A new version of SSALTO/Duacs products available in April 2014

Issue: 1. 1

Date: 2014,Apr.15

CENTRE NATIONAL D'ÉTUDES SPATIALES

Chronology Issues:

Issue:	Date:	Reason for change:	Author
1.0	2014/03/12	Creation	DUACS/Aviso team
1.1	2014/04/15	Addition of paragraph 3.1.2	

List of Acronyms

ATP	Along-Track Product
ADT	Absolute Dynamic Topography
AVISO	Archiving, Validation and Interpretation of Satellite Oceanographic data
DT	Delayed Time
DUACS	Data Unification and Altimeter Combination System
MADT	Map of Absolute Dynamic Topography
MDT	Mean Dynamic Topography
MSLA	Map of Sea Level Anomaly
MSS	Mean Sea Surface
NRT	Near-Real Time
SLA	Sea Level Anomaly
SSALTO	SSALTO multimission ground segment
SSH	Sea Surface Height

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1. Summary

On April 15th, 2014, a new version of the SSALTO/DUACS products distributed by Aviso, **so-called DUACS 2014**, will be released with several **significant upgrades**. The **whole range of products**, in near real time and delayed time, along track and gridded, will be impacted in terms of scientific content, format and naming. In parallel to the nominal production, which will be impacted from 15th of April onwards, **a complete reprocessing** of the whole altimeter time series has been performed and will be distributed in the same time.

These changes contribute to **improve the product quality** but also to **better fit the users' needs**. They mainly concern:

- The **change of the reference period:** in the DUACS 2014 version, the reference period of the Sea Level Anomalies is based on a 20-year [1993, 2012] period whereas in the former version it is on a 7-year [1993, 1999] period.
- **The change of the SLA bias**: the general convention to the bias applied to all of the SSALTO/DUACS SLA products consists of having a mean SLA null over the year 1993.
- The evolution of the **gridded product resolution and formats**: a new Cartesian ¼° resolution is used instead of the 1/3° Mercator grid and a new NetCDF format with new variables is used.
- The evolution of **the along track products** geophysical content: a new processing is applied in terms of filtering and sub-sampling, inducing less smoothing notably at low latitudes and a denser dataset.

In addition to these 4 main changes, several other scientific upgrades are applied.

IMPORTANT NOTICE: the major upgrades of DUACS 2014 products, which are summarised in the table below, will **have a strong impact and will necessitate actions on the user's side**. **We encourage all SSALTO/DUACS users to carefully read this technical note which describes and explains these evolutions.**

To insure a smooth transition between the current products and the DUACS 2014 products:

- samples of DUACS 2014 products are already available in the dedicated operational ftp folders.
- a double ftp dissemination is planned: the two versions of the products will be maintained up to mid June.

The ftp access is possible with the same personal username/password that you already have (new name since February 2014: ftp.aviso.altimetry.fr, the former one: ftp.aviso.oceanobs.com is still working).

For any questions, please contact Aviso User Services: aviso@altimetry.fr

	Former DUACS version up to 14 April 2014	DUACS 2014 version from 15 April 2014 onwards
Reference period for SLA (grid and along-track)	7-year [1993, 1999]	20-year [1993, 2012] Possible user action depending on the application: see section 2
SLA bias convention	-	Mean SLA null over the year 1993 User action needed: see section 5.1
Spatial grid resolution and projection for the Global product	1/3° Mercator	1/ 4° Cartesian with a new grid-points convention User action needed: see section 3
Temporal grid resolution	Daily maps in NRT Weekly maps in DT	Daily maps in NRT and DT
Grid definition	Latitude range for Global product = [-82,82°N] Longitude range for Mediterranean product= [355,396°E]	Latitude range for Global product= [-89.875,89.875°N] Longitude range for Mediterranean product =[354.0625, 396.9375°E] User action needed: see section 3
Grid Format	NetCDF Non CF	NetCDF 3-CF, with new variables and attributes User action needed: see section 6
Along track filtering for the Global product	Low pass filtered with a cut off wavelength between 65km and 250km depending on the latitude	Low pass filtered with a cut off wavelength of 65km for the whole globe Possible user action depending on the application: see section 4
Along track sub-sampling for the Global product	1 point kept over 3 to 7 points depending on the latitude	1 point kept over 2 points for the whole globe Possible user action depending on the application: see section 4
Folders and file naming on ftp.aviso.altimetry.fr* server	The Near Real Time and Delayed time product are respectively in the “nrt” and “dt” folders	The Near Real Time and Delayed time product are respectively in the “near-real-time” and “delayed-time” folders User action needed: see section 6

(*) Note that the name of the ftp server has changed. It is now ftp.aviso.altimetry.fr. The older name ftp.aviso.oceanobs.com is still valid.

2. The change of the altimeter reference period

Since 2001, the SSALTO/DUACS Sea Level Anomalies distributed by Aviso have been based on a 7-year reference period [1993, 1999]. As 20 years of altimeter measurements are now available it is of high interest to change the reference period for a longer period: in the 2014 version we thus change to a 20-year reference period [1993, 2012], as presented by Pujol and Faugere (2013) at the last Ocean Surface Topography Science Team meeting and in Aviso+ Newsletter#9 by Maheu et al., 2013.

The change of the altimeter reference period is a significant upgrade with a strong impact on the content of the products, in Near Real Time and Delayed Time, for along-track and gridded data. This will impact the users who may have to modify their processing, depending on their applications.

2.1. Why this change ?

As illustrated in Figure 1, Sea Level Anomalies (SLA) represent the variations of the Sea Surface Heights (SSH) relative to a Mean Sea Surface (MSS). This MSS is representative of a particular period of time, called the reference period.

The SSALTO/DUACS Sea Level Anomalies products have been historically referenced to the 7-year period [1993, 1999] since 2001, when the MSS CLS01 was computed. The Mean Dynamic Topography (MDT), is also representative of a particular reference period. The Absolute Dynamic Topography (ADT = SLA+MDT) is not, by definition, referenced to a particular reference period.

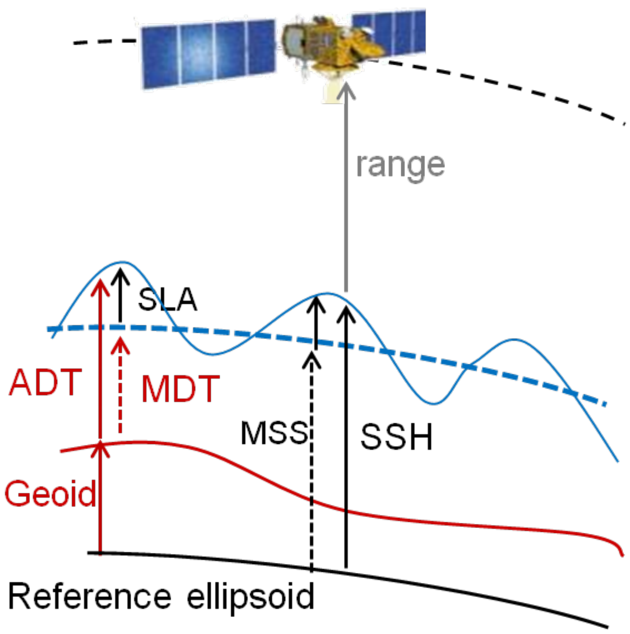

Figure 1 : Altimetry heights naming convention

As 20 years of altimeter measurements are now available it is of high interest to change the reference period for a longer period. For the last 20 years, the sea level variations have been observed thanks to altimetry data as illustrated by the regional Sea Level trends in Figure 2. The change of reference period from 7 years to 20 years integrates the evolution of the sea level in terms of trends, but also in terms of interannual signals at small and large scales (e.g. Niño/Niña) in the 13 last years.

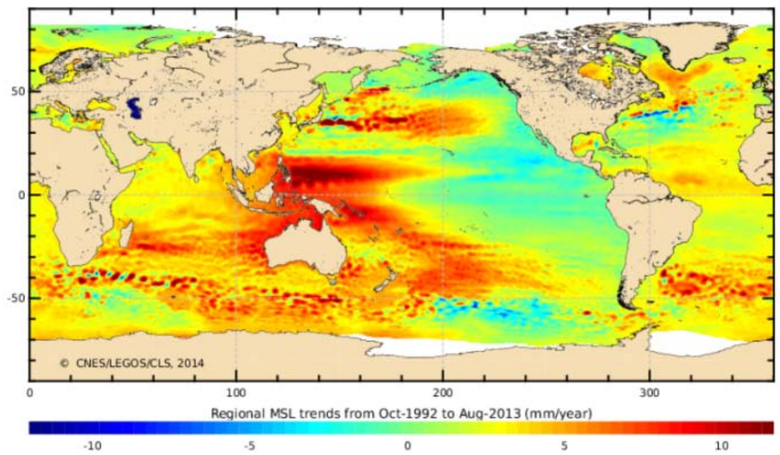

Figure 2: Evolution of the regional Mean Sea Level trend between 1993 and 2013

(source http://www.aviso.altimetry.fr/msl)

2.2. Impact

The reference period change from 7 years [1993-1999] to 20 years [1993-2012], induces the global and regional Mean Sea level variations, and is plotted in Figure 3. This represents the change that users will observe in the DUACS 2014 version of the product.

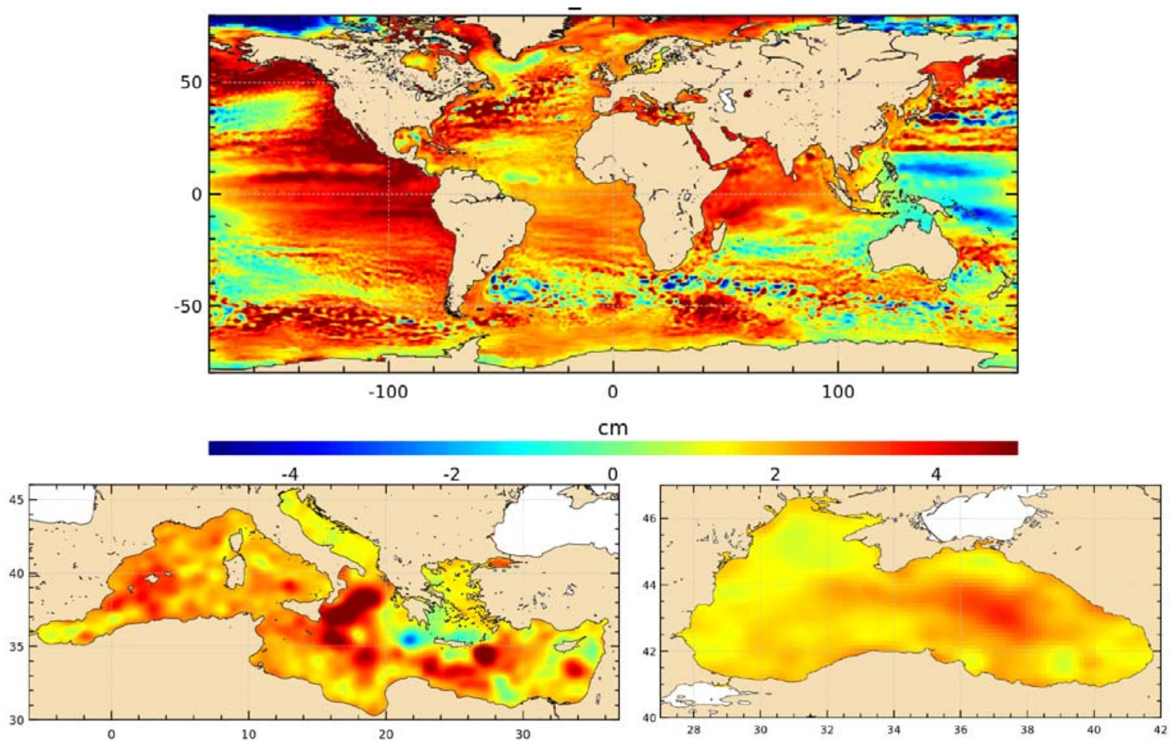

Figure 3: Regional Mean Sea Level changes between [1993-1999] and [1993-2012] periods, that impact Global, Med and Black Sea products (cm).

The change to a 20-year reference period has an impact on SLA:

- **2.3 cm globally for NRT products**
- **regional variations of up to ±5 cm**

An example of the impact of the reference period change is given in Figure 4 which shows the Mean of the Sea Level Anomaly for the year 2012 using the [1993-1999] reference period (right panel) and the [1993-2012] reference period (left panel). The difference between the two maps in Figure 4 corresponds to Figure 3 (top). Changing from a 7 to 20 years reference period leads to better interannual signals and oceanic anomalies. Figure 5 shows another example of this impact on a specific track of Jason-2 over the Kuroshio region.

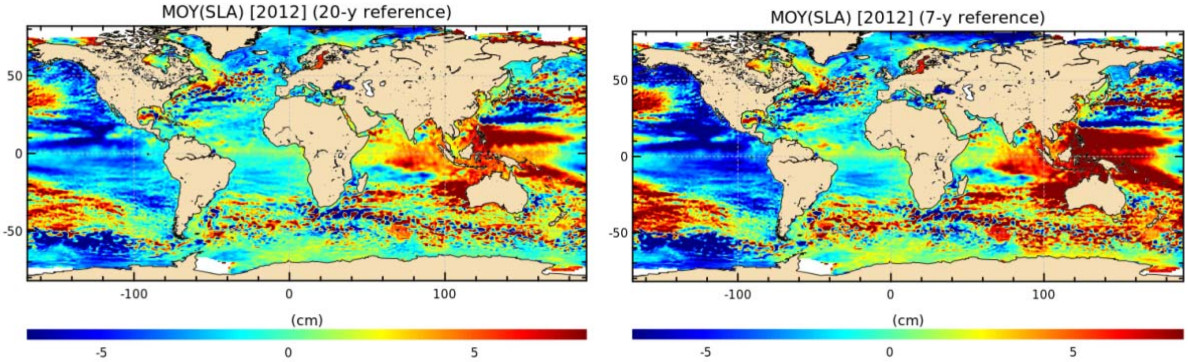

Figure 4: Mean of the Sea Level Anomalies over the year 2012 using the [1993, 1999] reference (right) and using the [1993, 2012] reference (left)

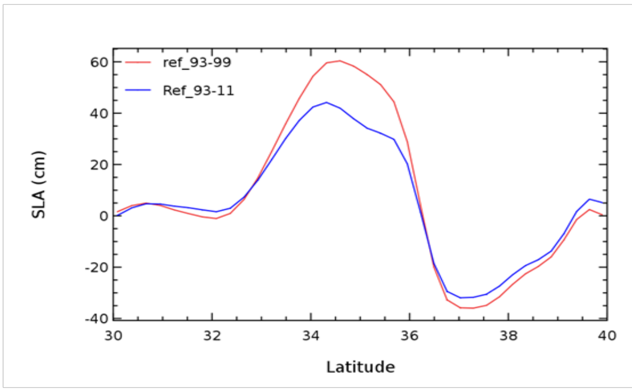

Figure 5: J1 pass crossing the Kuroshio in December 2011

2.3. How to manage the change of the reference period?

Depending on your application, you may wish to use this improved 20-year reference or you may wish to keep the original 7-year reference period.

If you are using the SLAs in association with a MDT (e.g. via assimilation in numerical models), you need to ensure consistency between the SLAs and the MDT used. In this case, an action (described below) is necessary on the users' side.

To allow the users to ensure this consistency between the SLA and MDT products, new “ref20yto7y” products are added to the catalogue (section Appendix A -). They consist of corrective maps that allow the user to change the reference of the SLA and MDT products. Three corrective maps are available, for the Mediterranean Sea, Black Sea and Global Ocean. Figure 3 is the plot of these gridded products.

These corrective products can be used in two ways:

1st corrective method, change the SLA reference period:

Users can apply the corrective map to the new DUACS 2014 SLA fields referenced to the 20-year period (SLA_20y) in order to obtain a SLA referenced to the original 7-year period (SLA_7y). The obtained SLA is equivalent to the former DUACS products.

$$SLA\_7y = SLA\_20y - ref20yto7y$$

When working with along-track measurements, you need to interpolate the gridded variable ref20yto7y onto the location of the SLA_20y measurements.

2nd corrective method, change the MDT reference period:

This corrective term can also be applied to the static MDT field:

$$MDT\_20y = MDT\_7y - ref20yto7y$$

In any case, the Absolute Dynamic Topography field will be unchanged if you use consistent SLA and MDT products. Check that you compute it in a consistent way using the new 20-year reference period:

$$ADT = SLA\_20y + MDT\_20y$$

Or the 7 year reference period:

$$ADT = SLA\_7y + MDT\_7y$$

3. Change of gridded products

In order to better fit the users' needs, the SSALTO/DUACS 2014 gridded products are modified, with a different spatial resolution and grid point positions, and with a NetCDF 3-CF compliant standard (see appendix A1). For some products, the area covered is extended.

This upgrade has a significant impact in terms of data handling and need an evolution of the users' reading routines.

3.1. Change of the resolution

3.1.1. Description of the change

Up to now, the Aviso products were available with two projections:

- Mercator grid projection with 1/3° x1/3° spatial resolution (Global product)
- Cartesian 1/4°x1/4° spatial resolution (so-called "qd") derived from Mercator grid through linear interpolation

After the feedback from users, the Mercator grid projection is abandoned. The DUACS 2014 products are now directly computed on a Cartesian ¼°x1/4° spatial resolution. This implies to main differences:

First, the precision of the product is now improved since the SLA field is directly estimated at this resolution, contrarily to the historical "qd" product.

Secondly, the positions of the grid points are shifted in order to be consistent with many other products. While the historical "qd" product positions were defined such that a grid point location (i.e. the center of a pixel) occurred on the point (0°N, 0°E), the new locations are defined in order that the **bottom left corner of a pixel** occurs on the point (0°N, 0°E). In the case of the global product, with 1/4°x1/4° spatial resolution, this pixel is centered on the point located at (0.125°N, 0.125°E). In the case of regional products, with 1/8°x1/8° spatial resolution, this pixel is centered on the point located at (0.0625°N, 0.0625°E). Figure 6 illustrates the different positions between the historical "qd" grid and the new grid used for the global product.

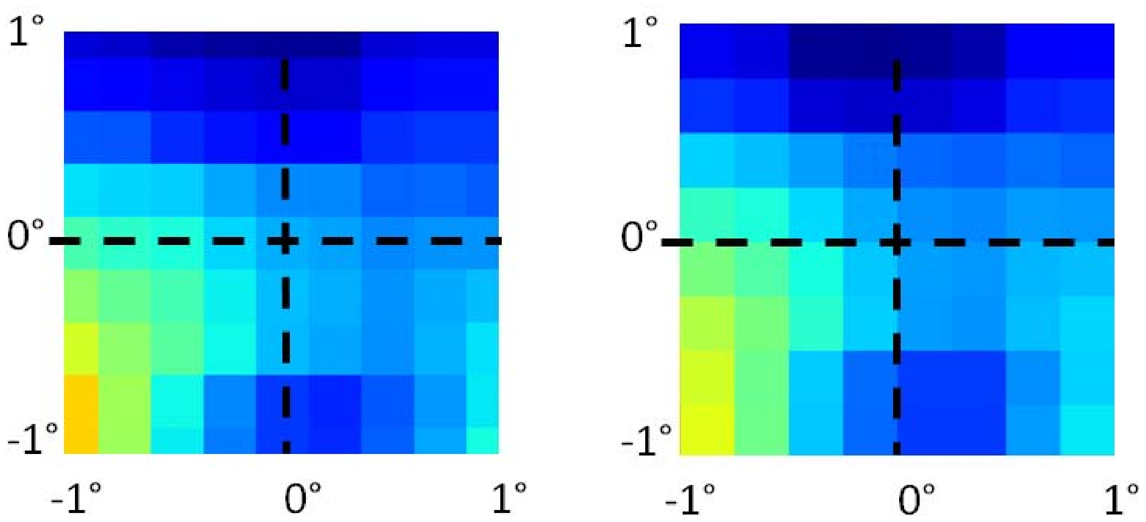

Figure 6: Global product pixel positions for the historical "QD" resolution (left) and for the new Global 1/4°x1/4° product (right). The grid point positions correspond to the centre of each box. The point (0°N, 0°E) is underlined with the black cross

3.1.2. Impact of the grid resolution change on the physical signal

The change of the grid spatial resolution has an impact in terms of resolution of the mesoscale structures.

The new ¼°x ¼°Cartesian grid leads to an improved resolution, especially for latitudes lower than nearly ±41.5°N, as illustrated by Figure 7. This latitude band includes the main part of the high variability areas as shown on Figure 8. Up to ±41.5°N, the Meridian resolution is reduced while the Zonal resolution comes closer to the resolution of the 1/3° Mercator grid.

The change of grid resolution has no impact in terms of SLA spatial variability.

At the opposite, the change of spatial resolution directly impacts the geostrophic current estimation. It is induced by the sensitivity of the methodology used to compute the geostrophic current to the distance between two latitudes and longitudes grid points. For instance when using finite difference methodology:

- We observe a mean increase of the Eddy Kinetic Energy of nearly 20% when deduced from the new 1/4°x1/4° Cartesian resolution product rather than with the old 1/3°x1/3° Mercator resolution. This increase mainly concerns latitudes lower than ±45°N. For higher latitudes the gain in zonal resolution does not exactly compensate the loss in meridian resolution, and a low decrease in EKE can be observed.
- As far as the distance between two grid points is the same for the historical "qd" and the new 1/4°x1/4° Cartesian resolution, the change of the position of the grid points has no impact on the EKE estimation.

The users must note that in addition to the change of the grid resolution, the different changes of parameters and processing used for the DUACS 2014 products also have an impact on the physical signal reconstruction.

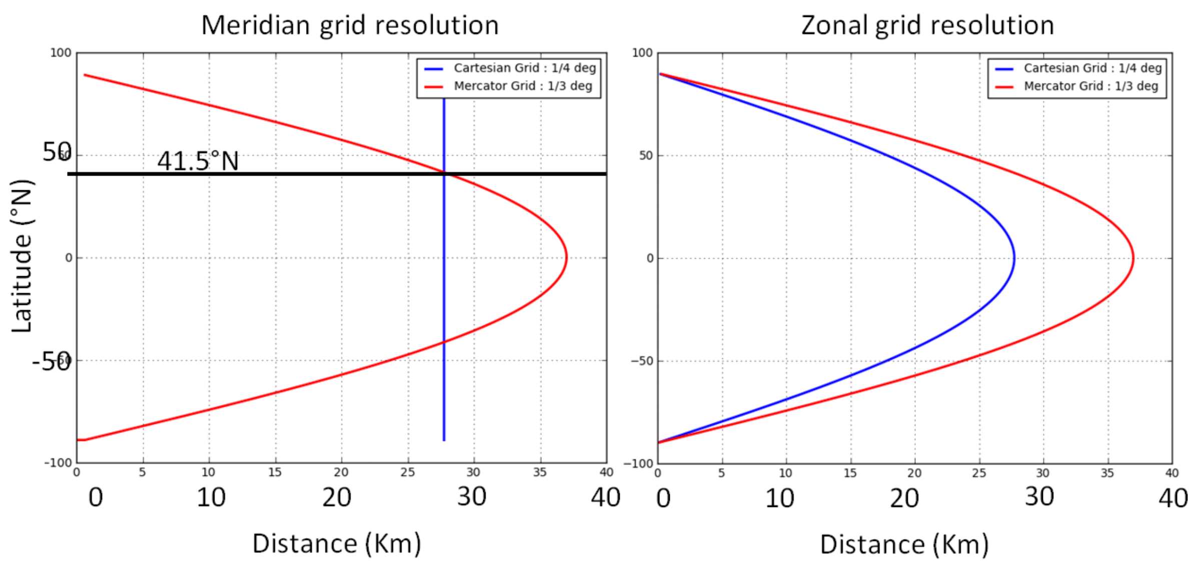

Figure 7 : Evolution of the distance between two successive Latitudes (left) and longitudes (right) as a function of the latitude. 1/3° Mercator grid (red) and ¼° Cartesian grid (blue).

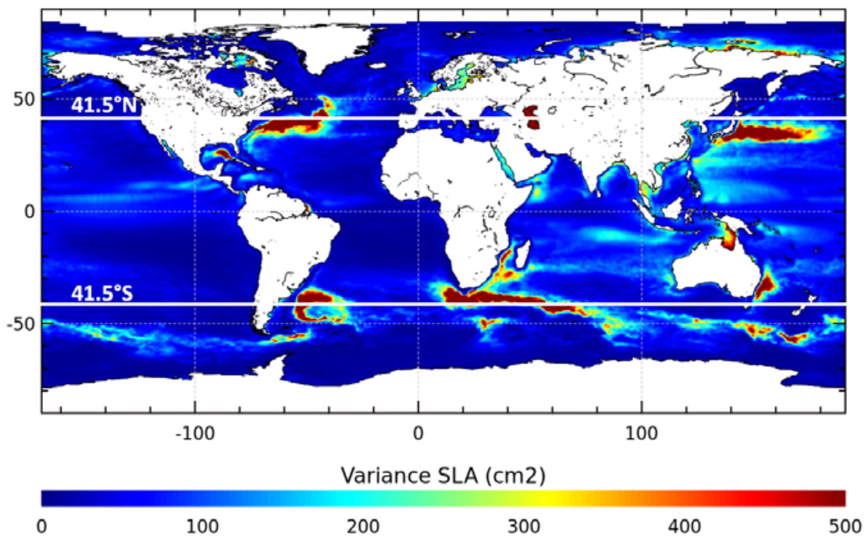

Figure 8: SLA variance. Horizontal white lines show the position of the ±41.5°N Latitudes

3.2. New area definition

The areas covered by the different DUACS 2014 products are modified compared to the former version. The main changes concern the Global area that is extended to higher latitudes. The Mediterranean Sea is also extended in its Western part in order to include the Gibraltar Strait. The areas for the DUACS 2014 version of the products are presented in Table 1.

Product area	Longitudes (degree East)		Latitudes (degree North)	
	min	max	min	max
Global	0.125	359.875	-89.875	89.875
Mediterranean	354.0625	396.9375	30.0625	45.9375
Black Sea	27.0625	41.9375	40.0625	46.9375
Mozambique	30.0625	59.9375	-29.9375	-0.0625

Table 1: Area defined by the DUACS 2014 version of the gridded products (position of the grid points)

3.3. New NetCDF standard

The NetCDF format for the gridded products has been updated in order to fit the NetCDF 3-CF convention. More details are available on Appendix A1.

3.4. Formal mapping error

The formal mapping error represents a purely theoretical mapping error. It mainly represents errors induced by the constellation sampling capability and consistency with the spatial/temporal scales considered, as described in Le Traon et al (1998) or Ducet et al (2000).

In the former DUACS version, the formal mapping error was delivered as the "ERR" product, and expressed in % of the signal variance. In the DUACS 2014 version, it is expressed in meters and is delivered in the same NetCDF files as the MSLA products. See Appendix A1.

4. Change of Along track Product

In the former DUACS version, the along-track filtering level and spatial resolution did not entirely fit different applications needs. Indeed, part of the physical signal is filtered and the sub-sampling applied led to the loss of an important part of the physical content, especially in low latitudes areas. In response to users' requirements, the along-track processing was improved in order to reduce the measurement noise and keep more of the physical content of the signal. We present these evolutions in this section. Details were presented by Dufau et al (OSTST 2013).

4.1. Change of the filtering level and resolution

The DUACS 2014 version of the products provides higher resolution along-track SLA. To achieve this objective, the new filtering level takes into account the capability of the 1Hz measurements to observe mesoscale signals. Therefore, a cut-off length of 65 km is applied everywhere to filter the SLA. Compared to the previous SLA filtering applied, it changes drastically the SLA resolution at low latitudes. In these areas, the cut-off length is reduced by more than 100 km (Figure 9). The DUACS 2014 version of the products then provides higher resolution SLA profiles below 30° in latitude and an improved noise reduction at latitude higher than 40°.

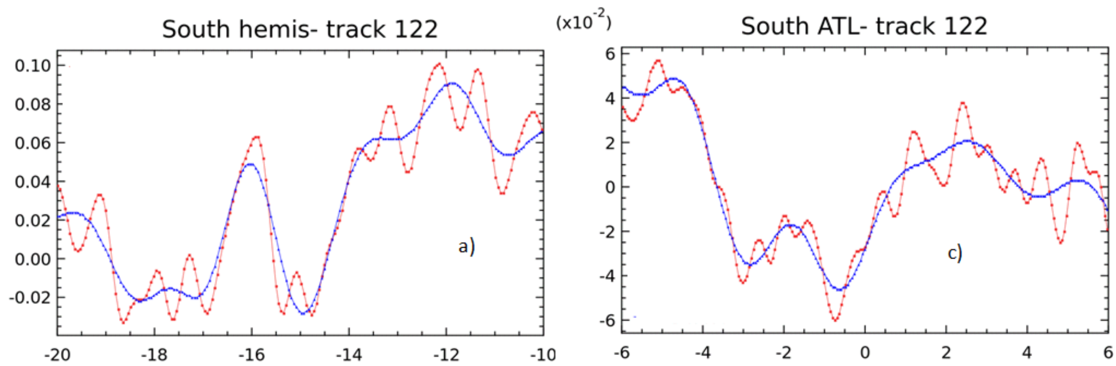

Figure 9 : Along-track SLA profiles on 2 sections along track 122 for Jason-2 mission. Former version of the products (blue) and DUACS 2014 version (red).

In addition to the along-track filtering, the SLA sub-sampling is also reduced, leading to the availability of more along-track signal. In the DUACS 2014 version of the products, the along-track spatial resolution is nearly 14 km. As for the filtering, the change in the along-track sub-sampling has a stronger impact in low latitudes areas, where the **number of measurements available is increased by a factor 3**.

This upgrade has a significant impact on the along-track data in terms of geophysical content with higher energy at 100-250 km wavelengths at low latitudes and with more points available due to the reduced sub-sampling.

5. Other scientific upgrades

In addition to the important changes presented here, other upgrades are included in the DUACS 2014 version of the products. They contribute to improve the quality of the products. They concern the NRT 2014 products, as well as the DT 2014 products that are entirely reprocessed.

5.1. SLA Bias convention

We decided to apply a general convention to the bias applied to all of the SSALTO/DUACS SLA products. It consists of having a mean SLA null over the year 1993. The use of this convention for the SLA leads to the introduction of a SLA bias between the DUACS 2014 products and the former version. In Delayed time, this bias is estimated at nearly 0.7 cm.

In the case of NRT products, they were adjusted to fit the DT sea level products. As a consequence, the bias between DUACS 2014 and the former version of NRT product is nearly 2.3 cm. In order to ease the transition for NRT applications, the use of the “ref20yto7y” correction (see §2.3) allows operational users to avoid any jump in the time series.

The users need to be careful in correcting the bias between the DUACS 2014 products and the former version for both DT and NRT products.

5.2. New altimetry standards used for the whole altimetry dataset

SLA is computed with the Mean Sea Surface **MSS CNES-CLS-2011** referenced to the 20-year period. For repetitive orbits, cross-tracks gradients are improved using the **reference Mean profile updated** in order to take into account the new standards and to improve the quality near the coast.

The new **up-to-date standards** (GDR-D or equivalent) are applied to all altimeter missions in the reprocessed DT 2014 products as well as in the NRT 2014 products. The main important changes are:

- New orbit solutions for Jason-1&2, Envisat, Topex/Poseidon, ERS-1&2 and GFO (except during maneuver periods)
- GOT4v8 tide solution for all missions
- New SSB solution from Tran 2012 for Jason-1&2, Envisat and Cryosat-2
- Reaper ionospheric solution for ERS-1
- Dry troposphere from ERA-Interim for Topex/Poseidon, ERS-1&2; From ECMWF Gaussian grids for Envisat.
- High resolution Dynamic Atmospheric Correction solution computed from ERA-Interim for Topex/Poseidon, ERS-1&2; From ECMWF Gaussian grids for Envisat.

The full description of the standards used for each altimeter mission is given in Appendix B.

Extended temporal coverage offered by the twin/triplet missions (Topex/Poseidon /Jason-1&2; TPN/Jason-1N and ERS/Envisat) was also exploited.

5.3. Tuned merging method

The parameters used for the mapping process (Optimal interpolation) are updated in DUACS 2014 version. The main improvement consists of the use of more accurate correlation scales, by taking into account optimally the spatial variability of the signal. These new correlation scales lead to a more accurate mapping of the mesoscale. An example is given in Figure 10.

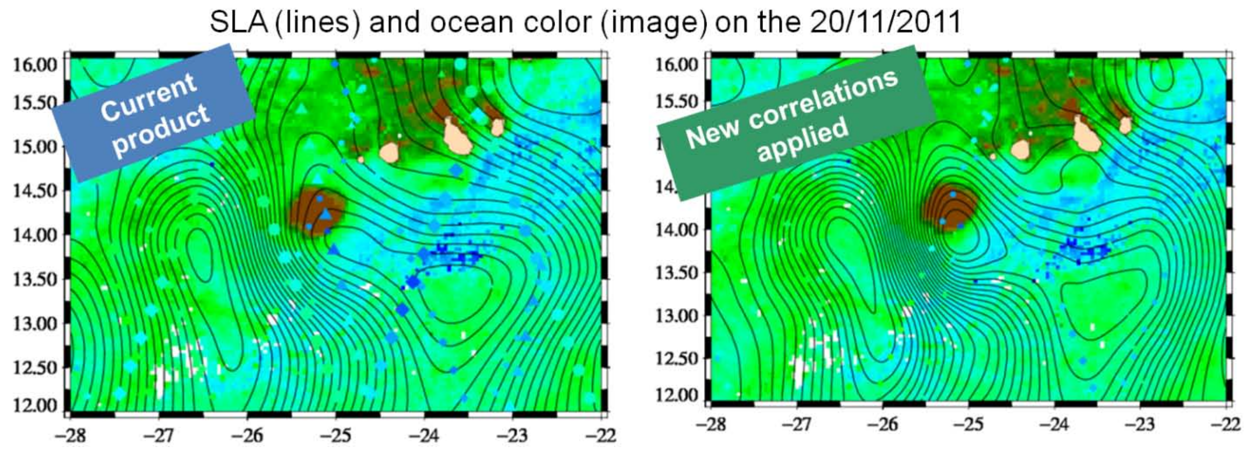

Figure 10: Example of Near Real Time product consistency with surface ocean Chlorophyll concentration. DUACS 2014 version (right) and former version (left).

5.4. New (M)ADT

The Mean Dynamic Topography (MDT) is a key reference surface for the optimal use of altimeter data. It is the missing component that allows us to estimate the ocean absolute dynamic topography (ADT) and the corresponding absolute geostrophic surface currents from the altimeter Sea Level Anomalies (SLA): ADT=MDT+SLA

The (M)ADT products in the DUACS 2014 version are computed using a new MDT. This new MDT uses the recent geoid mean field (GOCE DIR-R4) and in-situ dataset, as well as improved processing method. Details are presented in Mulet et al (OSTST 2013).

5.5. Geostrophic current estimation

The geostrophic current computation is improved with:

- The use of the 9-point stencil width method (Arbic et al, 2012). It contributes to reduce the impact of the anisotropy introduced by the Cartesian ¼° grid resolution.
- The SLA computation in the equatorial band is improved in order to smooth the transition at ±5°N and improve the consistency between altimeter products and drifters observations.

These modifications have several positive impacts on the geostrophic currents:

- The discontinuity observed at ±5°N latitude in the former product is reduced in the new product. An example is given in Figure 11
- The intensity of the current in this DUACS 2014 version is increased. As a consequence, the Eddy Kinetic Energy level is nearly 10% higher in the DUACS 2014 products compared to the former products (stencil width method impact only; excluding equatorial area). The intensity of the current is closer to the drifter observations.

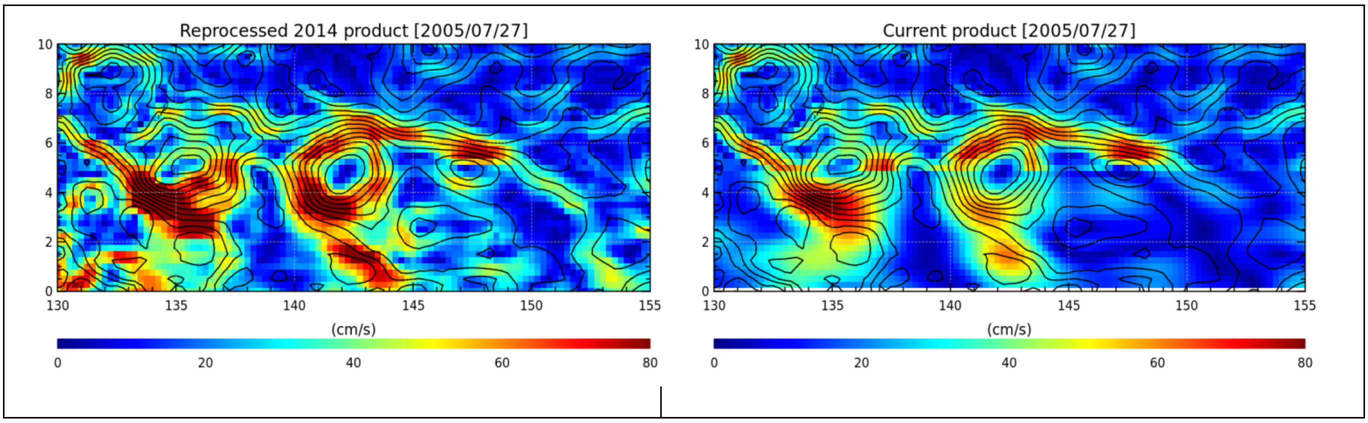

Figure 11: Example of Geotropic current intensity and SLA (black lines) around the 5°N equatorial band limit. DUACS 2014 product (left), former product (right).

6. Modifications of the Catalogue and format of files

New ftp folders have been created for the delivery of DUACS 2014 products as significant scientific and format/nomenclature changes have been made. This will allow the double dissemination of the DUACS 2014 and the former versions of products on ftp server. The opportunity was also taken to change the format of gridded products and to simplify the list of proposed products. All the details are given in Appendix A. To summarize, the changes affect:

- The nomenclature of ftp folders and files (sections A1.4 and A1.5 for gridded products and sections A2.3 and A2.4 for along-track products). Particularly,
  - The Mediterranean products folder is now "regional-mediterranean"
  - the "ref" and "upd" conventions of the former version are renamed as "two-sat" and "all-sat" respectively
- Gridded products
  - The standard of the files: NetCDF-3 CF (section A1.3)
  - The names of variables in the files (section A1.3) are more meaningful
  - The grid resolution: maps are cartesian ¼° for global and 1/8° for regional areas. The 1/3° Mercator grids will not be distributed anymore nor the 1° grids (section A1.1)
  - The position of the grid points: shifted compared to the former version (section 3.1)
  - The pseudo-monomission maps will no longer be delivered (only the merged maps will be available) (section A1.1)
- Other changes
  - Two new products will be delivered: the change of reference (20yto7y) and the noise estimations (appendix A3 and A4)
  - The Gomex and Mersea products will no longer be distributed (section A1.1 for gridded products and section A2.1 for along-track products)
  - The frequency of delivery will be daily for all files (section A1.2 for gridded products and A2.2 for along-track products)
  - The Delayed-Time along-track will no longer be distributed in "ref" series (section A2.1)

The change in the catalogue and standard will have a significant impact in terms of data handling: users will have to change their downloading and reading tools

Appendix A - **Details of the catalogue upgrades and format definitions**

Appendix A 1 -Gridded products

A1.1 List of products removed/modified

Table 2 Table 3 and Table 4 give the list of the modified (in blue), removed (in red) and added (in green) products:

	NRT ERR	NRT SLA		NRT ADT	
	h+err		uv	h	uv
	merged	monomission			
Global	~~1/3° Merc~~ 1/ 4° ~~1°~~	~~1/3° Merc~~	~~1/3° Merc~~ 1/ 4°	~~1/3° Merc~~ 1/ 4°	~~1/3° Merc~~ 1/ 4°
Mediterranean	1/8°	_	1/8°	1/8°	1/8°
Black Sea	1/8°	_	1/8°	_	_
Mozambique	1/8°	_	1/8°	_	_

Table 2: List of gridded Near-Real Time products with their resolution

	DT ERR	DT SLA			DT ADT	
	h+err		uv		h	uv
	two-sat/all-sat	tpj1	two-sat/all-sat	tpj1		
Global	~~1/3° Merc~~ 1/ 4° ~~1°~~	~~1/3° Merc~~	~~1/3° Merc~~ 1/ 4°	~~1/3° Merc~~	~~1/3° Merc~~ 1/ 4°	~~1/3° Merc~~ 1/ 4°
Mediterranean	1/8°	_	1/8°	_	1/8°	1/8°
Black Sea	1/8°	_	1/8°	_	_	_

Table 3: List of gridded Delayed-Time products with their resolution. Note that "two-sat" and "all-sat" refer to previous version definitions of "ref" and "upd" products

	Monthly clim	Monthly mean	Seasonal clim
	h	h	h
Global	~~1/3° Merc~~ 1/ 4°	~~1/3° Merc~~ 1/ 4°	~~1/3° Merc~~ 1/ 4°
Mediterranean	1/8°	1/8°	1/8°
Black Sea	1/8°	1/8°	1/8°

Table 4: List of gridded Delayed-Time Climatologies with their resolution

A1.2 Frequency of delivery

The delayed-time gridded files in DUACS 2014 version are now produced with a daily temporal resolution. This option was motivated by the fact that the weekly resolution used so far for DT maps in former version was insufficient wherever the time decorrelation scale is close to 15 days and many users were interested in this temporal resolution since up to now, it was distributed experimentally.

A1.3 Change of the gridded products standard and variable names

A1.3.1 Change of standard

The DUACS 2014 version of grids standard changes to fit the NetCDF-3 CF convention.

The NetCDF gridded files are now based on the attributed data tags defined by the Cooperative Ocean/Atmosphere Research Data Service (COARDS) and Climate and Forecast (CF) **metadata conventions**. The CF convention generalises and extends the COARDS convention but relaxes the COARDS constraints on dimension and order and specifies methods for reducing the size of datasets.

A wide range of softwares is available to write or read NetCDF/CF files. API are made available by UNIDATA (http://www.unidata.ucar.edu/software/netcdf)

- C/C++/Fortran
- Java
- MATLAB, Objective-C, Perl, Python, R, Ruby, Tcl/Tk

Examples of files are given in section A1.3.3

A1.3.2 Change of variable names

The names of the variables change in DUACS 2014 version. The following table gives the dimensions and variables defined for all the gridded files with their unit if necessary. Note that the formal mapping error is contained in the same file as the Sea Level Anomalies files and is expressed in meters.

dimensions	time	Time	
	lat	Latitude	
	lon	Longitude	
	nv	Defined for mapping	
Common Variables	time	Time	days since 1950-01-01 00:00:00 UTC
	lat	Latitude	degrees_north
	lat_bnds	Min/max of each grid interval in latitude	degrees_north
	lon	Longitude	degrees_east
	lon_bnds	Min/max of each grid interval in longitude	degrees_east
	crs	Defined for mapping	-
	nv	Defined for bounds	-
Variables defined for Sea Level Anomalies files (*msla_h*)	sla	Sea level anomalies	m
	err	Formal mapping error	m
Variable defined for Absolute Dynamic Topography files (*madt_h*)	adt	Absolute Dynamic Topography	m
Variables defined for Currents files (*uv*)	u	Zonal component	m/s
	v	Meridional component	m/s

Table 5: Definition of dimensions and variables of gridded sea level anomalies files

A1.3.3 Example of dumps of gridded files

Example of a global gridded sla h product:

```
netcdf dt_global_allsat_msla_h_20121205_20140106 {
dimensions:
	time = 1 ;
	lat = 720 ;
	lon = 1440 ;
	nv = 2 ;
variables:
	float time(time) ;
		time:long_name = "Time" ;
		time:standard_name = "time" ;
		time:units = "days since 1950-01-01 00:00:00 UTC" ;
		time:calendar = "julian" ;
		time:axis = "T" ;
	float lat(lat) ;
		lat:long_name = "Latitude" ;
		lat:standard_name = "latitude" ;
		lat:units = "degrees_north" ;
		lat:bounds = "lat_bnds" ;
		lat:axis = "Y" ;
		lat:valid_min = -90. ;
		lat:valid_max = 90. ;
	float lat_bnds(lat, nv) ;
	float lon(lon) ;
		lon:long_name = "Longitude" ;
		lon:standard_name = "longitude" ;
		lon:units = "degrees_east" ;
		lon:bounds = "lon_bnds" ;
		lon:axis = "X" ;
		lon:valid_min = 0. ;
		lon:valid_max = 360. ;
	float lon_bnds(lon, nv) ;
	int crs ;
		crs:grid_mapping_name = "latitude_longitude" ;
		crs:semi_major_axis = 6371000. ;
		crs:inverse_flattening = 0 ;
	int nv(nv) ;
	int sla(time, lat, lon) ;
		sla:_FillValue = -2147483647 ;
		sla:long_name = "Sea Level Anomalies" ;
		sla:standard_name = "sea_surface_height_above_sea_level" ;
		sla:units = "m" ;
		sla:scale_factor = 0.0001 ;
	int err(time, lat, lon) ;
		err:_FillValue = -2147483647 ;
		err:long_name = "Formal mapping error" ;
		err:comment = "The formal mapping error represents a purely theoretical mapping error. It mainly
traduces errors induced by the constellation sampling capability and consistency with the spatial/temporal
scales considered, as described in Le Traon et al (1998) or Ducet et al (2000)" ;
		err:units = "m" ;
		err:scale_factor = 0.0001 ;

// global attributes:
		:cdm_data_type = "Grid" ;
		:title = "DT merged Global Ocean Gridded Sea Level Anomalies SSALTO/Duacs L4 product" ;
		:summary = "This dataset contains Delayed Time Level-4 sea surface height above Mean Sea Surface
products from multi-satellite observations over Global Ocean." ;
		:comment = "Surface product; Sea Level Anomalies referenced to the [1993, 2012] period" ;
		:time_coverage_resolution = "P1D" ;
		:product_version = "5.0" ;
		:institution = "CNES, CLS" ;
		:project = "SSALTO/DUACS" ;
		:references = "www.aviso.altimetry.fr" ;
		:contact = "aviso@altimetry.fr" ;
		:license = "http://www.aviso.altimetry.fr/fileadmin/documents/data/License_Aviso.pdf" ;
```

```
        :platform = "Jason-1 Geodetic Phase, Jason-2, Cryosat-2" ;
        :date_created = "2014-02-21 09:52:28" ;
        :history = "2014-02-21 09:52:28:creation" ;
        :Conventions = "CF-1.6" ;
        :standard_name_vocabulary = "http://cf-pcmdi.llnl.gov/documents/cf-standard-names/standard-name-table/12/cf-standard-name-table.html" ;
        :geospatial_lat_min = -90. ;
        :geospatial_lat_max = 90. ;
        :geospatial_lon_min = 0. ;
        :geospatial_lon_max = 360. ;
        :geospatial_vertical_min = "0.0" ;
        :geospatial_vertical_max = "0.0" ;
        :geospatial_lat_units = "degrees_north" ;
        :geospatial_lon_units = "degrees_east" ;
        :geospatial_lat_resolution = 0.25 ;
        :geospatial_lon_resolution = 0.25 ;
```

Example of a global gridded adt h product:

```
netcdf dt_global_allsat_madt_h_20121205_20140106 {
dimensions:
	time = 1 ;
	lat = 720 ;
	lon = 1440 ;
	nv = 2 ;
variables:
	float time(time) ;
		time:long_name = "Time" ;
		time:standard_name = "time" ;
		time:units = "days since 1950-01-01 00:00:00 UTC" ;
		time:calendar = "julian" ;
		time:axis = "T" ;
	float lat(lat) ;
		lat:long_name = "Latitude" ;
		lat:standard_name = "latitude" ;
		lat:units = "degrees_north" ;
		lat:bounds = "lat_bnds" ;
		lat:axis = "Y" ;
		lat:valid_min = -90. ;
		lat:valid_max = 90. ;
	float lat_bnds(lat, nv) ;
	float lon(lon) ;
		lon:long_name = "Longitude" ;
		lon:standard_name = "longitude" ;
		lon:units = "degrees_east" ;
		lon:bounds = "lon_bnds" ;
		lon:axis = "X" ;
		lon:valid_min = 0. ;
		lon:valid_max = 360. ;
	float lon_bnds(lon, nv) ;
	int crs ;
		crs:grid_mapping_name = "latitude_longitude" ;
		crs:semi_major_axis = 6371000. ;
		crs:inverse_flattening = 0 ;
	int nv(nv) ;
	int adt(time, lat, lon) ;
		adt:_FillValue = -2147483647 ;
		adt:long_name = "Absolute Dynamic Topography" ;
		adt:standard_name = "sea_surface_height_above_geoid" ;
		adt:units = "m" ;
		adt:scale_factor = 0.0001 ;

// global attributes:
		:cdm_data_type = "Grid" ;
		:title = "DT merged Global Ocean Gridded sea Absolute Dynamic Topography SSALTO/Duacs L4
product" ;
		:summary = "This dataset contains Delayed Time Level-4 sea surface height above Geoid products
from multi-satellite observations over Global Ocean." ;
		:comment = "Surface product; Absolute Dynamic Topography" ;
		:time_coverage_resolution = "P1D" ;
		:product_version = "5.0" ;
		:institution = "CNES, CLS" ;
		:project = "SSALTO/DUACS" ;
		:references = "www.aviso.altimetry.fr" ;
		:contact = "aviso@altimetry.fr" ;
		:license = "http://www.aviso.altimetry.fr/fileadmin/documents/data/License_Aviso.pdf" ;
		:platform = "Jason-1 Geodetic Phase, Jason-2, Cryosat-2" ;
		:date_created = "2014-02-21 09:58:11" ;
		:history = "2014-02-21 09:58:11:creation" ;
		:Conventions = "CF-1.6" ;
		:standard_name_vocabulary = "http://cf-pcmdi.llnl.gov/documents/cf-standard-names/standard-
name-table/12/cf-standard-name-table.html" ;
		:geospatial_lat_min = -90. ;
		:geospatial_lat_max = 90. ;
		:geospatial_lon_min = 0. ;
```

```
        :geospatial_lon_max = 360. ;
        :geospatial_vertical_min = "0.0" ;
        :geospatial_vertical_max = "0.0" ;
        :geospatial_lat_units = "degrees_north" ;
        :geospatial_lon_units = "degrees_east" ;
        :geospatial_lat_resolution = 0.25 ;
        :geospatial_lon_resolution = 0.25 ;
}
```

Example of global gridded msla uv product

```
netcdf dt_global_allsat_msla_uv_20121205_20140106 {
dimensions:
	time = 1 ;
	lat = 720 ;
	lon = 1440 ;
	nv = 2 ;
variables:
	float time(time) ;
		time:long_name = "Time" ;
		time:standard_name = "time" ;
		time:units = "days since 1950-01-01 00:00:00 UTC" ;
		time:calendar = "julian" ;
		time:axis = "T" ;
	float lat(lat) ;
		lat:long_name = "Latitude" ;
		lat:standard_name = "latitude" ;
		lat:units = "degrees_north" ;
		lat:bounds = "lat_bnds" ;
		lat:axis = "Y" ;
		lat:valid_min = -90. ;
		lat:valid_max = 90. ;
	float lat_bnds(lat, nv) ;
	float lon(lon) ;
		lon:long_name = "Longitude" ;
		lon:standard_name = "longitude" ;
		lon:units = "degrees_east" ;
		lon:bounds = "lon_bnds" ;
		lon:axis = "X" ;
		lon:valid_min = 0. ;
		lon:valid_max = 360. ;
	float lon_bnds(lon, nv) ;
	int crs ;
		crs:grid_mapping_name = "latitude_longitude" ;
		crs:semi_major_axis = 6371000. ;
		crs:inverse_flattening = 0 ;
	int nv(nv) ;
	int u(time, lat, lon) ;
		u:_FillValue = -2147483647 ;
		u:long_name = "Geostrophic velocity anomalies: zonal component" ;
		u:standard_name =
"surface_eastward_geostrophic_sea_water_velocity_assuming_sea_level_for_geoid" ;
		u:units = "m/s" ;
		u:scale_factor = 0.0001 ;
	int v(time, lat, lon) ;
		v:_FillValue = -2147483647 ;
		v:long_name = "Geostrophic velocity anomalies: meridian component" ;
		v:standard_name =
"surface_northward_geostrophic_sea_water_velocity_assuming_sea_level_for_geoid" ;
		v:units = "m/s" ;
		v:scale_factor = 0.0001 ;

// global attributes:
		:cdm_data_type = "Grid" ;
		:title = "DT merged Global Ocean Gridded Geostrophic Velocities SSALTO/Duacs L4 product" ;
		:summary = "This dataset contains Delayed Time Level-4 geostrophic velocities products from multi-
satellite observations over Global Ocean." ;
		:comment = "Surface product; Geostrophic Velocities referenced to the [1993, 2012] period" ;
		:time_coverage_resolution = "P1D" ;
		:product_version = "5.0" ;
		:institution = "CNES, CLS" ;
		:project = "SSALTO/DUACS" ;
		:references = "www.aviso.altimetry.fr" ;
		:contact = "aviso@altimetry.fr" ;
		:license = "http://www.aviso.altimetry.fr/fileadmin/documents/data/License_Aviso.pdf" ;
		:platform = "Jason-1 Geodetic Phase, Jason-2, Cryosat-2" ;
		:date_created = "2014-02-21 09:55:15" ;
```

```
        :history = "2014-02-21 09:55:15:creation" ;
        :Conventions = "CF-1.6" ;
        :standard_name_vocabulary = "http://cf-pcmdi.llnl.gov/documents/cf-standard-names/standard-
name-table/12/cf-standard-name-table.html" ;
        :geospatial_lat_min = -90. ;
        :geospatial_lat_max = 90. ;
        :geospatial_lon_min = 0. ;
        :geospatial_lon_max = 360. ;
        :geospatial_vertical_min = "0.0" ;
        :geospatial_vertical_max = "0.0" ;
        :geospatial_lat_units = "degrees_north" ;
        :geospatial_lon_units = "degrees_east" ;
        :geospatial_lat_resolution = 0.25 ;
        :geospatial_lon_resolution = 0.25 ;
```

A1.4 Access on FTP server

A1.4.1 ftp server

You can access to the ftp server (new name since February 2014 ftp.aviso.altimetry.fr, the former one ftp.aviso.oceanobs.com is still working) with the same login/password that you already have. This will give you the access to DUACS 2014 products (described below) as well as to former version of products.

A1.4.2 Nomenclature of folders

The nomenclature of the DUACS 2014 version folders for gridded products is the following (you will find in next section the correspondence between former and DUACS 2014 versions):

<zone>/<delay>/grids/<variable>/<nbsat>/<field>/<year>

Where:

zone	global	Global geographic coverage product
	regional-mediterranean	Mediterranean products
	regional-blacksea	Black Sea products
	regional-mozambique	Mozambique products (only for near-real-time)
delay	delayed-time	delayed time products
	near-real-time	near-real time products
variable	msla	Sea Level Anomalies
	madt	Absolute Dynamic Topography
nbsat	all-sat-merged	maximum number of satellites: 4 (defined as “upd” in former version)
	two-sat-merged	maximum number of satellites: 2 (defined as “ref” in former version)
field	h	heights and formal mapping errors
	uv	geostrophic velocities

Table 6: Nomenclature of DUACS 2014 version of folders for Gridded Delayed-Time and Near-Real-Time products

A1.4.3 Correspondence between former and DUACS 2014 versions of folders on FTP server

Table 7, Table 8 and Table 9 give the correspondence between the former and DUACS 2014 versions of folders (note that the error is also contained in the *h* files)

Former version of folders/files	DUACS 2014 version folders
<zone>/nrt/msla/<mission>	No more distributed
<zone>/nrt/msla/merged/err	<zone>/near-real-time/grids/msla/all-sat-merged/h
<zone>/nrt/msla/merged/h	<zone>/near-real-time/grids/msla/all-sat-merged/h
<zone>/nrt/msla/merged/uv	<zone>/near-real-time/grids/msla/all-sat-merged/uv
<zone>/nrt/madt/merged/h	<zone>/near-real-time/grids/madt/all-sat-merged/h
<zone>/nrt/madt/merged/uv	<zone>/near-real-time/grids/madt/all-sat-merged/uv

Table 7: List of former/DUACS 2014 versions of folders for Near-Real-Time Gridded products

Former version of folders/files	DUACS 2014 version folders
<zone>/dt/upd/msla/merged/err <zone>/dt/upd/msla/daily_exp/merged/err	<zone>/delayed-time/grids/msla/all-sat-merged/h/<year>
<zone>/dt/upd/msla/merged/h <zone>/dt/upd/msla/daily_exp/merged/h/<year>	
<zone>/dt/upd/msla/merged/uv <zone>/dt/upd/msla/daily_exp/merged/uv	<zone>/delayed-time/grids/msla/all-sat-merged/uv/<year>
<zone>/dt/upd/madt/merged/h <zone>/dt/upd/madt/daily_exp/merged/h/<year>	<zone>/delayed-time/grids/madt/all-sat-merged/h/<year>
<zone>/dt/upd/madt/merged/uv <zone>/dt/upd/madt/daily_exp/merged/uv/<year>	<zone>/delayed-time/grids/madt/all-sat-merged/uv/<year>
<zone>/dt/ref/msla/merged/err <zone>/dt/ref/msla/daily_exp/merged/err/<year>	<zone>/delayed-time/grids/msla/two-sat-merged/h/<year>
<zone>/dt/ref/msla/merged/h <zone>/dt/ref/msla/daily_exp/merged/h/<year>	
<zone>/dt/ref/msla/merged/uv <zone>/dt/ref/msla/daily_exp/merged/uv/<year>	<zone>/delayed-time/grids/msla/two-sat-merged/uv/<year>
<zone>/dt/ref/madt/merged/h	<zone>/delayed-time/grids/madt/two-sat-merged/h/<year>
<zone>/dt/ref/madt/merged/uv	<zone>/delayed-time/grids/madt/two-sat-merged/uv/<year>
global/dt/ref/msla/tpj1/*	No longer distributed

Table 8: List of former/DUACS 2014 versions of folders for Delayed-Time Gridded products

Former version of folders/files	DUACS 2014 version folders
(anonymous) pub/oceano/AVISO/SSH/climatology/<zone>/seasonal_clim_dt_upd	(authenticated) <zone>/delayed-time/grids/climatology/seasonal_clim
(anonymous) pub/oceano/AVISO/SSH/climatology/<zone>/monthly_clim_dt_upd	(authenticated) <zone>/delayed-time/grids/climatology/monthly_clim
(anonymous) pub/oceano/AVISO/SSH/climatology/<zone>/monthly_mean_dt_upd	(authenticated) <zone>/delayed-time/grids/climatology/monthly_mean

Table 9: List of former/DUACS 2014 versions of folders for Delayed-Time Gridded Climatologies products

A1.5 Nomenclature of files

A1.5.1 Gridded Near-Real-Time and Delayed-Time products:

The nomenclature of the files is the following:

<delay>_<zone>_<nbsat>_<variable>_<field>_<date>_<dateprod>.<format>

delay	dt	delayed time products
	nrt	near-real time products
zone	global	global geographic coverage product
	med	Mediterranean products
	blacksea	Black Sea products
nbsat	twosat	Maximum 2 satellites are used to calculate the map
	allsat	All the satellites available are used to calculate the map
variable	msla	Map of Sea Level Anomalies
	madt	Map of Absolute Dynamic Topography
field	h	Contains the height+error
	uv	Contains geostrophic velocities
date	YYYYMMDD	date of the dataset
dateprod	YYYYMMDD	production date of the dataset
format	.nc.gz	compressed NetCdf CF1.6

Table 10: Nomenclature of gridded Near-Real-Time and Delayed-Time products

A2.5.2 Gridded climatologies products:

The nomenclature of the files is the following:

dt_<zone>_allsat _msla _h_y<year>_m<month>.<format>

where

year	YYYY	Year of monthly means
	YYYY_YYYY	First and last years of monthly and seasonal climatologies
month	MM	Month of monthly means and monthly climatologies
	MM_MM	First and last years of seasonal climatologies
format	.nc	NetCDF format
	.png	Images

Appendix A 2 -Along-track products

A2.1 List of products removed/modified

Table 11 and Table 12 give the list of the products removed (in red) and modified (in blue). Note that as there are only upd products now, no indication about "ref" and "upd" is given in nomenclatures of folders and files.

	DT SLA		DT ADT	
	Unfiltered (VXXC)	Filtered (VFEC)	Unfiltered (VXXC)	Filtered (VFEC)
Global	~~ref~~ upd	~~ref~~ upd	~~ref~~ upd	~~ref~~ upd
Mediterranean	~~ref~~ upd	~~ref~~ upd	~~ref~~ upd	~~ref~~ upd
Black Sea	~~ref~~ upd	~~ref~~ upd	~~ref~~ upd	~~ref~~ upd
~~GoMex~~	~~upd~~	~~upd~~	_	_
~~MerSea~~	~~upd~~	~~upd~~	_	_

Table 11: List of Delayed-time along-track products suppressed (in red) and modified (in blue)

	NRT SLA	NRT ADT
	Filtered (VFEC)	Filtered (VFEC)
Global	upd	upd
Mediterranean	upd	upd
Black Sea	upd	_
Arctic	upd	_
Europe	upd	_
Mozambique	upd	_
~~GoMex~~	~~upd~~	_
~~MerSea~~	~~upd~~	_

Table 12: List of Near-Real-time along-track products removed (in red) and modified (in blue)

A2.2 Frequency of delivery

The delayed-time along-track files in the former version contain 7 days of data. In the DUACS 2014 version, these files only contain one day of data. This is the reason why there will be only two dates in the nomenclature of the files: one date for the date of the measurements and one date for the date of production (Appendix A2.4)

A2.3 Access on FTP server

A2.3.1 FTP server

You can access to the ftp server (new name since February 2014 ftp.aviso.altimetry.fr, the former one ftp.aviso.oceanobs.com is still working) with the same login/password that you already have. This will give you the access to DUACS 2014 products (described below) as well as to former version of products.

A2.3.2 Nomenclature of folders

New folders on ftp have been implemented for the new products. The nomenclature of the new folders for along-track products is the following:

<zone>/<delay>/along-track/<filtering>/<variable>/<mission>

Where:

zone	global	global geographic coverage product
	regional-mediterranean	Mediterranean products
	regional-blacksea	Black Sea products
	regional-arctic	Arctic products (only for near-real-time)
	regional-europe	Europe products (only for near-real-time)
	regional-mozambique	Mozambique products (only for near-real-time)
delay	delayed-time	delayed time products
	near-real-time	near-real time products
filtering	filtered	filtered products (section 4.1)
	unfiltered	unfiltered products (section 4.1)
variable	sla	Sea Level Anomalies
	adt	Absolute Dynamic Topography
mission	e1	ERS-1
	e2	ERS-2
	tp	TOPEX/Poseidon
	tpn	TOPEX/Poseidon on its new orbit
	g2	GFO
	j1	Jason-1
	j1n	Jason-1 on its new orbit
	j1g	Jason-1 on its geodetic orbit
	j2	Jason-2
	c2	Cryosat-2
	al	Saral/AltiKa
	h2	HY-2A

Table 13: Nomenclature of DUACS 2014 folders for along-track Delayed-Time and Near-Real-Time products

A2.3.3 Correspondence between former and DUACS 2014 versions of folders on FTP server

Table 14 and Table 15 give the correspondence between former and DUACS 2014 versions of ftp folders:

Former version of folders/files	DUACS 2014 version folders
<zone>/dt/upd/sla/<mission>_cf/*vxxc*	<zone>/delayed-time/along-track/unfiltered/sla/<mission>/*
<zone>/dt/upd/sla/<mission>_cf/*vfec*	<zone>/delayed-time/along-track/filtered/sla/<mission>/*
<zone>/dt/upd/adt/<mission>_cf/*vxxc*	<zone>/delayed-time/along-track/unfiltered/adt/<mission>/*
<zone>/dt/upd/adt/<mission>_cf/*vfec*	<zone>/delayed-time/along-track/filtered/adt/<mission>/*
<zone>/dt/ref/sla/<mission>_cf	No longer distributed, only “upd” products are distributed (the mention of “ref” and “upd” is no more taken into account for along-track products
<zone>/dt/ref/adt/<mission>_cf	

Table 14: List of former/DUACS 2014 folders for Delayed-Time along-track products

Former version of folders/files	DUACS 2014 version folders
<zone>/nrt/sla/<mission>_cf	<zone>/near-real-time/along-track/filtered/sla/<mission>
<zone>/nrt/adt/<mission>_cf	<zone>/near-real-time/along-track/filtered/adt/<mission>

Table 15: List of former/DUACS 2014 folders for Near-Real-Time along-track products

A2.4 Nomenclature of files

The nomenclature of the files is the following:

<delay>_<zone>_<mission>_<variable>_<filtering>_<date>_<dateprod>.<format>

where the fields in "<>" are described below:

delay	dt	delayed time products
	nrt	near-real time products
zone	global	Global geographic coverage product
	med	Mediterranean products
	blacksea	Black Sea products
	arctic	Arctic products (only for near-real-time)
	europe	Europe products (only for near-real-time)
	mozambique	Mozambique products (only for near-real-time)
mission	e1	ERS-1
	e2	ERS-2
	tp	TOPEX/Poseidon
	tpn	TOPEX/Poseidon on its new orbit
	g2	GFO
	j1	Jason-1
	j1n	Jason-1 on its new orbit
	j1g	Jason-1 on its geodetic orbit
	j2	Jason-2
	c2	Cryosat-2
	al	Saral/AltiKa
	h2	HY-2A
variable	sla	Sea Level Anomalies
	adt	Absolute Dynamic Topography
fitering	vfec	filtered and sub-sampled
	vxxc	non filtered and non sub-sampled
date	YYYYMMDD	date of the dataset
dateprod	YYYYMMDD	production date of the dataset
format	.nc.gz	compressed NetCdf CF1.6

Table 16: Nomenclature of along-track Delayed-Time and Near-Real Time products

Appendix A 3 -New product: Change of reference from 20 years to 7 years (ref20yto7y)

The DUACS 2014 version delivers products with a reference period of 20 years [1993, 2012]. In order to obtain a reference period of 7 years (to allow the users time to adapt to this new reference period), it is possible to download a corrective map and apply it to the new products (see section 2.3).

- Three gridded files are provided:
  - global (grid 1/ 4°),
  - Mediterranean Sea (grid 1/8°)
  - Black sea (grid 1/8°)
  - For Arctic, Europe and Mozambique areas, please download "global" product.
- The files provided are the same for delayed time and near real time
- They have to be applied on both along-track and gridded Sea Level Anomalies products (after interpolation)
- You can access the files on ftp at:
  - **global/ref20yto7y/global_ref20yto7y.nc.gz**
  - **regional-mediterranean/ref20yto7y/med_ref20yto7y.nc.gz**
  - **regional-blacksea/ref20yto7y/blacksea_ref20yto7y.nc.gz**

Appendix A 4 -New product: Noise estimations

Maps of 1 Hz noise level have been estimated

- For each mission, three grids (2°) have been calculated over global areas (for regional products, a value has been calculated and will be delivered in the user handbook):
  - one in delayed time
  - two in near-real time:
    - one for filtered products
    - one for unfiltered products
- These noise estimates can be applied to along track Sea Level Anomalies products (after interpolation)
- You can access the files on ftp at:
  - **global/near-real-time/along-track/filtered/noise-sla/<mission>/ nrt_global_<mission>_sla_noise_vfec.nc.gz**
  - **global/delayed-time/along-track/filtered/noise-sla/<mission>/ dt_global_<mission>_sla_noise_vfec.nc.gz**
  - **global/delayed-time/along-track/unfiltered/noise-sla/<mission>/ dt_global_<mission>_sla_noise_vxxc.nc.gz**

Appendix B - **List of new standards**

The cells in blue are upgrades in 2014 version.

	ERS-1	ERS-2	EN	T/P	J1	J2	GFO	C2
Orbit	Reaper	Reaper	GDR-D	GFSC STD08	GDR-D	GDR-D	GSFC	GDR-D
Major Instr. correction			PTR FPAC					
Sea State Bias	BM3 (Gaspar, Ogor, 1994)	Non parametric Mertz et al., 2005	Tran 2012 compatible enhanced MWR	Non parametric SSB [N. Tran et al. 2010]	Tran 2012 (OSTST)	Tran 2012	Non parametric SSB [Tran and Labroue, 2010]	Non parametric SSB from J1 (GDR-C) with unbiased sig0
Ionosphere	Reaper	Bent (cycle 1-49), GIM from cycle 50	Bi frequency (c≤64), GIM (c≥65) corrected for 8mm bias	Bi frequency (TOPEX) DORIS (POSEIDON)	Dual frequency		GIM	GIM
Wet troposphere	MWR	MWR+Minimisation of TB drift [Scharoo et al. 2004]	c≤64 :MWR(dist≥50km from the coasts), ECMWF (dist≤50km from th coast) <≥65: MWR	TMR (Scharoo et al, 2004)	MWR replacement product	GDR-D (MWR JPL enhancement product)	From GFO radiometer	From ECMWF model
Dry troposphere	Era Interim based		ECMWF Gaussian grids based	Era Interim based	ECMWF rectangular grids based	ECMWF Gaussian grids based	ECMWF rectangular grids based	ECMWF Gaussian grids based
Combined atmospheric correction	MOG2D High Resolution forced with Era Interim pressure and wind fields		MOG2D High Resolution forced with ECMWF pressure and wind fields + IB	MOG2D High Resolution forced with Era Interim pressure and wind fields	MOG2D High Resolution forced with ECMWF pressure and wind fields + IB computed from rectangular grid			MOG2D High Resolution forced with ECMWF pressure and wing fields + IB from rectangular grids
Ocean tide	GOT4V8							
Solid Earth tide	Elastic response to tidal potential [Cartwright and Tayler, 1971], [Cartwright and Edden, 1973]							
Pole tide	[Wahr, 1985]							
MSS	CNES-CLS-2011 + reference period change [1993, 2012]							