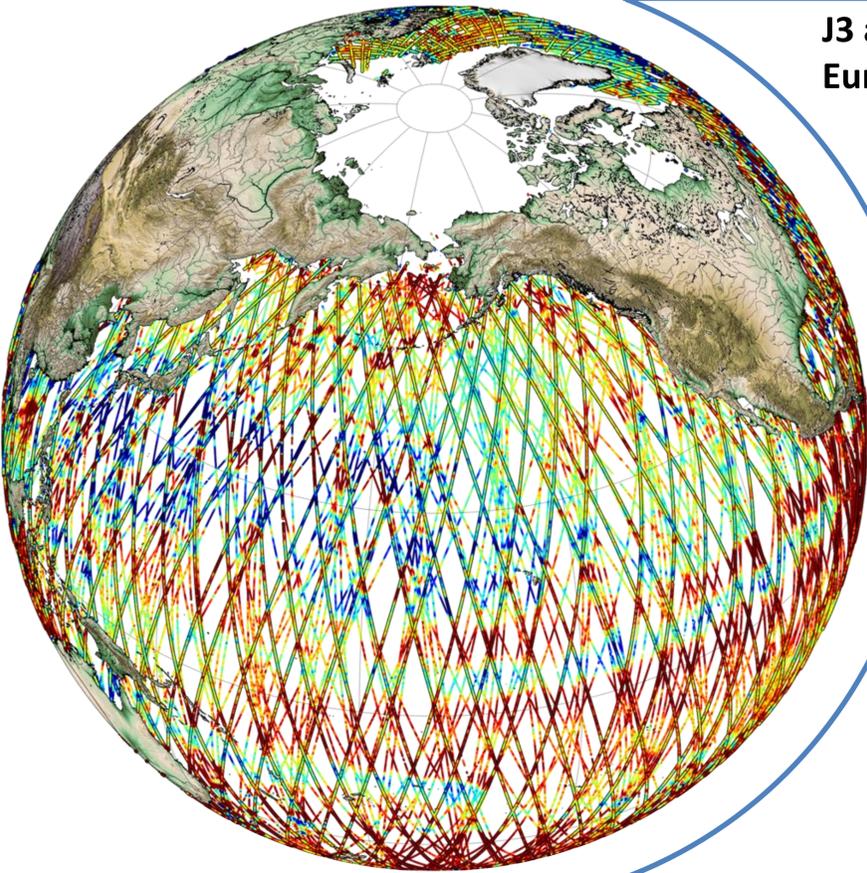
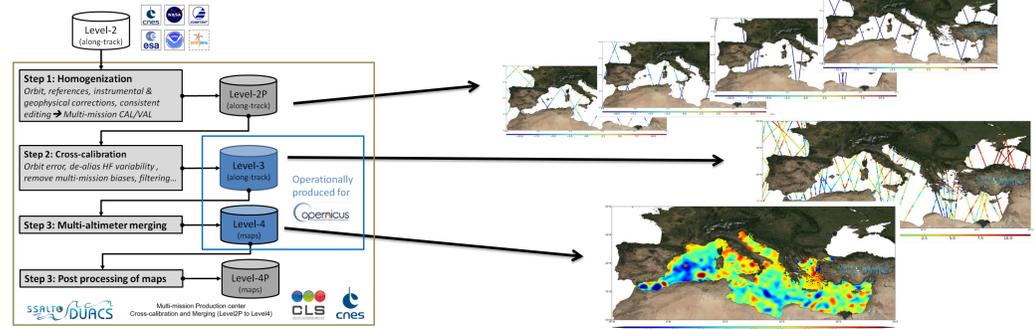


The DUACS System

The DUACS (Data Unification and Altimeter Combination) system has produced, as part of the CNES/SALP and MyOcean projects and since 1st May will produce in the frame of the Copernicus Marine Environment and Monitoring Service (CMEMS), high quality multimission Sea Level products for oceanographic applications, climate forecasting centers, geophysics & biology communities.

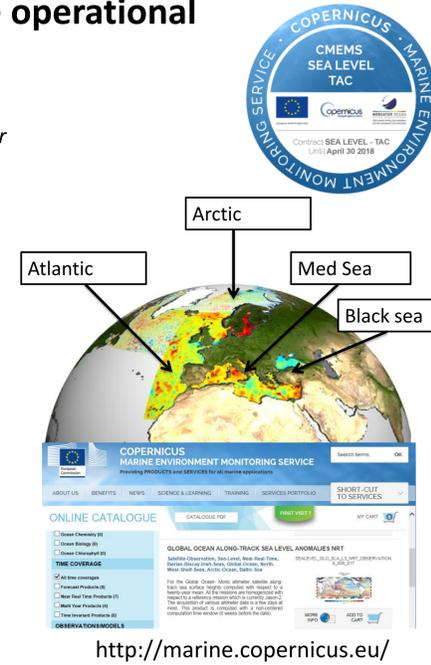
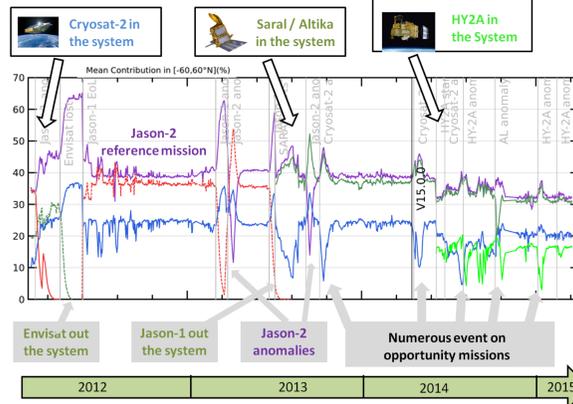
These products are directly usable and convenient Level 3 (along-track cross-calibrated SLA) and Level 4 products (multiple sensors merged as maps or time series). Another set of products, Level4p products are also delivered: geostrophic currents, Lagrangian fields....



J3 and S3-SRAL needed as soon as possible in the operational European Marine Service

Since the 1st may 2015, Sea level products are delivered as part of the CMEMS. L3 and L4 products are produced operationally, in real time, for the global ocean and for European seas

After the successful integration of AltiKa in July 2013 and HY-2A in June 2014, 4 satellites are now used in the DUACS System

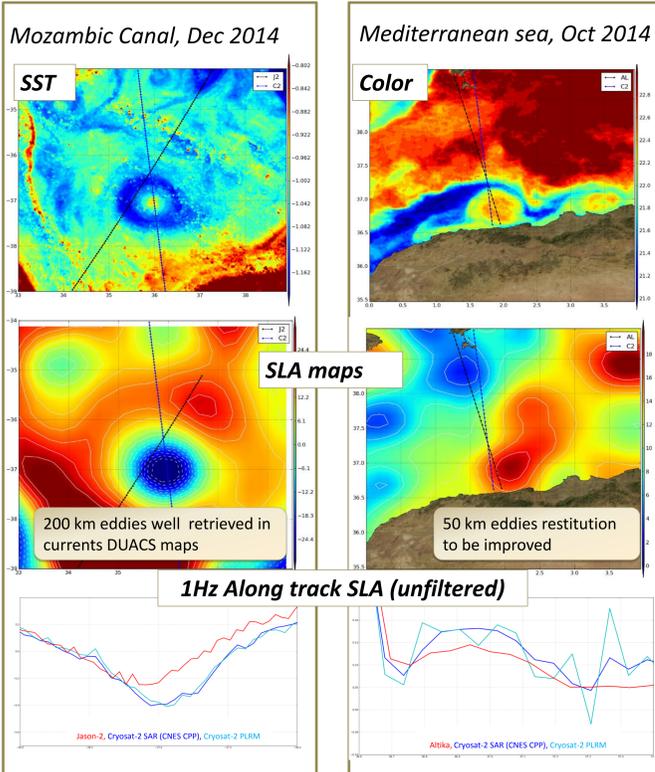


The next key points are the integration of Jason-3 by the end of 2015 and Sentinel 3 in 2016. This is critical since other altimeters have outlived their nominal lifespan. **Jason-3 and Sentinel 3 SRAL measurements are required as soon as possible after launch.** Feasibility of rapid integration in CMEMS was demonstrated with Jason2 and AltiKa: these sensors were used operationally in Myocean-2 only a few months after Launch.

Outlook of Sea Level products and the challenge of Sentinel-3 SAR-Mode

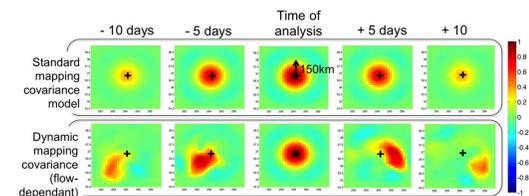
The launch of Sentinel-3 will strengthen the altimeter constellation and guarantee the continuity of the Sea Level service. Moreover, with its global SARM coverage, the contribution of Sentinel-3A is potentially unique to improve sea level product in CMEMS. Exploiting the fine-scale content of the SAR-Mode is a challenging task tackled with R&D support from CNES.

Examples of eddies as seen in Altimetry (DUACS), Ocean Color and SST products (CLS). Units respectively in m, mg/m3 and °C



The cross-track and temporal resolution of the altimetry constellation will increase with the combination of operational Copernicus missions (Jason-3 and Jason-CS, Sentinel-3A/B) and contributing missions (Jason-2, SARAL, SWOT's nadir channel, HY-2A/B, CFOSAT's nadir channel) allowing to envision a constellation of 5-6 altimeters or more instead of the current 3-4 sensors.

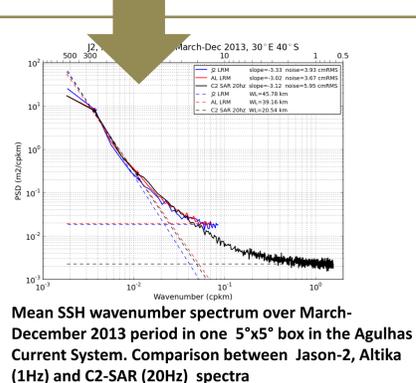
Combined with new mapping technology and new Level-3 products developed by the research community, CMEMS Level-4 products will try to resolve scales of the order of 100 km and 7 days (~4x better than now).



Example of Correlation of an estimated Sea level Anomaly signal on a particular grid point. In the current mapping (top figures) technique the correlation are statistically estimated. Bottom figures shows the covariance that are dynamically calculated for each time steps (Ubelmann, 2015)

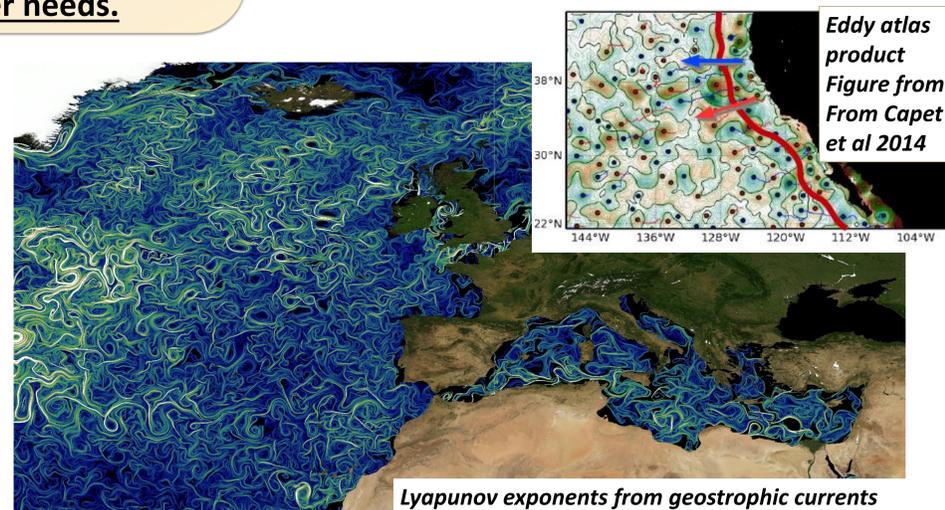
In the coming years CNES R&D will make it possible to leverage the new technology of Sentinel-3 in Level-3/4. **Overcoming the challenges of SARM altimetry will provide major upgrades of Sea Level products to better fulfill downstream user needs.**

The L4 mapping improvement will benefit to downstream products such as geostrophic currents, Lagrangian products, eddy atlas, etc...



Demonstrations performed by CNES with CryoSat-2 on the performance of SARM mode, and improvement of LRM algorithms (derived from and validated with SARM) allow us to foresee an effective resolution of ~ 50 km along-track.

However, 1Hz measurements are no longer sufficient to retrieve the smaller scales. Exploiting the full 20Hz record is becoming the new baseline of L3 processors.



20 years LE time series available on www.aviso.altimetry.fr