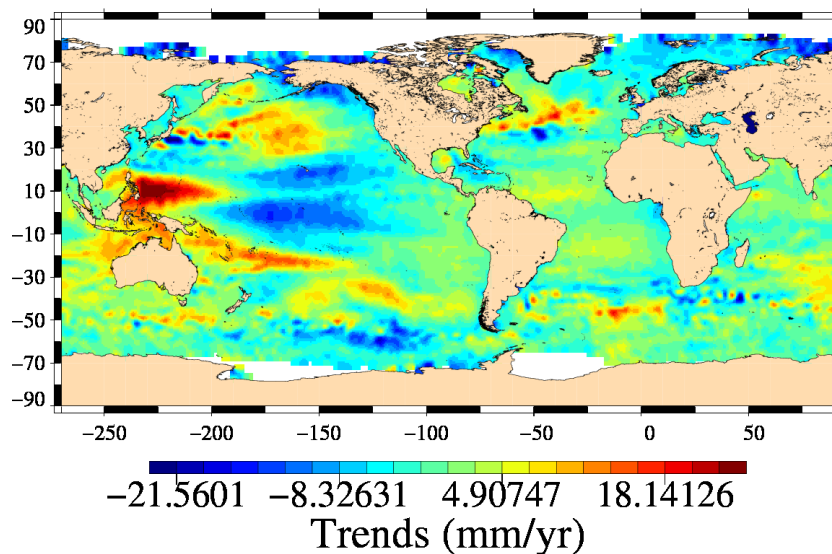
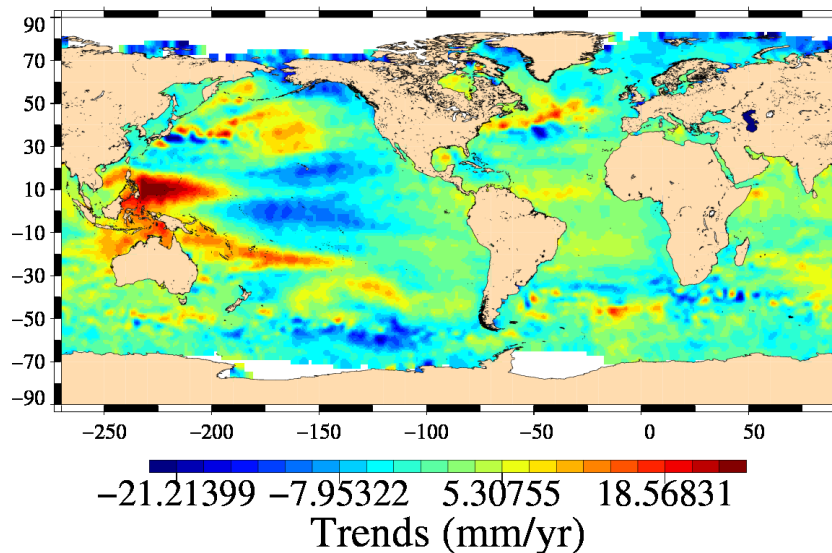
**Name :** Map of Sea Level Anomaly (SLA) over all the period

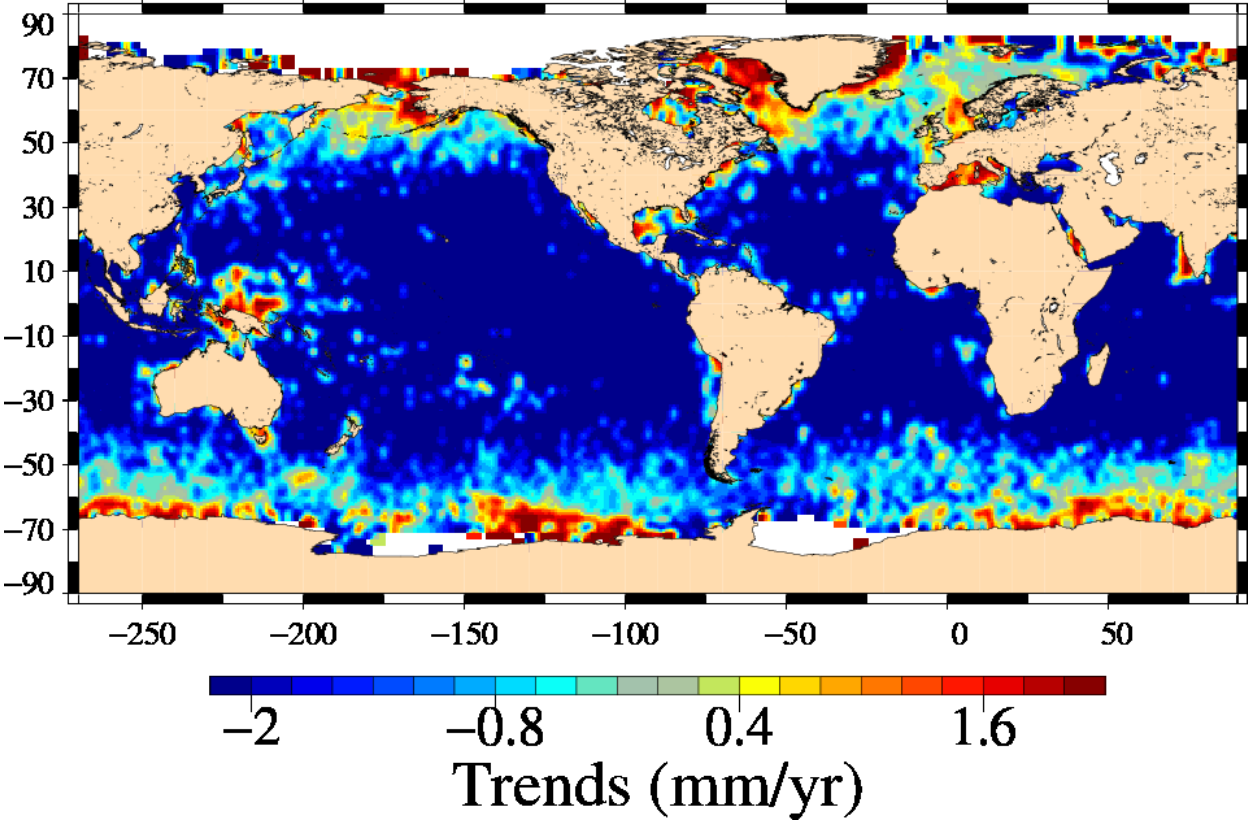
**Input data :** Along track SLA

**Description :** The map of global statistics (mean, standard deviation) of SLA are calculated using successively both altimetric components in the SLA calculation over a large period. These statistics are calculated from 1 Hz altimetric measurements after removing spurious sea level measurements.

Diagnostic type : Global internal analyses

SLA with ECMWF trends : odd pass numbers  
Mission en, cycles 9 to 93



Diagnostic type : Global internal analyses	Diagnostic A204_a (mission e2)	
	Name : Differences between maps of SLA	
	Input data : Along track SLA	
	Description : The difference of SLA maps (mean, standard deviation, slope) is calculated from maps derived from diagnostic A203 using successively both altimetric components in the SLA calculation over a given period. This can be done globally, or separating in ascending and descending passes (except for SLA Grids).	
	<div>SLA with ECMWF trends – SLA with Radiometer trends</div> <div>Mission e2, cycles 49 to 85</div> 	

## Diagnostic A204\_b (mission e2)

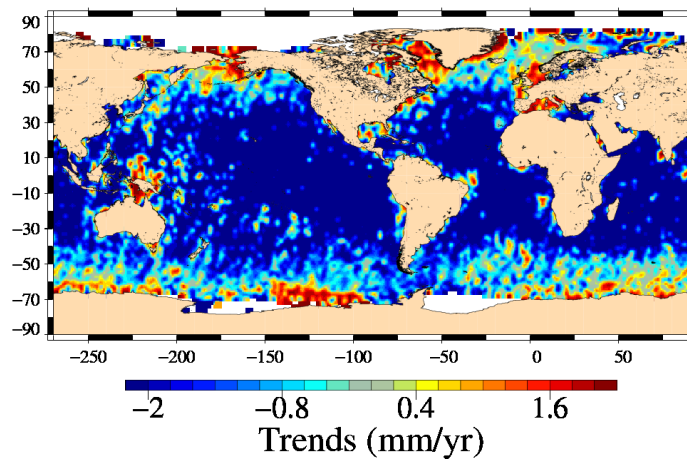
**Name :** Differences between maps of SLA

**Input data :** Along track SLA

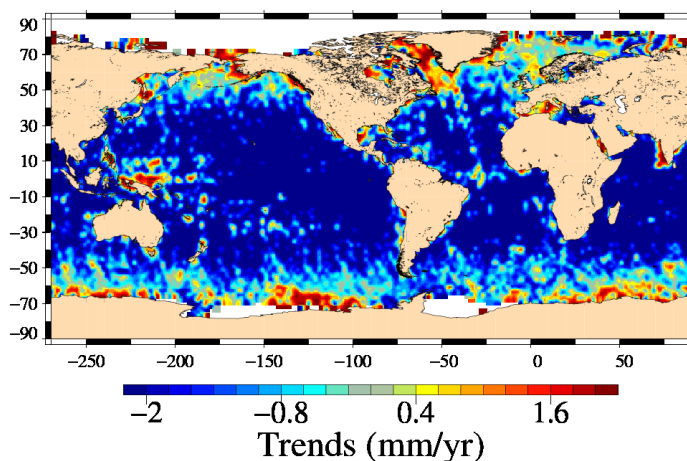
**Description :** The difference of SLA maps (mean, standard deviation, slope) is calculated from maps derived from diagnostic A203 using successively both altimetric components in the SLA calculation over a given period. This can be done globally, or separating in ascending and descending passes (except for SLA Grids).

Diagnostic type : Global internal analyses

SLA with ECMWF trends – SLA with Radiometer trends : even pass numbers  
Mission e2, cycles 49 to 85



SLA with ECMWF trends – SLA with Radiometer trends : odd pass numbers  
Mission e2, cycles 49 to 85





## Diagnostic A204.a (mission en)

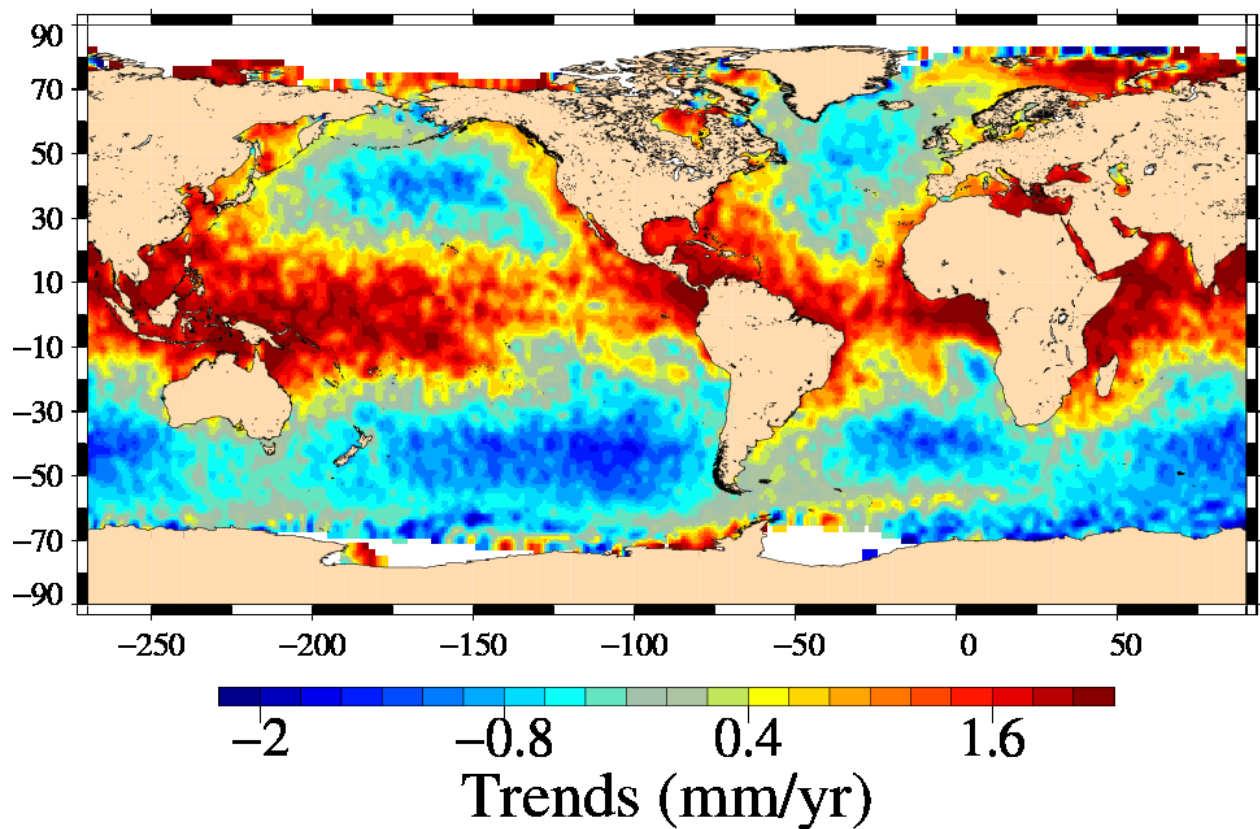
**Name :** Differences between maps of SLA

**Input data :** Along track SLA

**Description :** The difference of SLA maps (mean, standard deviation, slope) is calculated from maps derived from diagnostic A203 using successively both altimetric components in the SLA calculation over a given period. This can be done globally, or separating in ascending and descending passes (except for SLA Grids).

Diagnostic type : Global internal analyses

### SLA with ECMWF trends – SLA with Radiometer trends Mission en, cycles 9 to 93



## Diagnostic A204\_b (mission en)

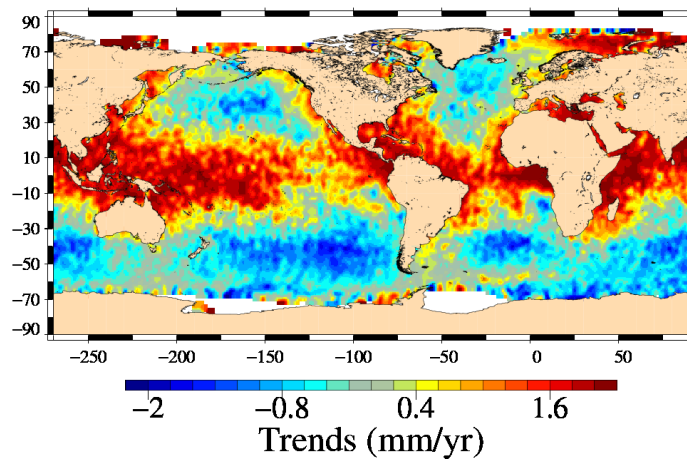
**Name :** Differences between maps of SLA

**Input data :** Along track SLA

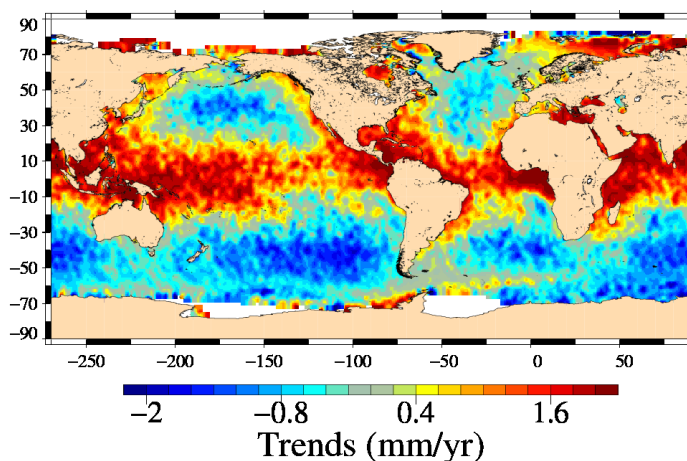
**Description :** The difference of SLA maps (mean, standard deviation, slope) is calculated from maps derived from diagnostic A203 using successively both altimetric components in the SLA calculation over a given period. This can be done globally, or separating in ascending and descending passes (except for SLA Grids).

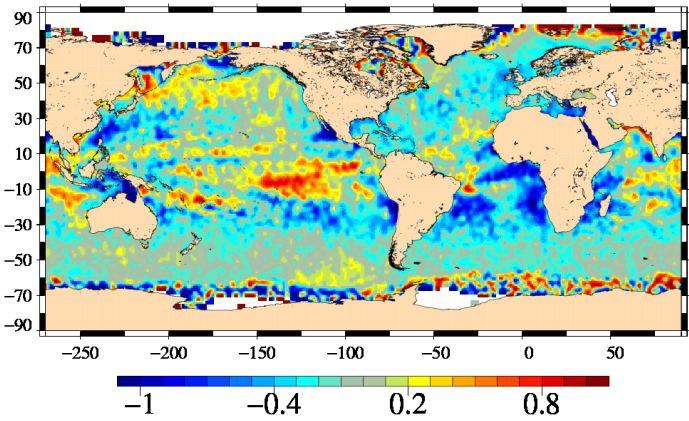
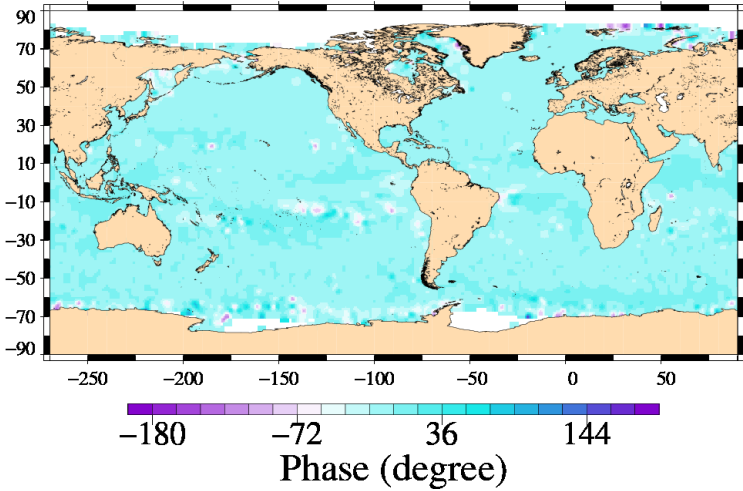
Diagnostic type : Global internal analyses

SLA with ECMWF trends – SLA with Radiometer trends : even pass numbers  
Mission en, cycles 9 to 93



SLA with ECMWF trends – SLA with Radiometer trends : odd pass numbers  
Mission en, cycles 9 to 93



Diagnostic type : Global internal analyses	Diagnostic A205_a (mission e2)	
	Name : Differences between maps of SLA (2)	
	Input data : Along track SLA	
	Description : The difference of SLA maps (mean, standard deviation, slope) is calculated from maps derived from diagnostic A203 using successively both altimetric components in the SLA calculation over a given period. This can be done globally, or separating in ascending and descending passes (except for SLA Grids).	
	<div>LA with ECMWF amplitude – SLA with Radiometer amplitude : annual signal Mission e2, cycles 49 to 85</div> <div><p>A global map showing the difference in SLA amplitude between LA with ECMWF and SLA with Radiometer for mission e2, cycles 49 to 85. The map uses a color scale from -1 to 0.8 cm, with blue representing negative values and red representing positive values. The map shows significant variations across the globe, particularly in the tropical and subtropical regions.</p><p>Amplitude (cm)</p></div> <div>SLA with ECMWF phase – SLA with Radiometer phase : annual signal Mission e2, cycles 49 to 85</div> <div><p>A global map showing the difference in SLA phase between SLA with ECMWF and SLA with Radiometer for mission e2, cycles 49 to 85. The map uses a color scale from -180 to 144 degrees, with purple representing negative values and blue representing positive values. The map shows significant variations across the globe, particularly in the tropical and subtropical regions.</p><p>Phase (degree)</p></div>	



## Diagnostic A205\_b (mission e2)

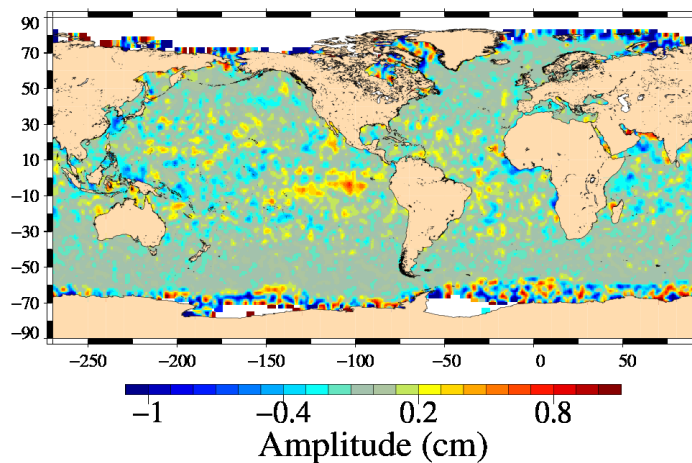
**Name :** Differences between maps of SLA (2)

**Input data :** Along track SLA

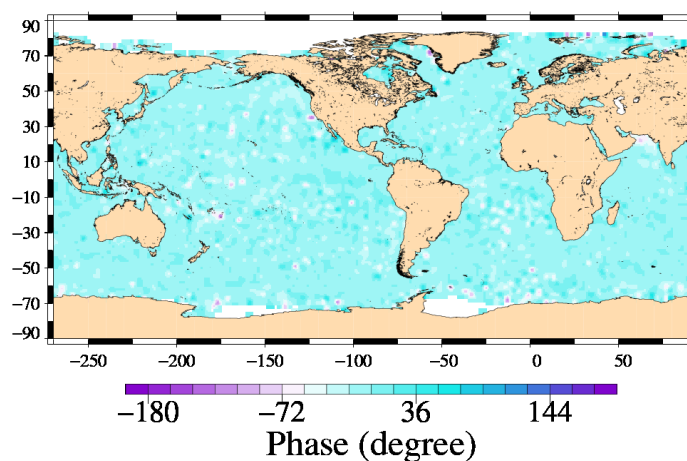
**Description :** The difference of SLA maps (mean, standard deviation, slope) is calculated from maps derived from diagnostic A203 using successively both altimetric components in the SLA calculation over a given period. This can be done globally, or separating in ascending and descending passes (except for SLA Grids).

Diagnostic type : Global internal analyses

with ECMWF amplitude – SLA with Radiometer amplitude : semi-annual signal  
Mission e2, cycles 49 to 85



SLA with ECMWF phase – SLA with Radiometer phase : semi-annual signal  
Mission e2, cycles 49 to 85



## Diagnostic A205.a (mission en)

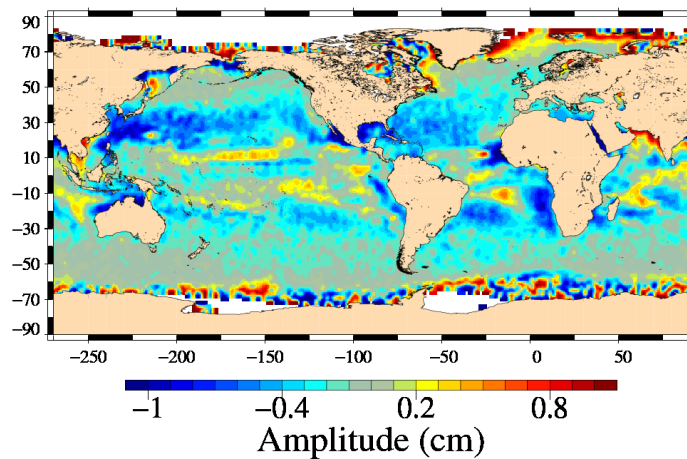
**Name :** Differences between maps of SLA (2)

**Input data :** Along track SLA

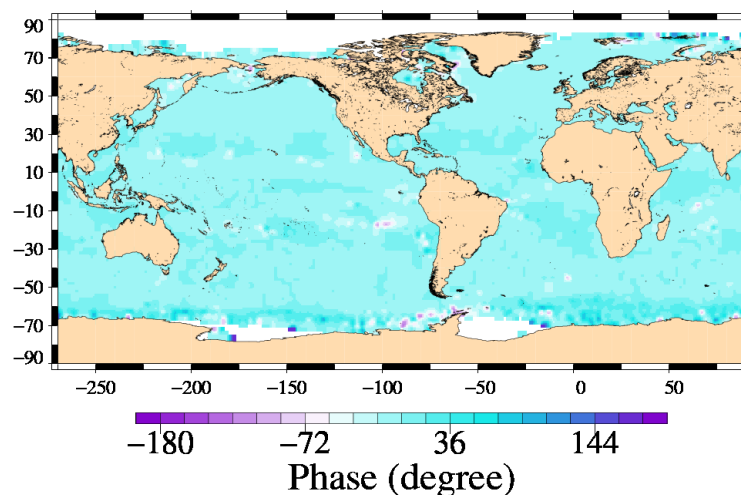
**Description :** The difference of SLA maps (mean, standard deviation, slope) is calculated from maps derived from diagnostic A203 using successively both altimetric components in the SLA calculation over a given period. This can be done globally, or separating in ascending and descending passes (except for SLA Grids).

Diagnostic type : Global internal analyses

LA with ECMWF amplitude – SLA with Radiometer amplitude : annual signal  
Mission en, cycles 9 to 93



SLA with ECMWF phase – SLA with Radiometer phase : annual signal  
Mission en, cycles 9 to 93



## Diagnostic A205\_b (mission en)

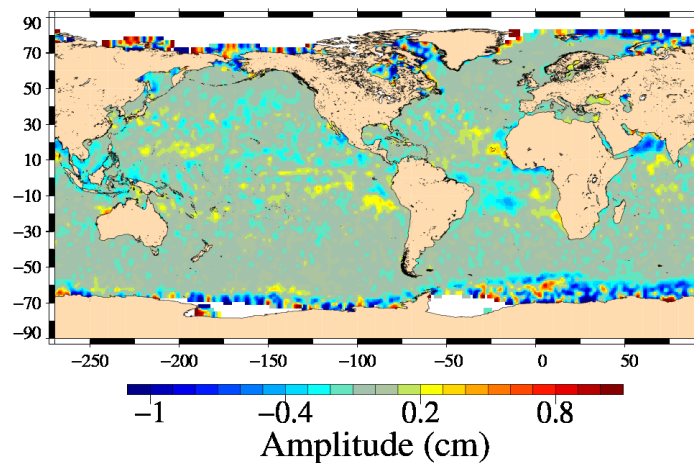
**Name :** Differences between maps of SLA (2)

**Input data :** Along track SLA

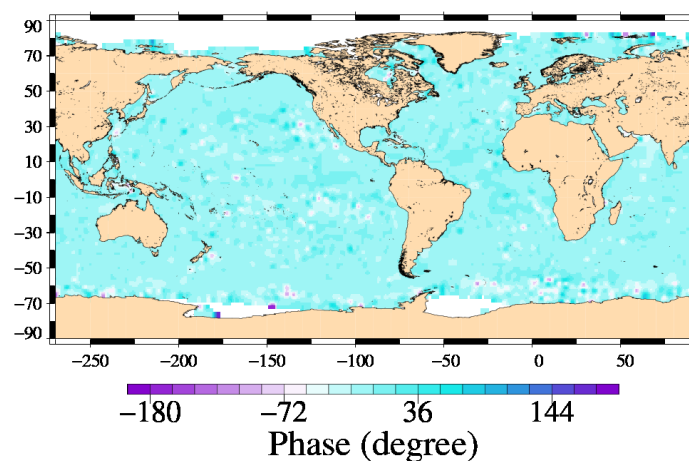
**Description :** The difference of SLA maps (mean, standard deviation, slope) is calculated from maps derived from diagnostic A203 using successively both altimetric components in the SLA calculation over a given period. This can be done globally, or separating in ascending and descending passes (except for SLA Grids).

Diagnostic type : Global internal analyses

with ECMWF amplitude – SLA with Radiometer amplitude : semi-annual signal  
Mission en, cycles 9 to 93



SLA with ECMWF phase – SLA with Radiometer phase : semi-annual signal  
Mission en, cycles 9 to 93

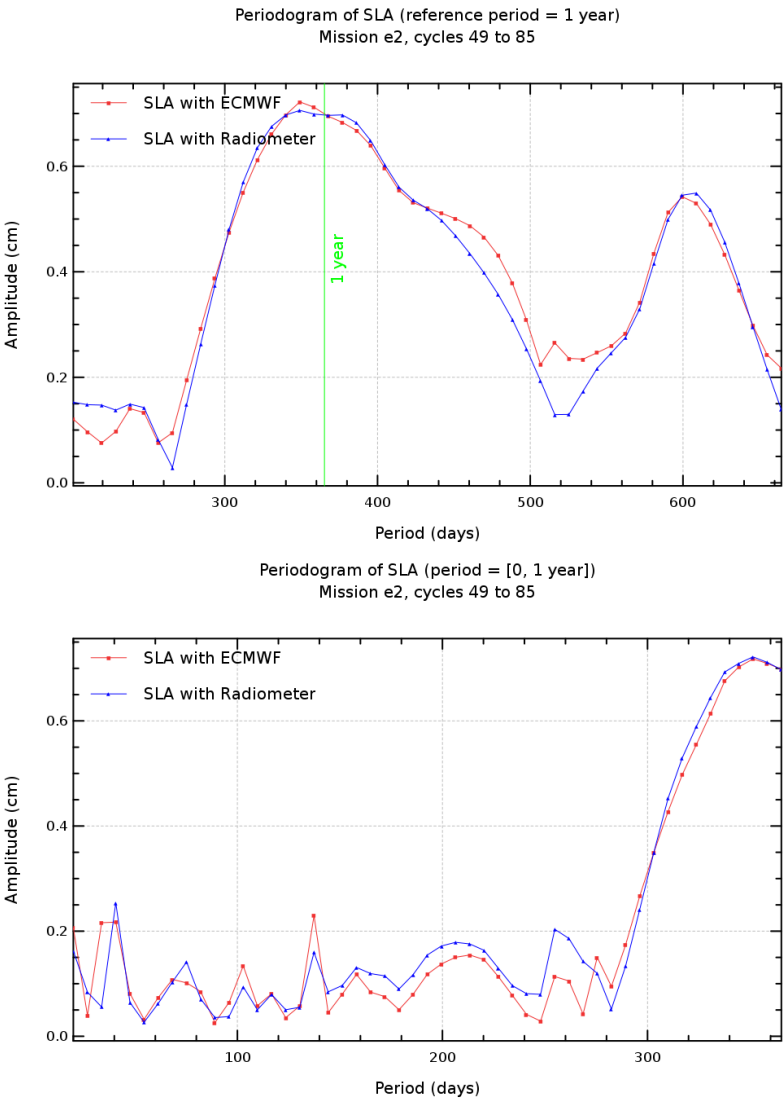


Diagnostic A206\_a (mission e2)

Name : Periodogram derived from temporal evolution of Sea Level Anomaly (SLA)

Input data : Along track SLA

Description : The periodogram derived from temporal evolution of SLA (global, northern or southern hemisphere) can be done over all periods or focusing on particular periods, such as annual, semi annual or 60 day signal. Therefore mean of SLA differences are computed (every day or cycle), and time data series are plotted as a periodogram.



## Diagnostic A206\_b (mission e2)

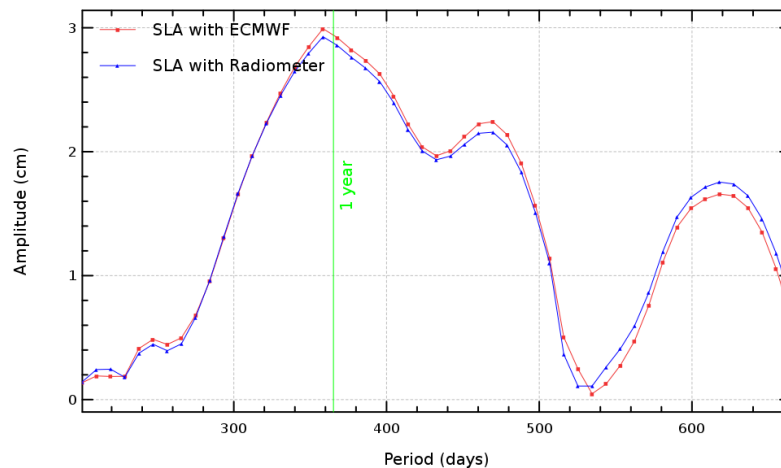
**Name :** Periodogram derived from temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

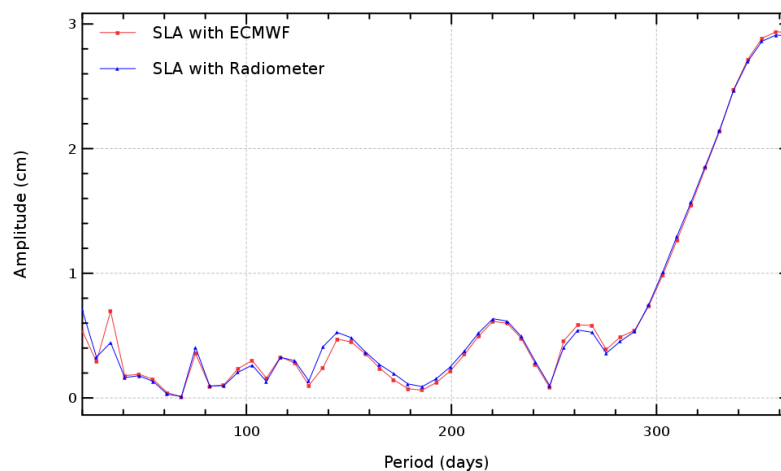
**Description :** The periodogram derived from temporal evolution of SLA (global, northern or southern hemisphere) can be done over all periods or focusing on particular periods, such as annual, semi annual or 60 day signal. Therefore mean of SLA differences are computed (every day or cycle), and time data series are plotted as a periodogram.

Diagnostic type : Global internal analyses

Periodogram of north hemisphere SLA (reference period = 1 year)  
Mission e2, cycles 49 to 85



Periodogram of north hemisphere SLA (period = [0, 1 year])  
Mission e2, cycles 49 to 85



## Diagnostic A206\_c (mission e2)

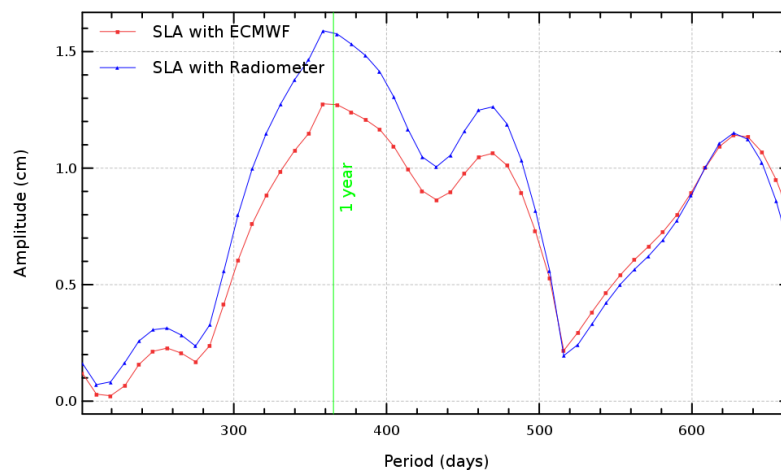
**Name :** Periodogram derived from temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

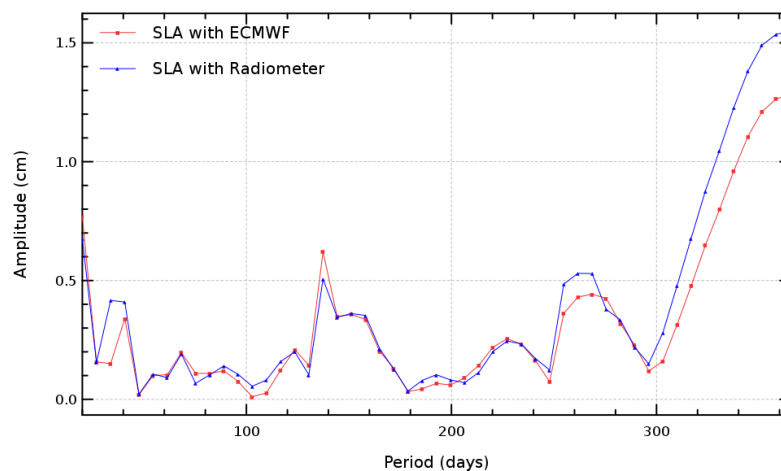
**Description :** The periodogram derived from temporal evolution of SLA (global, northern or southern hemisphere) can be done over all periods or focusing on particular periods, such as annual, semi annual or 60 day signal. Therefore mean of SLA differences are computed (every day or cycle), and time data series are plotted as a periodogram.

Diagnostic type : Global internal analyses

Periodogram of south hemisphere SLA (reference period = 1 year)  
Mission e2, cycles 49 to 85



Periodogram of south hemisphere SLA (period = [0, 1 year])  
Mission e2, cycles 49 to 85



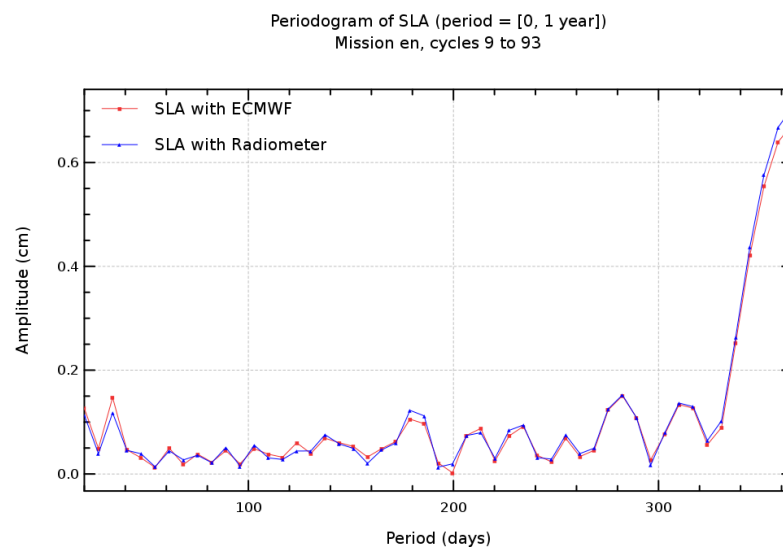
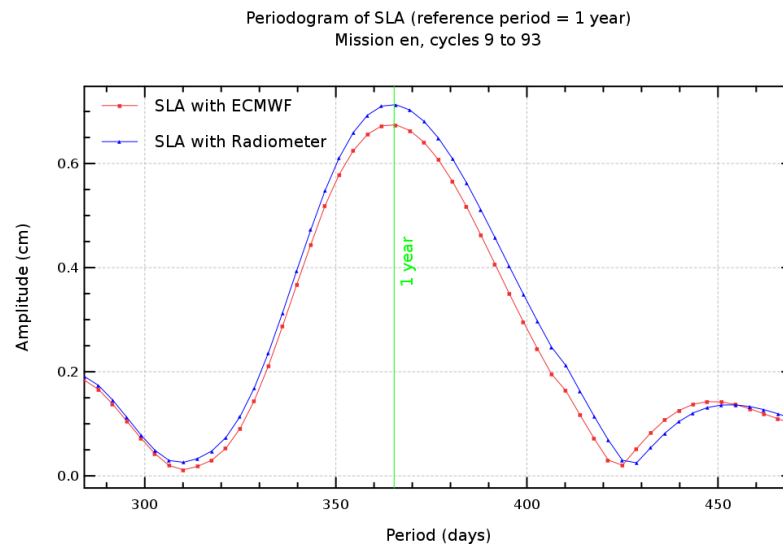
## Diagnostic A206.a (mission en)

**Name :** Periodogram derived from temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

**Description :** The periodogram derived from temporal evolution of SLA (global, northern or southern hemisphere) can be done over all periods or focusing on particular periods, such as annual, semi annual or 60 day signal. Therefore mean of SLA differences are computed (every day or cycle), and time data series are plotted as a periodogram.

Diagnostic type : Global internal analyses



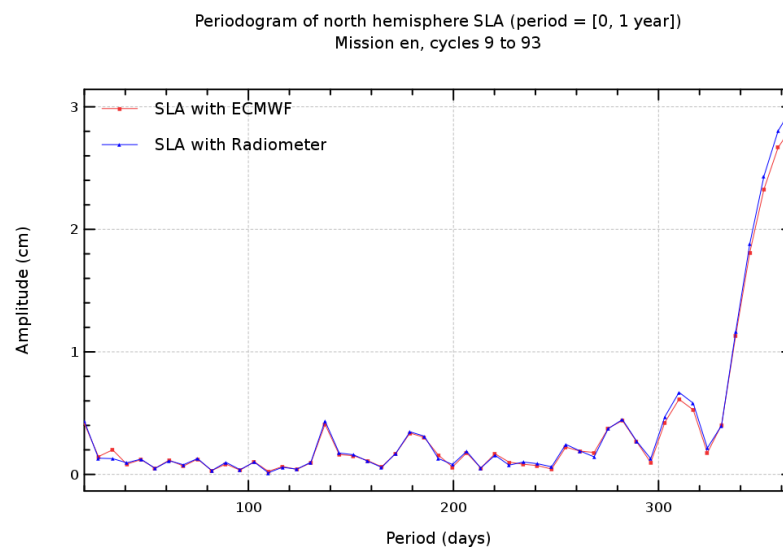
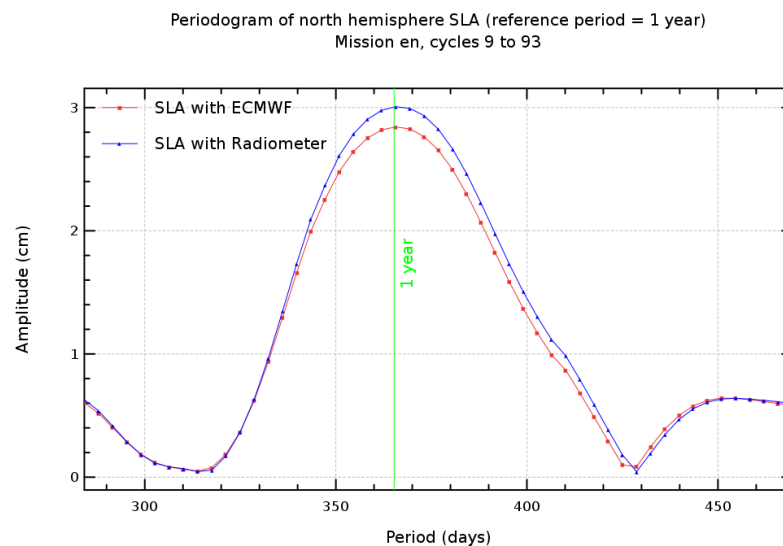
## Diagnostic A206\_b (mission en)

**Name :** Periodogram derived from temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

**Description :** The periodogram derived from temporal evolution of SLA (global, northern or southern hemisphere) can be done over all periods or focusing on particular periods, such as annual, semi annual or 60 day signal. Therefore mean of SLA differences are computed (every day or cycle), and time data series are plotted as a periodogram.

Diagnostic type : Global internal analyses





## Diagnostic A206\_c (mission en)

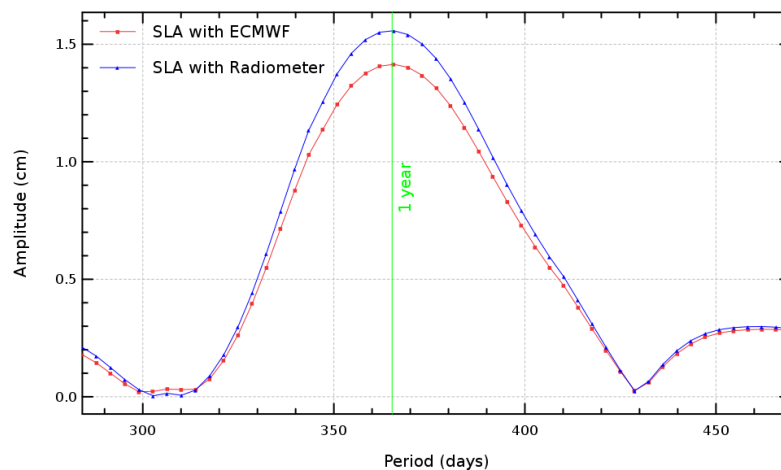
**Name :** Periodogram derived from temporal evolution of Sea Level Anomaly (SLA)

**Input data :** Along track SLA

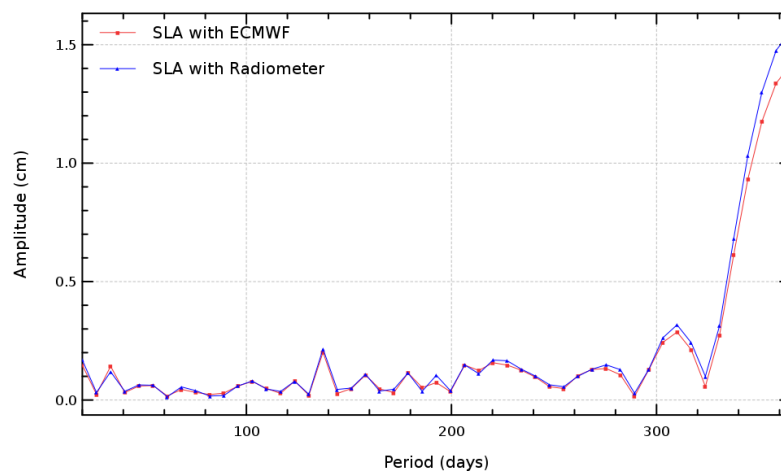
**Description :** The periodogram derived from temporal evolution of SLA (global, northern or southern hemisphere) can be done over all periods or focusing on particular periods, such as annual, semi annual or 60 day signal. Therefore mean of SLA differences are computed (every day or cycle), and time data series are plotted as a periodogram.

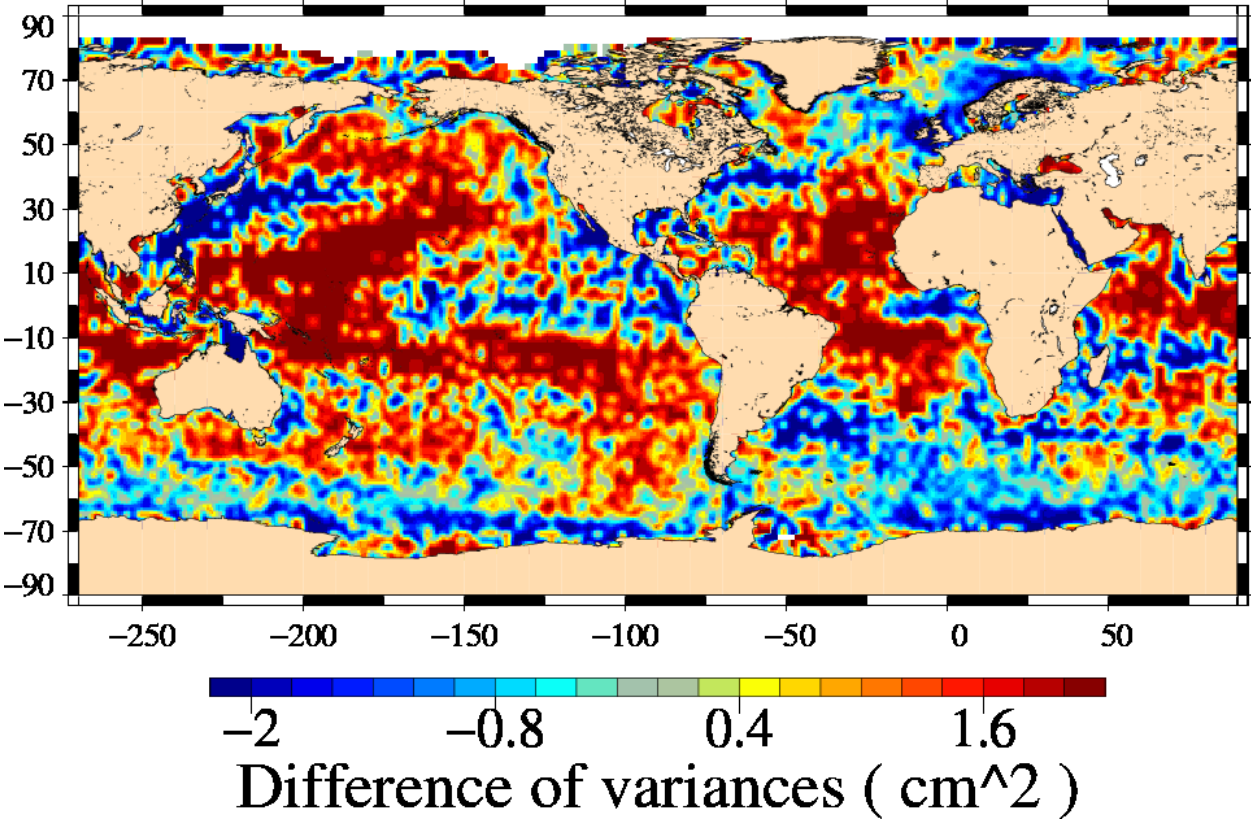
Diagnostic type : Global internal analyses

Periodogram of south hemisphere SLA (reference period = 1 year)  
Mission en, cycles 9 to 93



Periodogram of south hemisphere SLA (period = [0, 1 year])  
Mission en, cycles 9 to 93



Diagnostic type : Global internal analyses	Diagnostic A209 (mission e2)	
	Name : Differences between maps of SLA (3)	
	Input data : Along track SLA	
	Description : The differences between maps of SLA are calculated from the SLA differences (mean, standard deviation) using successively both altimetric components in the SLA calculation.	
	<div>VAR(SLA with ECMWF) – VAR(SLA with Radiometer)</div> <div>Mission e2, cycles 49 to 85</div> 	

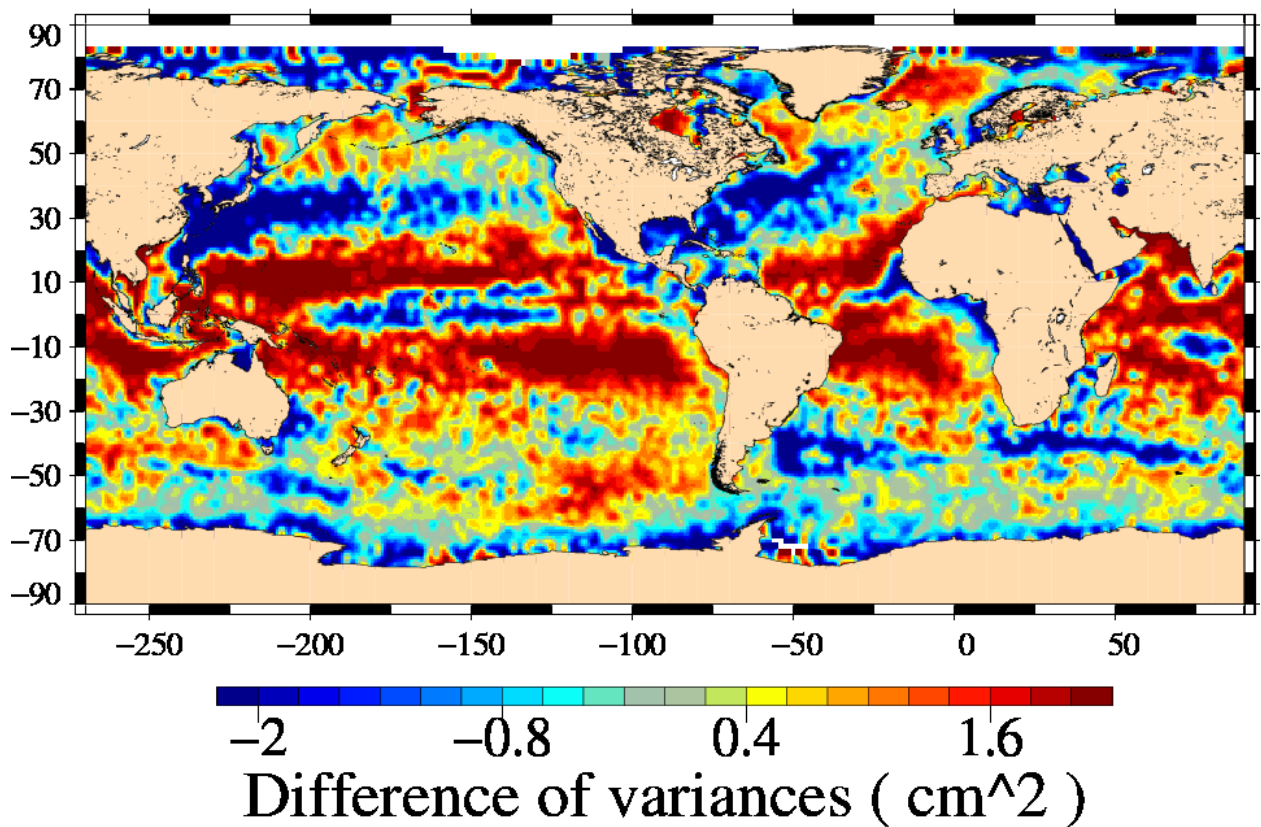
## Diagnostic A209 (mission en)

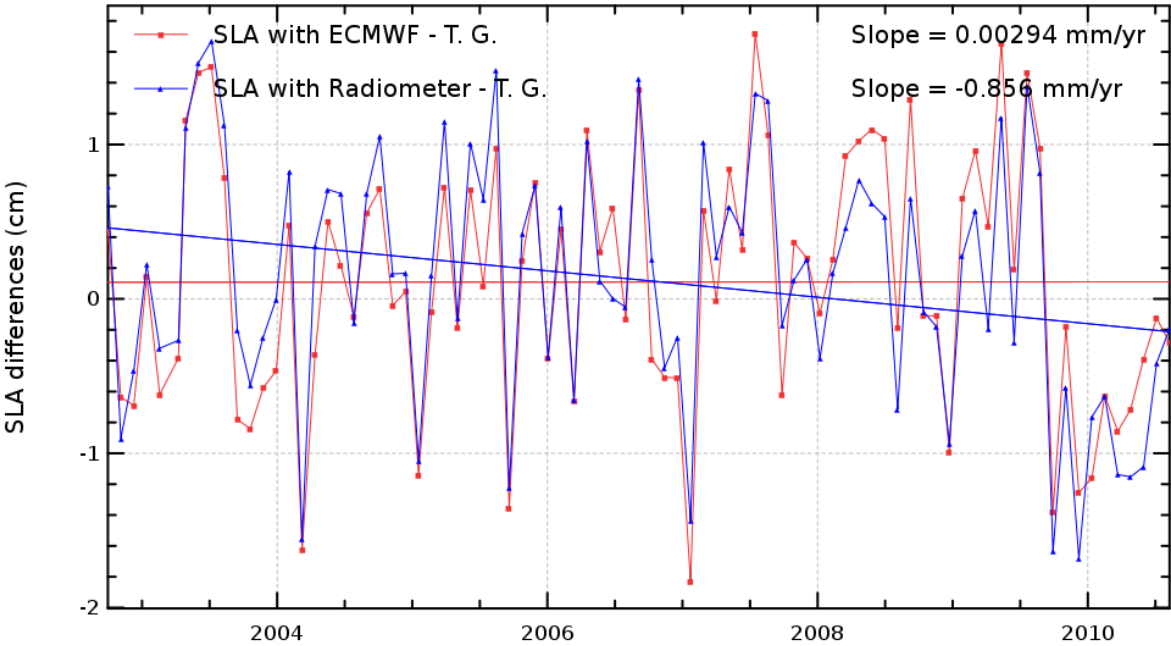
**Name :** Differences between maps of SLA (3)

**Input data :** Along track SLA

**Description :** The differences between maps of SLA are calculated from the SLA differences (mean, standard deviation) using successively both altimetric components in the SLA calculation.

**VAR(SLA with ECMWF) – VAR(SLA with Radiometer)**  
**Mission en, cycles 9 to 93**



Diagnostic C001 (mission en)	
Name : Temporal evolution of SSH differences between tide gauges and altimetry measurements	
Input data : Tide gauges SSH measurements	
Description : The temporal evolution of global statistics (mean, variance, slope) of SSH differences between tide gauges and altimeter measurements are calculated from a cyclic way (altimeter repetitivity) using successively both altimetric components in SSH calculation. The altimetric and tide gauges data are colocated with criteria of maximum of correlation, and tide gauges used are derived from global networks (GLOSS/CLIVAR, REFMAR).	
<div>SLA differences : altimetry measurements - tide gauges Mission en, cycles 9 to 93</div> 	

**Diagnostic C002 (mission en)**

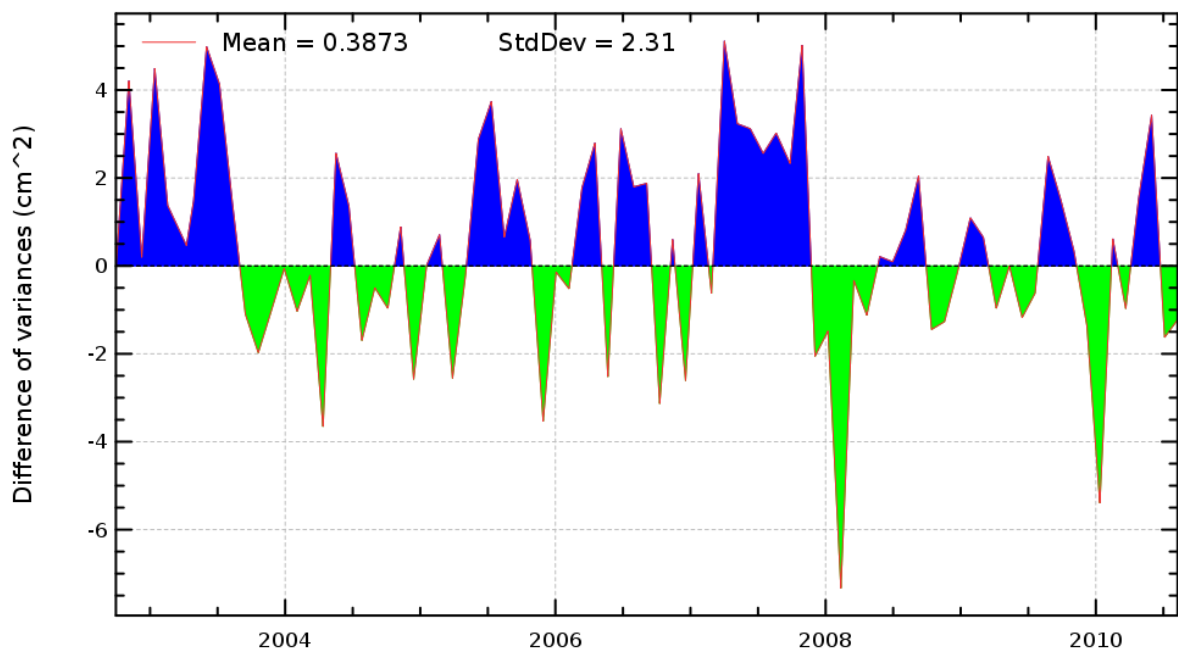
**Name :** Differences of temporal evolution of SSH differences between tide gauges and altimetry measurements

**Input data :** Tide gauges SSH measurements

**Description :** The difference between temporal evolution of global statistics of differences between tide gauge and altimeter data differences are calculated from a cyclic way (altimeter repetivity, daily, weekly, monthly) using successively both altimetric components in altimetric SSH calculation. The altimetric and tide gauges data are collocated with criteria of maximum of correlation, and tide gauges used are derived from global networks as GLOSS/CLIVAR.

Diagnostic type : Altimetry and in-situ data comparison

Difference of variances :  $\text{VAR}(\text{SLA with ECMWF} - \text{T. G.}) - \text{VAR}(\text{SLA with Radiometer} - \text{T. G.})$   
Mission en, cycles 9 to 93

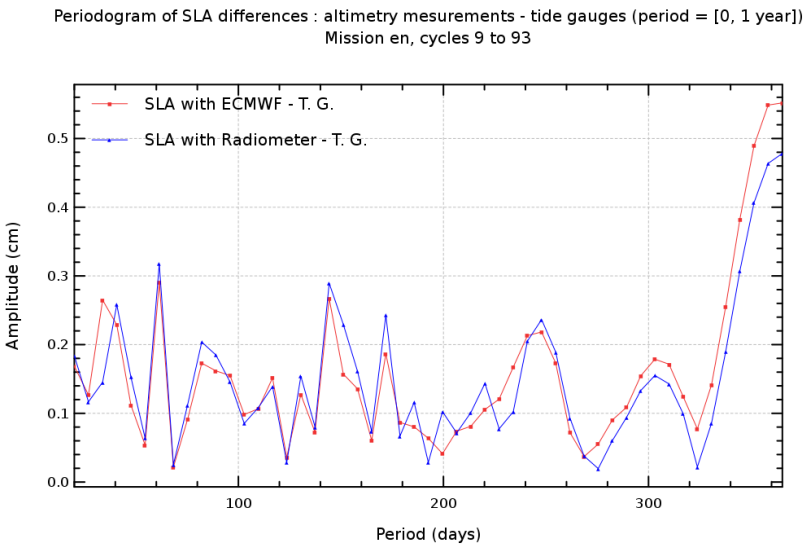
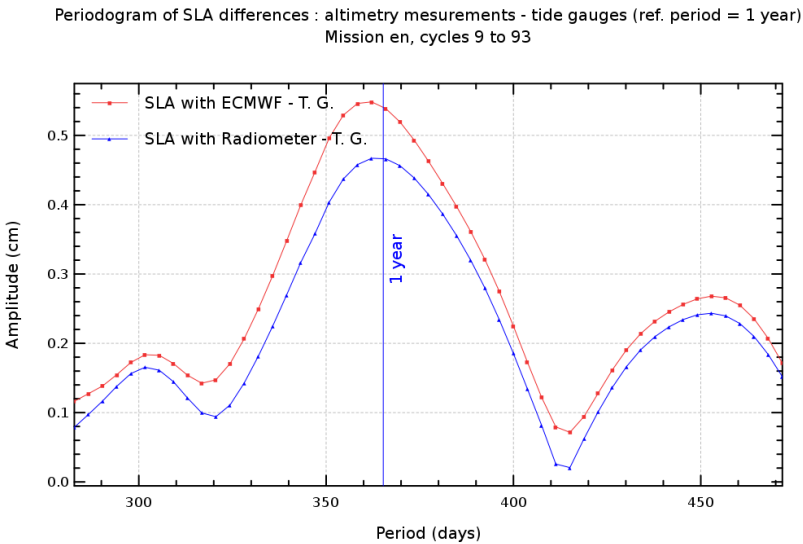


Diagnostic C003 (mission en)

**Name :** Periodogram derived from temporal evolution of SSH differences between tide gauges and altimetry

**Input data :** Tide gauges SSH measurements

**Description :** The periodogram derived from temporal evolution of altimetric and tide gauges SSH differences is calculated using successively both altimetric components in the altimetric SSH. The periodogram is calculated from the mean or variance statistics and it can be displayed for all the whole time period or a dedicated one



## Diagnostic C004 (mission en)

**Name :** Histograms of differences between tide gauges and altimeter SSH differences

**Input data :** Tide gauges SSH measurements

**Description :** The difference of histograms between altimeter and tide gauge SSH differences is computed from the elementary statistics (mean, variance) at each tide gauge using successively both altimetric components in the altimetry SSH.

Diagnostic type : Altimetry and in-situ data comparison

Histogram of the difference of variances :  $\text{VAR}(\text{SLA with ECMWF} - \text{T. G.}) - \text{VAR}(\text{SLA with Radiometer} - \text{T. G.})$   
Mission en, cycles 9 to 93

