Sentinel-3 L2P-L3 Sea Level Marine Altimetry Service

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Introduction

The **Sentinel-3 L2P/L3** Sea Level Marine Altimetry Service is supported by Eumetsat in the frame of the Copernicus program funded by the European Union. It is an operational service operated by CNES and CLS (operational since 27th of June 2017) for marine surface for NRT (near-real-time), STC (short-time-critical), NTC (non-time-critical) products.
The **intended users** are: **operational oceanography, modelers, climate researchers**.

Data Access

Products	Missions	Timeliness	Access	S3A available since	S3A latency
L2P	All (*)	NTC (delayed time)	AVISO+ FTP: https://www.aviso.altimetry.fr/en/data/data-access/endatadata-accessregistration-form.html	15/06/2016	~40 days
	S3A	NRT and STC (real time)	1) AVISO+ FTP: https://www.aviso.altimetry.fr/en/data/data-access/endatadata-accessregistration-form.html 2) EUMETCAST	14/12/2016 12/01/2017	~ 4h (nrt) ~2 days (stc)
L3	All (*)	NRT/STC (real time) and NTC (delayed time)	CMEMS: http://marine.copernicus.eu/services-portfolio/register-now/), products: - SEALEVEL_GLO_PHY_L3_NRT_OBSERVATIONS_008_044 - SEALEVEL_GLO_PHY_L3_REP_OBSERVATIONS_008_045	29/03/2017 15/06/2016 (delayed time)	~5h (NRT/STC) 3 x per year

(*) All = Jason-2/3, SARAL/Altika, Crysoat-2, HY-2A (for current altimetry missions) and TOPEX/Poseidon, ERS-1, ERS-2, GFO, Envisat, Jason-1 (for ended missions)

- Handbooks:
  - L2P products : https://www.aviso.altimetry.fr/fileadmin/documents/data/tools/hdbk_L2P_S3.pdf
  - L3 products : http://marine.copernicus.eu/documents/PUM/CMEMS-SL-PUM-008-032-051.pdf

Added value of L2P/L3 products

L2 products (altimetry)

- Along-track products containing all information measured by altimetry satellite over ocean and land

- Comments :
  - Altimetry standards and format not homogenous between the different altimetry missions
  - Relative biases uncorrected for altimeter parameters

L2P products (altimetry)

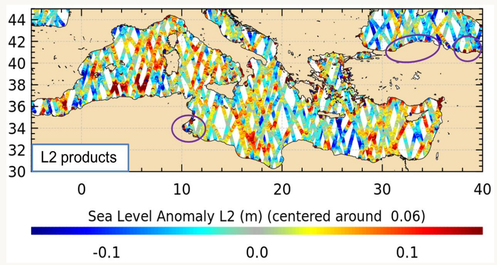
- Along-track products containing information relative to sea-level only on marine surface

Added value versus L2 :
- **Homogenization** of format and altimetry standards between all the altimetry missions
- **Global and regional sea-level biases** are corrected versus a reference mission
- **Selection of valid** measurements to calculate sea-level height
- **Empirical correction** to remove errors in L2 products (e.g. time tag bias)

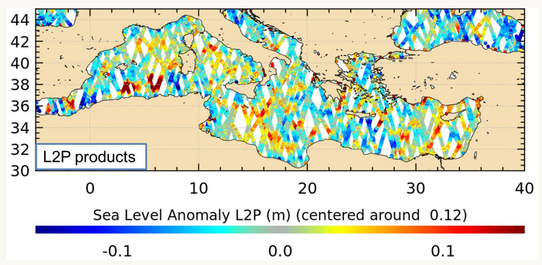
L3 products (altimetry)

- Along-track products that contain time, sea level anomaly and absolute dynamic topography for valid marine surfaces

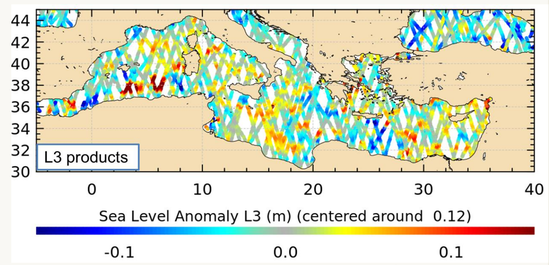
Added value versus L2P:
- **Projection of measurements** on a mean ground track
- **Discrepancies** between altimetry missions are **reduced** (e.g. error orbit, long wavelength errors)
- **Sea-Level** height is **filtered out and subsampled** to provide users with a useful sea-level content for oceanographic applications



L2 products : Spurious measurements and biases between missions are detected



L2P products : Spurious measurements and global biases are removed, SLA is more homogenous



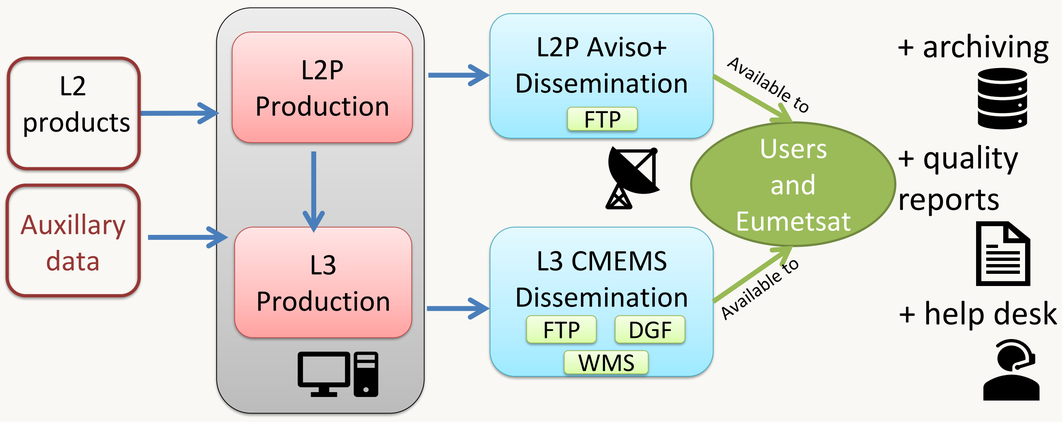
L3 products : sea-level is filtered and subsampled and discrepancies between missions adjusted

Along-track SLA for : J3(IGDR), AL (IGDR) , S3A (STC) from 10/08/18 to 24/08/18. Zoom on Mediterranean Sea

Presentation of the L2P/L3 service

Sentinel-3 L2P/L3 service is complementary to other existing services:

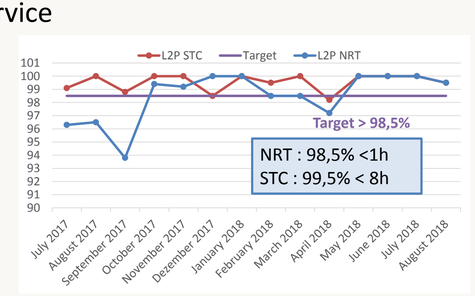
- L2P-SALP service supported by CNES for several years for all the altimetry missions (excepted S3) :
  - Jason-2/3, SARAL/AltiKa, Crysoat-2, HY-2A for current altimetry missions
  - TOPEX/Poseidon, ERS-1, ERS-2, GFO, Envisat, Jason-1 for ended missions
- L3-CMEMS service supported by Mercator for all altimetry missions (excepted S3)

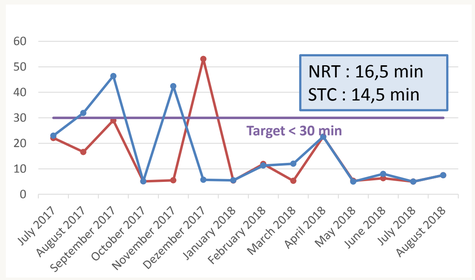


- **Input** : Sentinel-3 L2 data from Eumetsat and auxiliary data
- **Production** of L2P and L3 products
- **Dissemination** on AVISO+ ftp (L2P) and by CMEMS (L3)
- Distribution of **quality monitoring reports**
- **Archiving** of L2P and L3 products
- Users can ask questions to the help desk

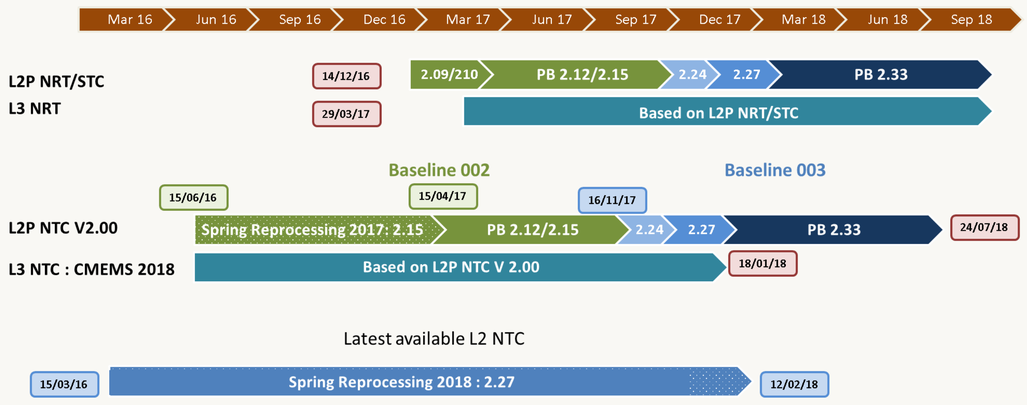
Status of operational production

- The Sentinel-3 L2P/L3 Altimetry Service was in **pre-operational phase since the 15th of December 2016** , and has been in **operational service since the 27th of June 2017**
- Several operational requirements exist for this service as for instance :
  - The delivery delay of Near Real Time L2P products upon reception of the input NRT L2 shall be less than 1 hour with a goal of 0.5 hours.
  - The availability of L2P products shall be better than 85% in 1h with regard to the available corresponding L2 products with a goal of availability better than 98.5%.
- Key Point Indicators (KPI) has been developed to follow the efficiency and the quality of the service





- S3A L2P (V 2.00) and L3 NTC products were reprocessed end of 2017/beginning 2018 based on Sentinel-3A L2 spring reprocessing 2017 (PB 2.15). A more recent version of L2 products is now available (spring reprocessing 2018, PB 2.27), but no yet used for L2P
- Timeline of Sentinel-3A L2 products used for L2P and L3 products



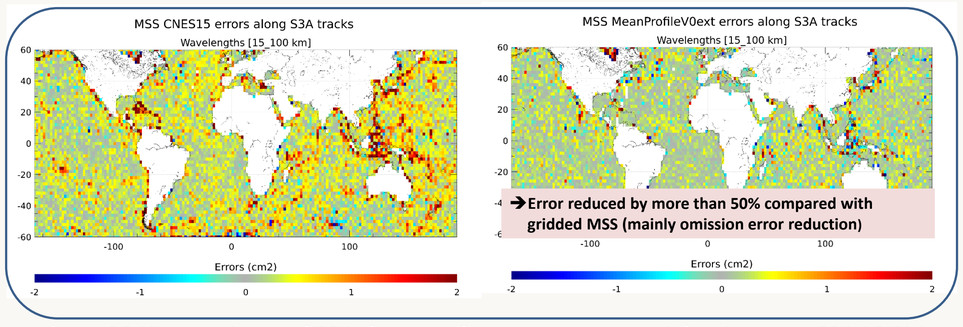
Conclusions and perspectives

- Sentinel-3 L2P/L3 Marine Altimetry Service is fully operational:
  - S3A L2P products are provided in 3 timeliness's (NRT, STC, NTC)
  - S3A L3 products are provided in 2 timeliness's (NRT/STC, NTC)
  - Timeliness requirements are reached
  - The service is complementary with L2P-SALP and L3-CMEMS services
- Potential **improvement** of the L2P/L3 products

L2P :
- S3A L2P NTC reprocessing based on L2 spring 2018 (PB 2.27) data to have homogeneous timeseries using the same retracking.

L3 :
- use of a S3A mean profile in NRT processing

- Evolution of standards for L2P NRT



CNES R&D study on 20 Hz experimental S3A data set shows strong potential to improve S3A L3 SLA estimation using a S3A mean Profile (= along-track MSS) instead of a gridded MSS. S3A mean profile computation planned using S3A L2P data (see poster Pujol et al: "Improvements and limitations of recent mean sea surface models: importance for Sentinel-3 and SWOT") => this is only possible if there is an homogeneous L2P dataset (using the same retracking) over at least 2 years

- Evolution of the S3 L2P/L3 altimetry service
  - Integration of S3-B in L2P/L3 system is ongoing: first L2P/L3 products are expected beginning of 2019
  - Implementation of Sentinel-3 significant wave height L2P/L3 service is planned
  - new variables added in the L3 product will enable users to fit the altimeter physical content to their applications
- In the future, high resolution L2P/L3 sea-level products could be integrated in the marine L2P/L3 service