

Review of potential use of altimetry products for coastal/regional models validation

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On behalf of the CLS/CNES  team



- Altimetry is a key observing system for oceanography
- Intensively use to analyse the ocean variability, from climate change (MSL) and interannual signal to mesoscale signal (of the order of 50-100 km)...
- Use by Operational Monitoring and Forecasting Centers and research groups for assimilation and/or validation .
- The use of altimetry for regional/coastal applications is less mature and remains challenging for two main reasons :
 - accuracy decreases when approaching the coast
 - coastal community is not very familiar with altimetry data (except some specific groups that have expertise on this kind of data)



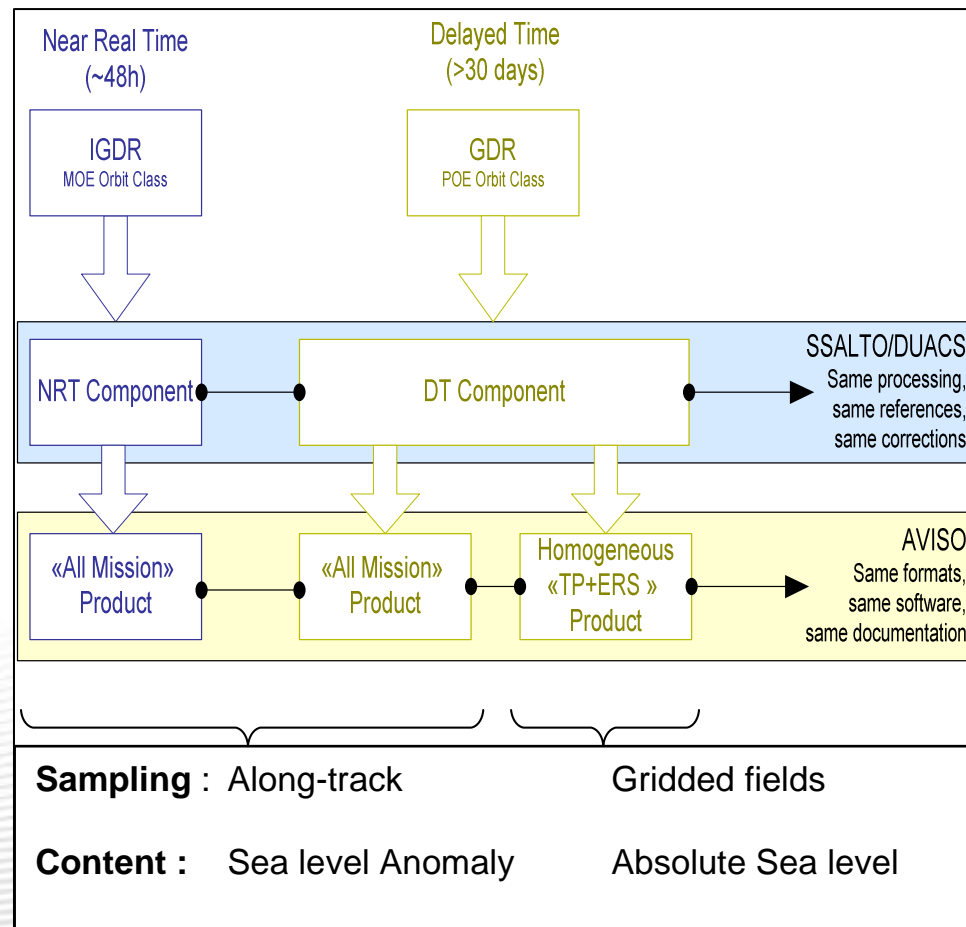
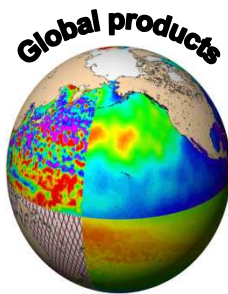
-1-Review of existing products

→ standard products :global and regional

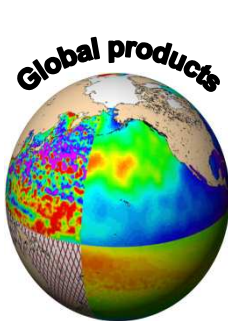
-2- Describe the recent work done to develop and produce new generation of products for coastal applications

→ PISTACH project (CNES)

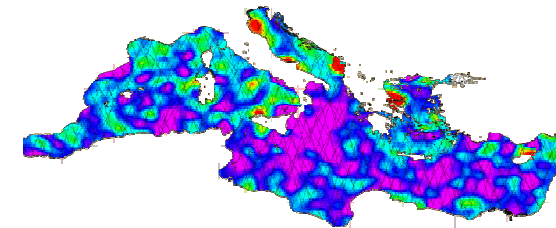
Based on SALP/ DUACS center operated by CNES/CLS which will be integrated into MyOcean system (FP7 EU project)



- Refined the global processing to obtain regional products



Mediterranean Sea
(MFS)



Along track SLA

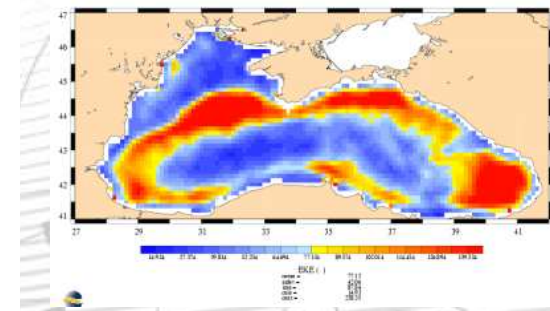
Maps of SLA

Mean Dynamic
Topography (MDT)

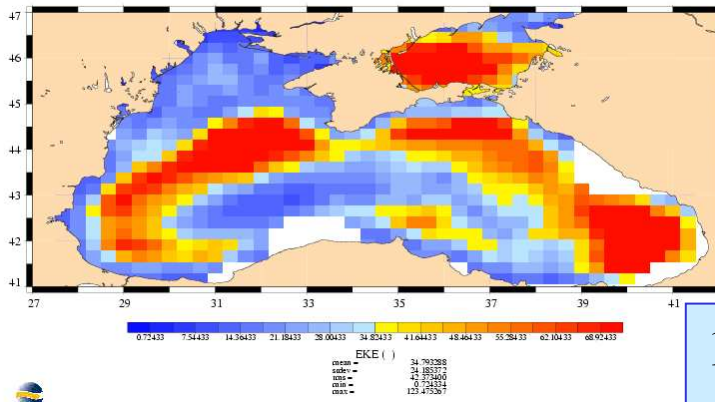
Specific processing applied

- Tide, DAC corrections
- Editing, Filtering, sub-sampling
- Refined objective analysis parameter
- Regional MDT (Med only + new one in Mouton area (SHOM))

Black Sea
(ECOOP)

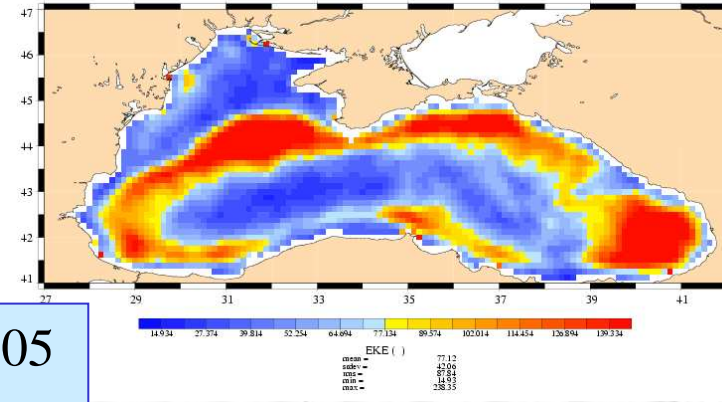


- Using a dedicated **regional processing**
 - ✓ Data selection with specific criteria based on mean profiles quality
 - ✓ Higher resolution
 - ✓ Local LWE correction (HF aliasing, orbit and tidal residual error)



Standard AVISO 1/3°

1992-2005
EKE



New products 1/8°

→ **Strategy could be applied almost everywhere in the world**

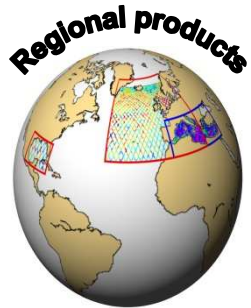
→ within MyOcean , plan to fulfill all the European regions:
(Med, Black sea, and European Shelves (NWS + IBI), Arctic

This approach allows us to provide improved products but a lot of improvement still remains to reach the regional/coastal needs :

- work on the physical content
- obtain more recent data
- improved the accuracy of the products close to the coast
- have a better knowledge of the observation error covariance
- consistency with the modelling/assimilation systems
use of the same forcing ?



- Provision of geophysical corrections ; **mersea products**



- Standard SLA (along track full resolution, daily)
- Same processing but not filtered, not subsampled, no LWE

-1- High Frequency Signal Correction

High Frequency from MOG2D barotropic model, Low Frequency from Inverse Barometer

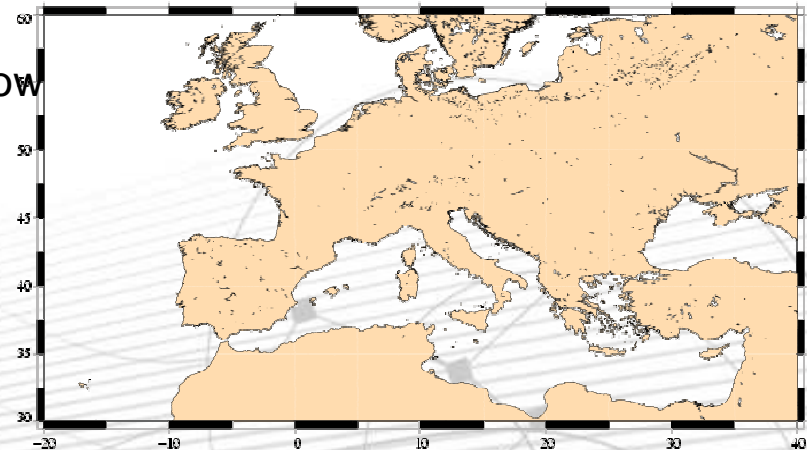
-2- Ocean Tide Correction

Based on GOT00 model

-3- Inverse Barometer

based on ECMWF pressure

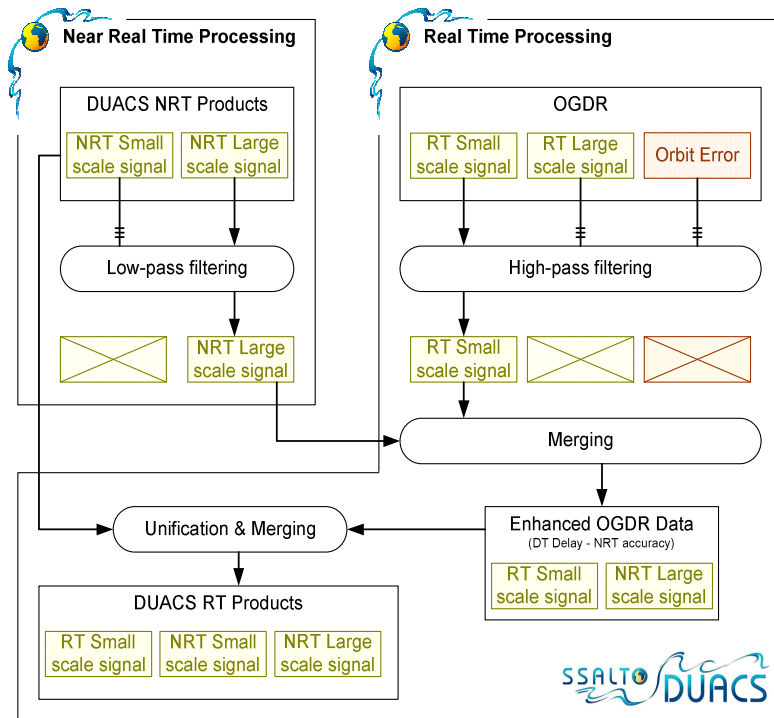
European Shelves (Mersea)



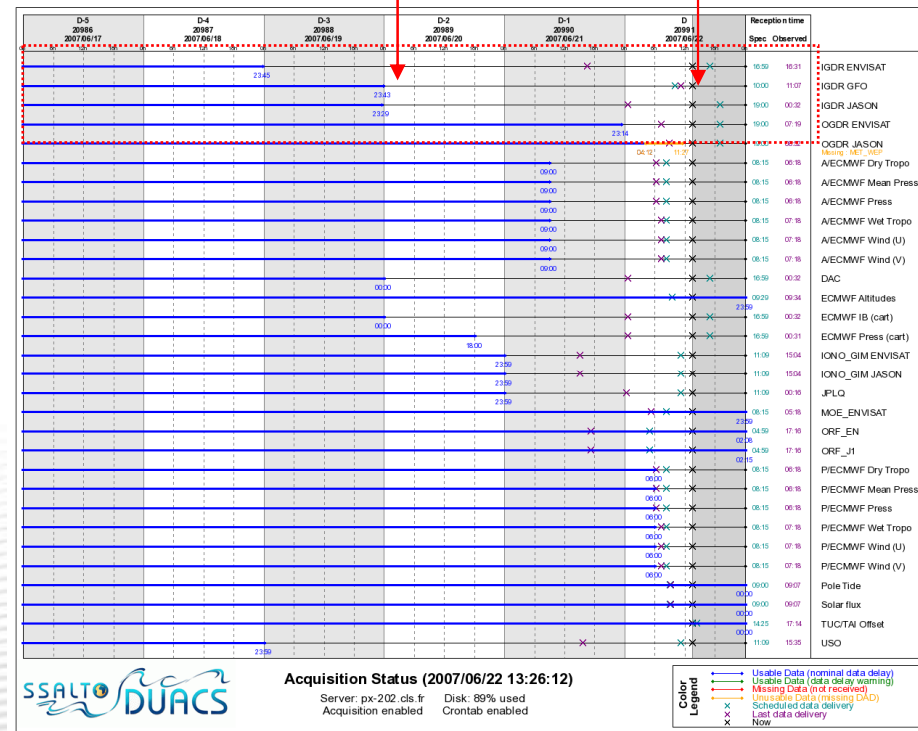
Real Time product



-Near Real Time product has a delay of due to the use of IGDR fields.
 Attempt to reduce this delay by using real time fields (OGDR) → **gain of about 2 days**,
 usefull for short term forecasts



2 days gain



-Combination of accurate small scale signal (eddies,fronts) of the OGDR with the large scale information of the IGDR

Used by UkMet office



PISTACH : A CNES initiative for improved altimeter products in coastal zone



Objective

Conception of an experimental **altimetry level2 product** dedicated to the monitoring of **coastal areas** and **continental waters** using new standards

Realization of a **prototype** for generating level2 products during Jason-2 CalVal Phase

Operation of the prototype, **production of data** during 1 year (sept 2008-2009)

*Similarly, ESA is supporting the **COASTALT** project (coastal ocean only) applied on EnviSat and ERS datasets*



PISTACH : A CNES initiative for improved altimeter products in coastal zone



- **Increase the along track resolution :**

1 pt/350 m (20 hz) instead of 1 pt/7km (1hz)

trade off between resolution and noise

→ 5 or 10 hz seems a good compromise

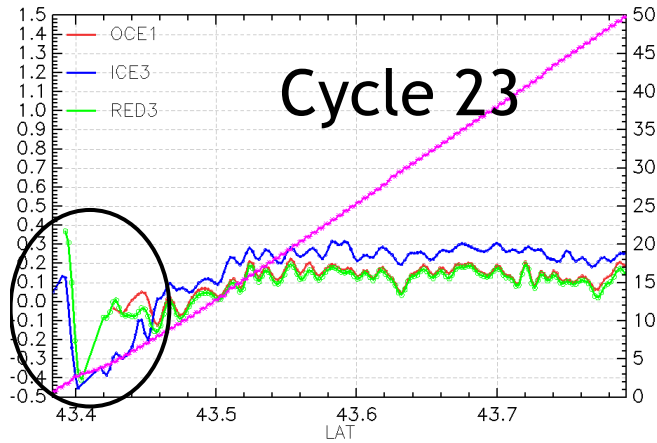
- **Closer to the coast thanks to new algorithm :**

retracking, wet tropospheric corrections,...

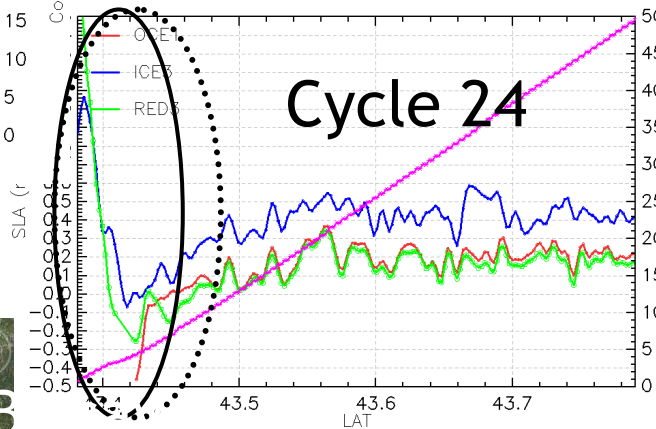
→ gain of few points (3-5 km)

- **Apply regional geophysical model for tide and DAC (dynamic atmospheric corrections)**

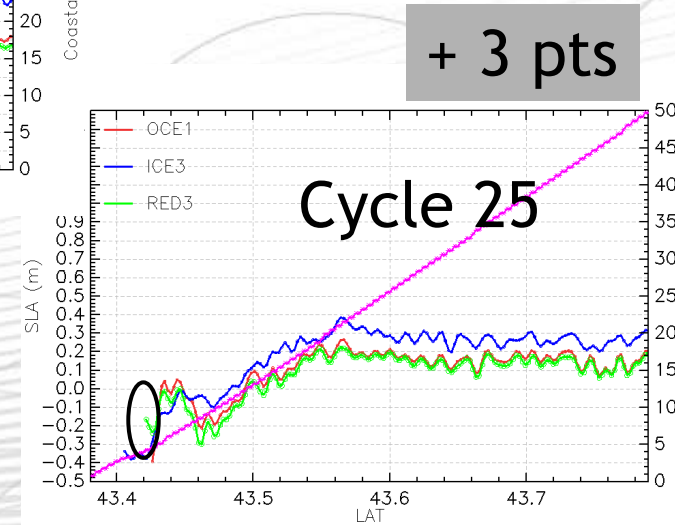
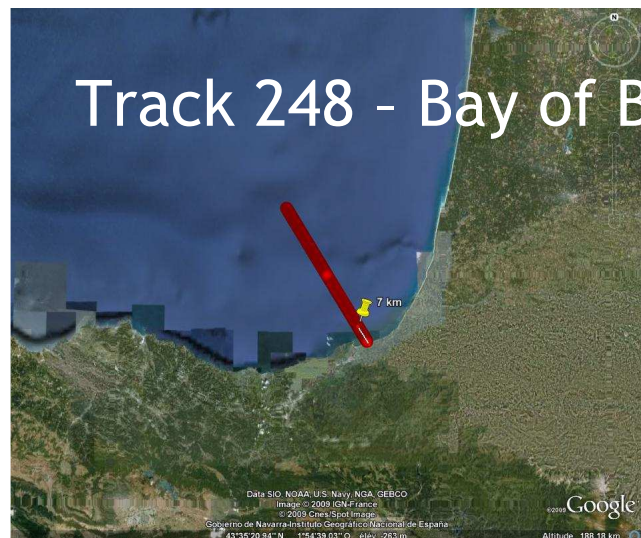
→ specific model tested with new bathymetry but also specific forcing (wind, pressure, wet tropo)



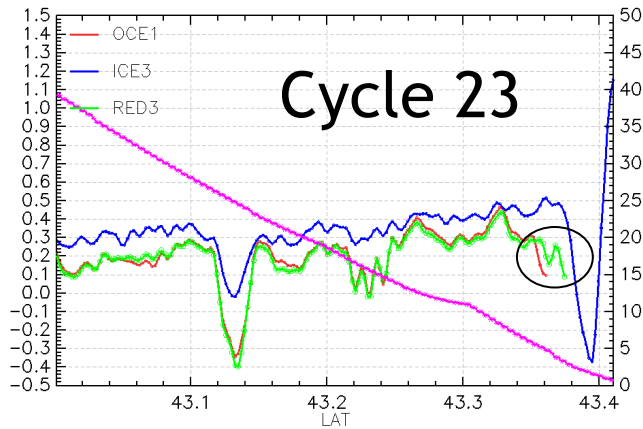
Variation of benefit with time



+ 14 pts -> +34 pts



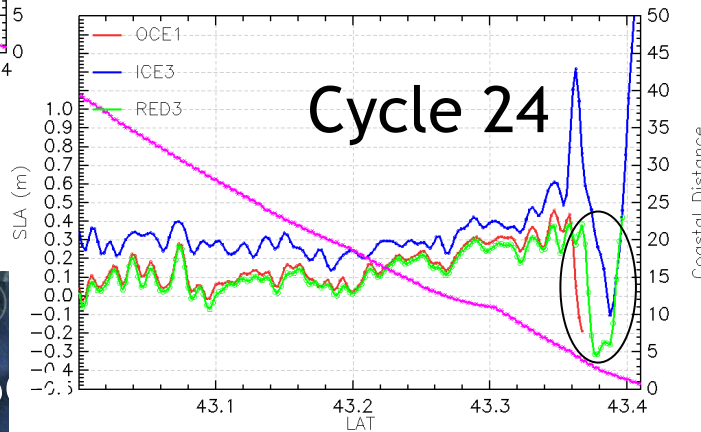
+ 3 pts



Cycle 23

+ 10 pts

Variation of the benefit with time

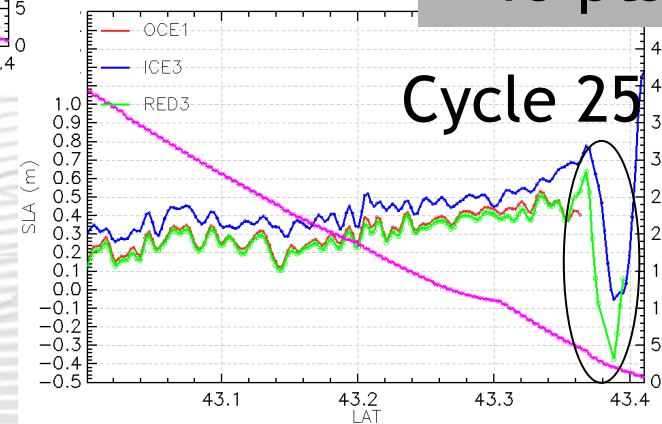


Cycle 24

+ 15 pts



Track 222
NW Mediterranean S



Cycle 25

+ 15 pts



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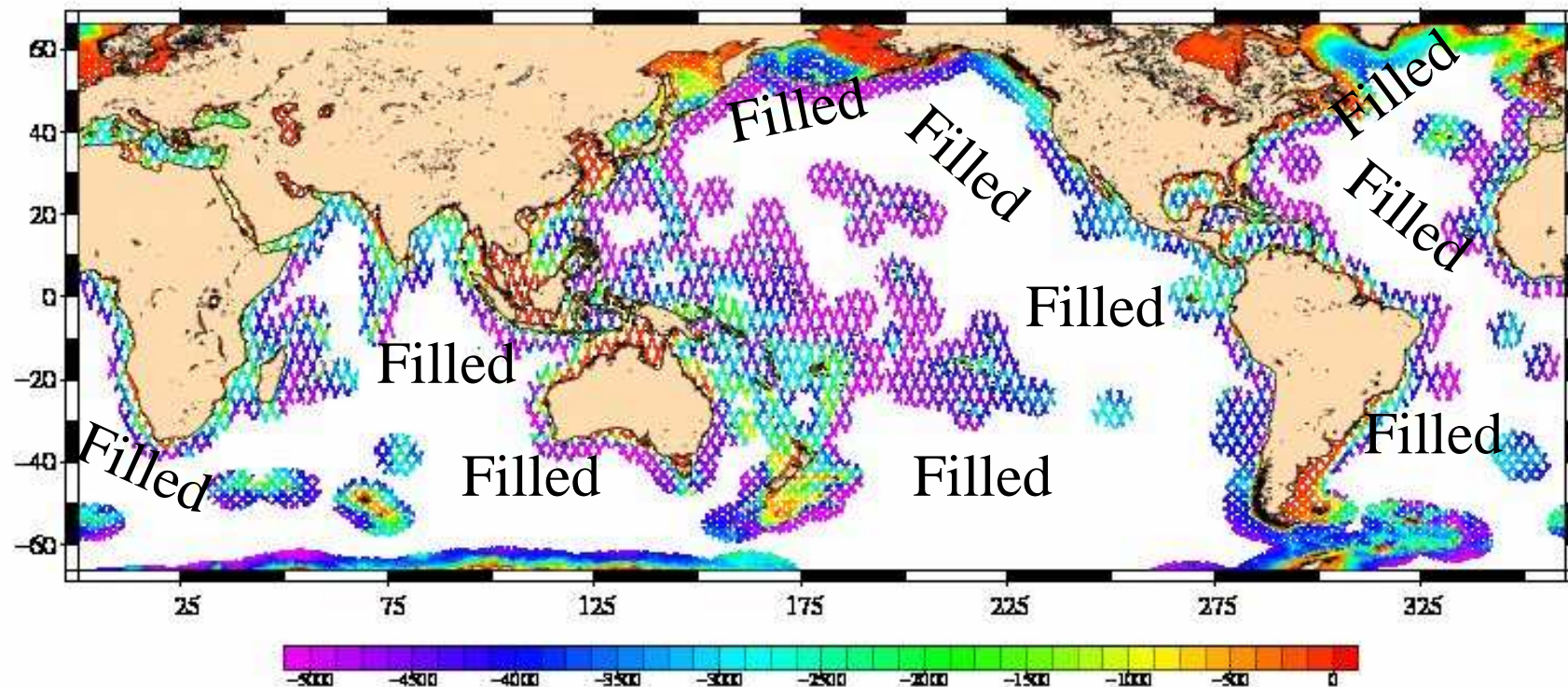
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V1.0 PISTACH: whole oceanic domain + 25 km over land at 20hz

Data access : <ftp://ftpsedr.cls.fr/pub/oceano/pistach/>



Objective to serve all the users → global+local = Glocal !



PISTACH : A CNES initiative for improved altimeter products in coastal zone



- **Product available is a level 2 products (GDR)**
mainly dedicated to groups that have a minimum of expertise in altimetry

CLS/CNES will provide support to use these data.

- **Data access and contact :**
claire.dufau@cls.fr gilles.larnicol@cls.fr
aviso@cls.fr
<ftp://ftpsedr.cls.fr/pub/oceano/pistach/>

Don't hesitate to contact us !

- **A lot of products are already available**
 - standard regional products
 - Mersea products (possibility to play with the physical content)
 - Real Time product for those who are interested by short term forecast

- **Need to work with the coastal community to better understand their needs to define next generation of products :**
 - L2P or L3 (along track)
what physical content is required ?
tide, barotropic signal,
 - Is atmospheric forcing consistency needed ?
 - Need for coastal Mean dynamic topography ?
 - What is the need in terms of observations errors covariances ?