# Orbit comparison: GSCF1504 versus GSFC1204

<table>
<thead>
<tr>
<th>Study variable</th>
<th>GSFC1504</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference variable</td>
<td>GSFC1204</td>
</tr>
<tr>
<td>Missions</td>
<td>TOPEX-Poseidon ((tp))</td>
</tr>
<tr>
<td>Period</td>
<td>([15608, 19216])</td>
</tr>
</tbody>
</table>

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Diagnostic A002 (mission tp)

**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 A003 (mission tp)

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.
**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.
**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 A005 (mission tp)**

**Name:** Altimetric component differences versus coastal distances, latitude and longitude

**Input data:** Along track altimetric components

**Description:** Mean and standard deviation of the differences between 2 different standards of a same altimetric component (sea surface height correction, altimeter parameter, orbit) are computed and plotted in function of coastal distances between 0 and 100 km, in function of latitudes and in function of longitudes.
Name: Altimetric component differences versus coastal distances, latitude and longitude

Input data: Along track altimetric components

Description: Mean and standard deviation of the differences between 2 different standards of a same altimetric component (sea surface height correction, altimeter parameter, orbit) are computed and plotted in function of coastal distances between 0 and 100 km, in function of latitudes and in function of longitudes.
Name: Altimetric component differences versus coastal distances, latitude and longitude

Input data: Along track altimetric components

Description: Mean and standard deviation of the differences between 2 different standards of a same altimetric component (sea surface height correction, altimeter parameter, orbit) are computed and plotted in function of coastal distances between 0 and 100 km, in function of latitudes and in function of longitudes.
Diagnostic A006_a (mission tp)

**Name**: EOF Decomposition of Differences

**Input data**: Along track altimetric components

**Description**: The differences between map of SLA (mean) are calculated from the mean SLA maps (per cycle) using successively both altimetric components in the SLA calculation. The maps of the differences are analyzed through an Empirical Orthogonal Functions (EOF) decomposition.

![EOF #1-Mean- Explained Variance=38.0%](image)
**Diagnostic A006_b (mission tp)**

**Name**: EOF Decomposition of Differences

**Input data**: Along track altimetric components

**Description**: The differences between map of SLA (mean) are calculated from the mean SLA maps (per cycle) using successively both altimetric components in the SLA calculation. The maps of the differences are analyzed through an Empirical Orthogonal Functions (EOF) decomposition.

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**EOF #2-Mean- Explained Variance=31.0%**

![Map and time series plot](image-url)
Name: EOF Decomposition of Differences

Input data: Along track altimetric components

Description: The differences between map of SLA (mean) are calculated from the mean SLA maps (per cycle) using successively both altimetric components in the SLA calculation. The maps of the differences are analyzed through an Empirical Orthogonal Functions (EOF) decomposition.
Name: EOF Decomposition of Differences

Input data: Along track altimetric components

Description: The differences between map of SLA (mean) are calculated from the mean SLA maps (per cycle) using successively both altimetric components in the SLA calculation. The maps of the differences are analyzed through an Empirical Orthogonal Functions (EOF) decomposition.
**Name**: EOF Decomposition of Differences

**Input data**: Along track altimetric components

**Description**: The differences between map of SLA (mean) are calculated from the mean SLA maps (per cycle) using successively both altimetric components in the SLA calculation. The maps of the differences are analyzed through an Empirical Orthogonal Functions (EOF) decomposition.
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).
**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).
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 A103 (mission tp)**

**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 A104 (mission tp)

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 A105 (mission tp)**

**Name:** Differences between SSH crossovers vs coastal distance

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

**Description:** The differences of SSH variances at crossovers are plotted in function of coastal distance, latitudes and longitudes.

![Graph 1](image1.png)

![Graph 2](image2.png)
Diagnostic A201_a (mission tp)

**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, or separating North and South hemispheres.

![Global MSL](chart.png)

**Global MSL**

Mission tp, cycles 1 to 364

- SLA with GSFC1504: Slope = 2.95 mm/yr [L.S.R. = 0.0687]
- SLA with GSFC1204: Slope = 2.93 mm/yr [L.S.R. = 0.0679]
**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, or separating North and South hemispheres.
**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, or separating North and South hemispheres.
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, or separating North and South hemispheres.
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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, or separating North and South hemispheres.
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, or separating North and South hemispheres.
**Diagnostic A202_a (mission tp)**

**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 or separating North and South hemispheres.

![Graph showing differences in mean SLA and variance SLA over time](image)
Diagnostic A202.b (mission tp)

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 or separating North and South hemispheres.
Diagnostic A203_a (mission tp)

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 tp)

**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_c (mission tp)

**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 A204_a (mission tp)

Name: Differences between maps of SLA trends

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).

SLA with GSFC1504 trends - SLA with GSFC1204 trends

Mission tp, cycles 1 to 364
Diagnostic A204_b (mission tp)

Name: Differences between maps of SLA trends

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 A205.a (mission tp)

Name: Differences between maps of SLA amplitude and phase

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 A205_b (mission tp)

Name: Differences between maps of SLA amplitude and phase

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 A206_a (mission tp)

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 tp)**

**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_c (mission tp)

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 A207 (mission tp)

Name: Sea Level Anomaly (SLA) versus coastal distance

Input data: Along track SLA

Description: Mean and standard deviation of SLA - computed by using successively both altimetric components - are plotted in function of coastal distances between 0 and 100 km.
Diagnostic A208 (mission tp)

**Name**: Sea Level Anomaly (SLA) differences versus coastal distance, latitude and longitude

**Input data**: Along track SLA

**Description**: The differences of SLA variances - computed by using successively both altimetric components - are plotted in function of coastal distances between 0 and 100 km, in function of latitudes and in function of longitudes.

![Graph showing the difference of SLA variances](image-url)

- **VAR(SLA with GSFC1504) - VAR(SLA with GSFC1204)**
- Mission tp, cycles 1 to 364
- Mean = 0.2627

**Coastal Distance (km)**

**Difference of variances (cm$^2$)**
**Diagnostic A208 (mission tp)**

**Name**: Sea Level Anomaly (SLA) differences versus coastal distance, latitude and longitude

**Input data**: Along track SLA

**Description**: The differences of SLA variances - computed by using successively both altimetric components - are plotted in function of coastal distances between 0 and 100 km, in function of latitudes and in function of longitudes.
Name: Differences between maps of SLA variance

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.
Name: Differences between maps of SLA variance for different frequency bands

Input data: Along track SLA

Description: The differences between maps of SLA (variance) are calculated from the mean SLA maps using successively both altimetric components in the SLA calculation filtered to separate high-frequency (T < 1 yr), mid-frequency (1 yr < T < 3 yrs) and low-frequency (T > 3 yrs) signals.
**Diagnostic A210_b (mission tp)**

**Name:** Differences between maps of SLA variance for different frequency bands

**Input data:** Along track SLA

**Description:** The differences between maps of SLA (variance) are calculated from the mean SLA maps using successively both altimetric components in the SLA calculation filtered to separate high-frequency ($T < 1$ yr), mid-frequency ($1$ yr $< T < 3$ yrs) and low-frequency ($T > 3$ yrs) signals.
## Diagnostic A210_c (mission tp)

### Name
Differences between maps of SLA variance for different frequency bands

### Input data
Along track SLA

### Description
The differences between maps of SLA (variance) are calculated from the mean SLA maps using successively both altimetric components in the SLA calculation filtered to separate high-frequency ($T < 1$ yr), mid-frequency ($1$ yr $< T < 3$ yrs) and low-frequency ($T > 3$ yrs) signals.

![VAR(SLA with GSFC1504) - VAR(SLA with GSFC1204) for FILTER BF](image)

**Mission tp, cycles 1 to 364**

<table>
<thead>
<tr>
<th>Difference of variances BF (cm^2)</th>
</tr>
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<tbody>
<tr>
<td>-2</td>
</tr>
<tr>
<td>-1</td>
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<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>
Name: Differences between maps of SLA per year

Input data: Along track SLA

Description: The differences between map of SLA (mean) are calculated for each year using successively both altimetric components in the SLA calculation.