Ready for Jason-2

M.-I. Pujol
G.Dibarboure
- CLS
N.Picot
- CNES

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 2008 …

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, 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. 1). The 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.

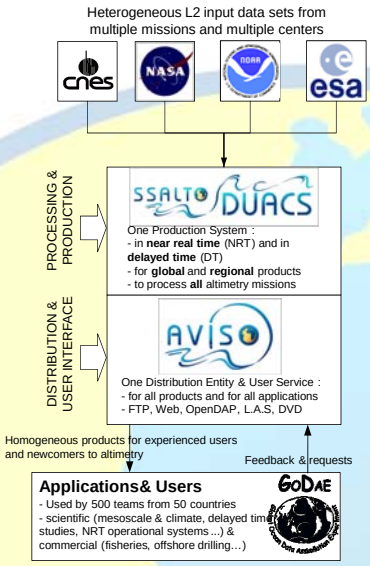

Fig 1 : DUACS and AVISO, a user-driven altimetry service

Real Time (RT): Since June 2007, OGDR/FDGDR Jason-1 and Envisat data (lower quality but faster delivery) were integrated in the NRT system in an experimental way in order to improve the resilience and quality of the system. (see section "processing upgrades").

System resilience and limitations

DUACS system accuracy and resilience (ex: against data gaps or temporary delay) are depending on number of altimeter data available. Lower quality measurements (orbit determination; Fig. 7) combined with non-centered processing time-windows (Fig. 8) make the NRT processing more sensitive to the number of altimeter missions involved in the system. If two altimeters are acknowledged as the bare minimum needed to observe mesoscale signals in DT (offline) maps, three or even four missions are needed to obtain equivalent accuracy in NRT.(Pascual & al., 2008)

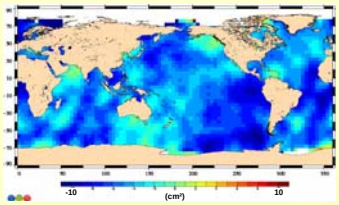

Fig 7 : Variance reduction of crossover SSH differences induced by the use of a POE (i.e. DT used) instead of a MOE (i.e. NRT used) orbit.

The recent temporary anomaly onboard Jason-1 and the shutdown of GFO increased the weakness of the system. At this time DUACS is using only two altimeter missions limiting the accuracy and resilience of the system. This could be a significant limitation in the future considering the current launch schedule and the probability to remain with only two satellites in operations in the coming years (Fig. 9).

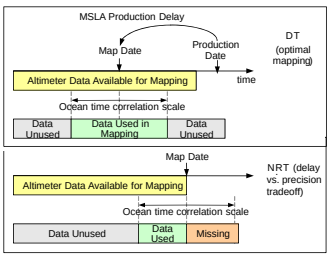

Fig 8 : Illustration of the time-window used in DT and NRT processing. At the opposite of DT processing, no data 'from the future' is available in NRT.

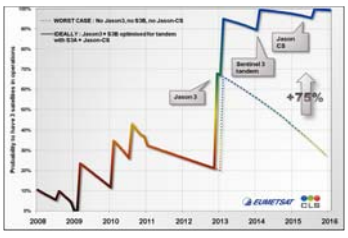

Fig 9 : Probability to have three altimeters in operations in the coming years (best and worst case launch scenarios).

Processing Upgrades 2008-2009

Jason-2 integration: The DUACS system was modified to integrate Jason-2 data as an experiment during the CalVal phase. This system was successfully deployed during the temporary absence of Jason-1 data due to an onboard anomaly in last August.

Jason-2 data impacted on merged product quality with reduced formal mapping error (Fig. 2) and improved mesoscale feature restitution (Fig. 3). Jason-2 is now passively processed by DUACS: its data are ready to be used but the satellite is not activated in the product generation (100% redondant with Jason-1)

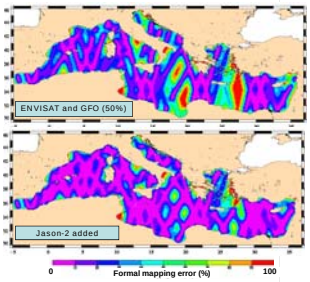

Fig 2 : Formal mapping error obtained by merging Envisat and GFO (50% coverage) and when adding Jason-2 data.

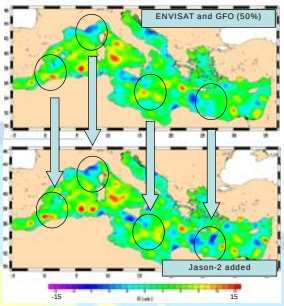

Fig 3 : Sea Level Anomaly obtained by merging Envisat and GFO (50% coverage) and when adding Jason-2 data.

Real time (RT) data integration: an experimental system was implemented to combine RT data information with NRT (IGDR) data on a daily basis. First analyses of such RT products showed a significant impact for improved restitution of ocean variability especially in high energetic areas (Fig 4).

Actually, OGDR data brought ~2 days of additional and recent data with respect to standard NRT products, thus allowing a better precision and resilience of the system (Pascual & al, 2008).

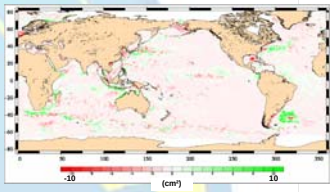

Fig 4 : MSLA variance added when OGDR products are combined with IGDR data in NRT processing (observed on actual operational data from July 2007 to July 2008).

However, first analyses also underlined a few sporadic anomalies associated to exceptionally degraded quality in RT data. Ongoing studies have for objective to improve RT products quality.

Key Performance Indicators (KPI) : In the context of the MyOcean project, preliminary studies were carried out to define a new way to provide to the users a quick and easy access to the system performances with the release user-friendly KPI. They gather most of the quality information available, from upfront data delivery delays to SLA statistics.

New Orbit Error reduction : System performances also depend on quality of the missions used, and more precisely quality of the reference mission currently used for multi-mission inter-calibration processing. In order to minimize the impact of an anomaly on the reference mission, a new orbit error (OE) reduction scheme is being developed. It is based on multiple reference missions rather than single reference mission.

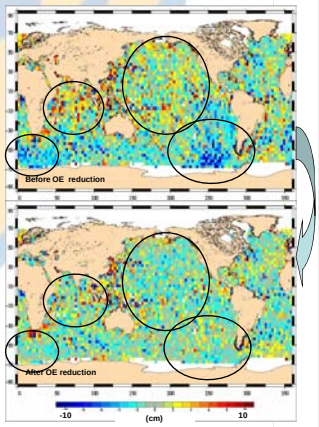

Fig 5 : EN/J1 crossover SLA differences before and after OE reduction based on new multiple reference method.

No EO correction	OE correction on both J1 and EN	OE correction on Envisat only	OE correction on Jason-1 only
7.35	6.14	6.92	6.62

Fig 6: EN/J1 crossover SLA standard deviation before and after OE reduction based on new multiple reference method and applied on both or only one of the satellite.

First results show that this new OE leads to a significant reduction of crossover SLA variance even if only one satellite is corrected (Fig. 5 & 6). The performances are even slightly better than with the current OE correction (monomission referenced).

Regional products : Efforts were done to improve quality and availability of regional products. Black Sea products, already distributed in DT will be added to the NRT product generation for an operational demonstration in December.

More information on the AVISO website
www.aviso.oceanobs.com