Daily multi-mission products for global and regional applications

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Abstract

An overview of the SSALTO/DUACS system is given : key features and architecture, processing used to ensure stability and homogeneity and accuracy, products and users, upgrades scheduled for 2007 …

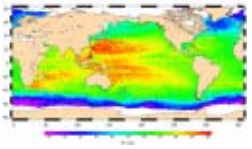


Fig 1 : DUACS Absolute Dynamic Topography product (based on SLA + MDT Rio05)

Project Overview

Objectives: to provide operational applications with homogeneous and directly usable high quality altimeter data from **all** missions (Jason-1, T/P, ENVISAT, GFO, ERS1/2 and even GEOSAT). The system uses common processing facilities for global and regional applications. It ensures that upgrades are consistently applied on all products to better serve the altimetry user community.

Delayed Time (DT) : The second generation of DUACS-DT products is composed of global data sets of along track and gridded Sea Level Anomaly, Absolute Dynamic Topography (Fig. 1), and geostrophic currents, but also of regional-specific products (higher resolution, optimized parameters). DUACS reprocessed all past altimeter data. These delayed time products are regularly updated when new GDR are released.

Near Real Time (NRT) : DUACS-NRT provides GODAE and climate forecasting centers with global Near Real Time altimeter data (Fig. 2). Since summer 2006, DUACS near real time products are generated and distributed on a daily basis to reduce the NRT delay.

The DUACS system also provides a long term monitoring of NRT data it has used. Quality Control reports are released twice per week

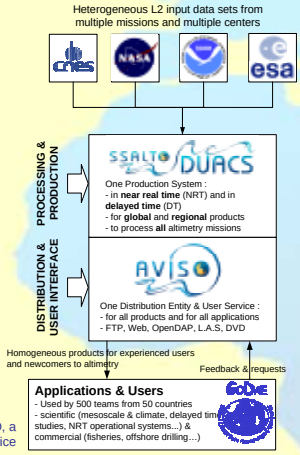


Fig 2 : DUACS and AVISO, a user-driven altimetry service

Behind the Scene

The DUACS processing engine is intricately linked with Cal/Val activities carried out by CLS and CNES with support from ESA. End users benefit from this synergy with systematic detailed analyses, offline studies, software upgrades...

Using a common base of experts, algorithms, corrections, software, tools, and data bases ensures that DUACS products take into account the latest recommendations for altimeter processing (see Fig 7).

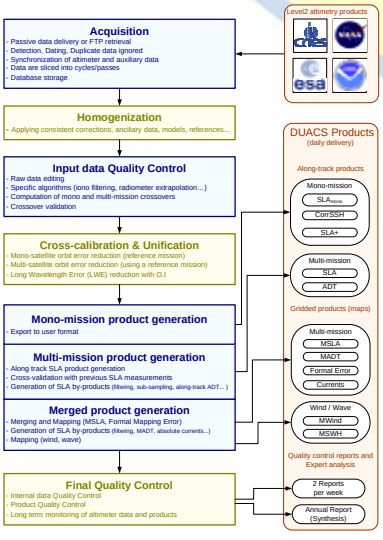


Fig 7 : Simplified sequence of DUACS processing

Processing Upgrades 2007

Data delivery delay: user feedback showed that data timeliness was critical for some applications. As a user-driven system DUACS has been upgraded significantly to meet these user requirements. The main NRT product generation is now performed on a **daily** basis to reduce the NRT delay and to smooth the operational user procedures.

Continuous improvements on DUACS in 2007 :
With the aging of current missions and the altimeter launch schedule, the probability to have two or three altimeters in operations is getting dangerously low (see below). It is important to use as many data flows as possible to maintain an acceptable quality level on the multi-mission altimetry observation.

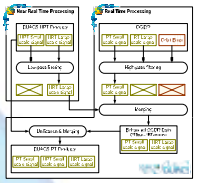


Fig 3 : Real Time processing in DUACS. Using the high-quality database to enhance the quality of fast delivery measurements

Preliminary studies are carried out to merge the innovative information of lower quality altimeter data (either real time data delivered in a few hours or opportunistic ocean measurements from CryoSat) into the high-accuracy NRT system (Fig. 3). Similarly, the system is being upgraded to dynamically toggle parameters, algorithms and references based on the altimeter status (e.g: unavailability of reference mission).

Significant improvements will be added to the data validation and analysis with online, simpler and more user-friendly quality flags and indicators.

New demonstration data sets will be released : Google Earth graphical data with high-resolution maps and daily satellite coverage overlays, or along-track coverage expected by DUACS in the coming days…

And more… The next upgrade could be based on YOUR request. Feel free to contact us for feedback (positive and negative) and specific needs.

Product accuracy and limitations

When produced in delayed time (offline processing), multi-mission altimetry maps of Sea Level Anomaly or geostrophic currents are known to be accurate yet imperfect [Pascual et al, 06] due to measurement errors and along-track sampling.

Processing altimetry in Near Real Time involves additional errors due to lower quality orbit determination and non-centered processing time windows.

If offline processing can use data “from the map future” to increase the mapping accuracy, NRT processing do not have access to these measurements. To estimate this loss of accuracy, an OSE approach has been used. Ideal NRT processing have been simulated (orbit error, non centered time windows) and compared to offline products and to independent in-situ datasets.

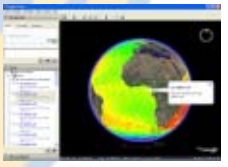


Fig 4 : Displaying DUACS data with GoogleEarth : from Nadir measurements to gridded maps.

If two altimeters are acknowledged as the bare minimum needed to observe mesoscale signals in delayed time (offline) maps, three or even four missions are needed to obtain equivalent accuracy in NRT (Fig 5).

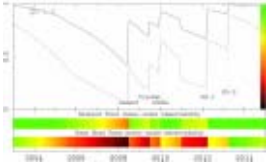
This will be a significant limitation in the future considering the current launch schedule and the probability to have three satellites in operations in the coming years (Fig 6).

	Delayed Time		*Real Time*	
	2 missions	*4 missions*	*2 missions*	*4 missions*
U	26.6	24.2	31.0	26.9
V	33.1	28.1	41.2	33.4

Fig 5 : Comparing DUACS with in-situ data. Differences between tide gauges height (top) or buoys currents (right) and altimetry maps. Unit : % of in-situ variance. Four altimeters are needed in NRT to obtain an accuracy equivalent to DT maps.

	2 missions	*4 missions*
Dealyed time Old corrections *(GOT99+IB)*	46.7	35.3
Delayed time new corrections *(GOT00+MOG2D*	36.7	29.7
Real time Orbit error No-centring	45.2	37.1

Fig 6 : Probability to have two (solid) or three (dashed) altimeters in operations in the coming years and impact on meso-scale observation



More information on the AVISO website
www.aviso.oceanobs.com
www.cls.fr/duacs (mirror)