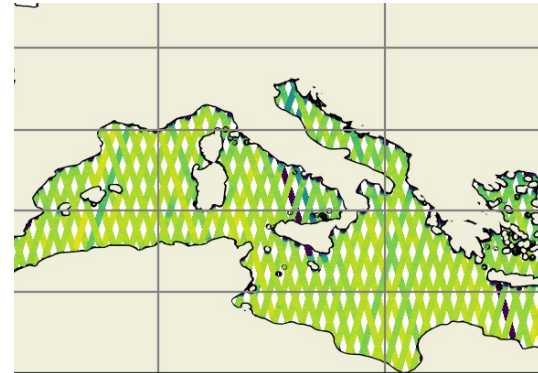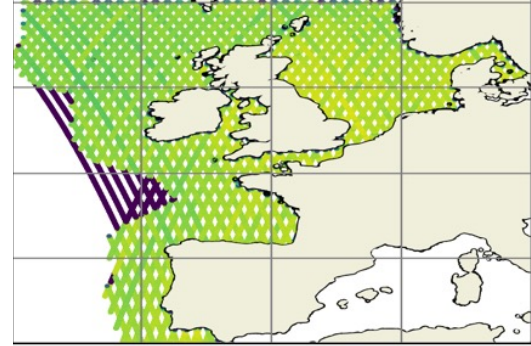# FDR4ALT new coastal products for the ERS / Envisat missions

Fernando Niño, Florence Birol ; Fabien Blarel ;
Wassim Fkaier ; Fabien Léger ; Mathilde Cancet &
Ergane Fouchet (Noveltis) Fanny Piras (CLS), H.
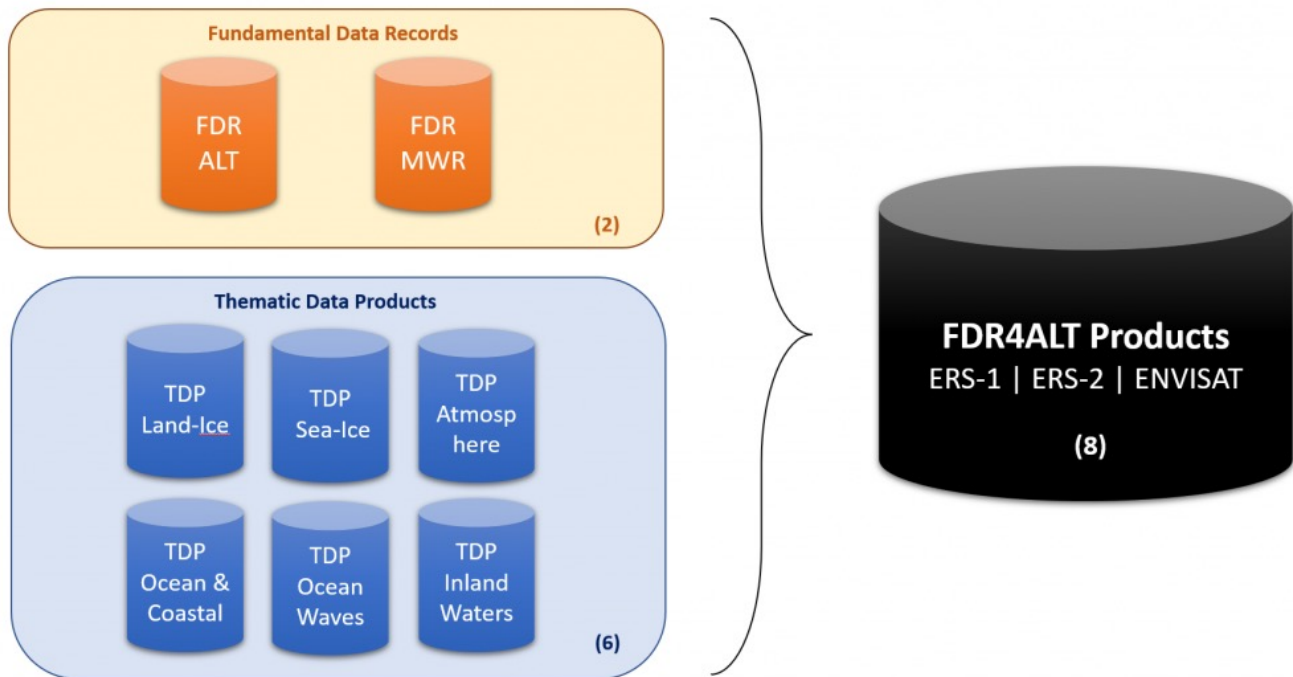Roinard (CLS), P. Féménias (ESA)

" FDR4ALT

Fundamental data records for altimetry

ESA project in the scope of the european Long Term Data Preservation Program (LTDP+)

"

Coastal Thematic Data Product (TDP)

Coastal TDP goals

User needs given by the results of a survey in ESA's Coastal Altimetry Workshop in February 2020

Performance

Get as close to the coast as possible:

Only high-frequency data

Coverage

Almost global coverage: the coastal ocean is considered at 200 km from the coast.

Continuity

Continuity of Ocean and Coastal SLA data must be ensured

Validation

Data must be validated with *in situ* data (tide gauges).

If TDP is a level-2 product, validation is made with level-3 products.

Ocean & Coastal NetCDF file

netcdf variables content	main	
	data_01	data_20
time	X	X
latitude	X	X
longitude	X	X
sea_level_anomaly	X	X
inter_mission_bias	X	X
validation_flag	X	X
distance_to_coast	X	X
meso_scale_uncertainty	X	X
short_scale_uncertainty	X	X
Total number of variables	*9*	*9*

The validation flag :

    0 : rejected data
    1 : valid ocean data
    2: valid coastal data

	expert	
	data_01	data_20
surface_type	X	X
altitude	X	X
range	X	X
sea_state_bias	X	X
ionospheric_correction	X	X
high_frequency_adjustment		X
range_ssb_hfa	X	
wet_tropospheric_correction	X	X
dry_tropospheric_correction	X	X
dynamic_atmospheric_correction	X	X
ocean_tide_height	X	X
ocean_tide_height_model_type	X	X
internal_tide	X	X
pole_tide	X	X
solid_earth_tide	X	X
mean_dynamic_topography	X	X
mean_sea_surface	X	X
Total number of variables	*16*	*16*

Round Robin analysis

(⭐ is a reference solution : REAPER)

Validation regions

E Australia

E North America

Norway Arctic

NEA

MedSea

Final selection

Mind map diagram:

FDR4ALT Coastal Round Robin (center)

- **MSS**
  - CNESCLS15 ⭐
  - Combined CNES15/DTU15 ✅
- **Ionospheric Correction**
  - Bifrequency ⭐ 🚩
  - **GIM/NIC09** ⭐ ✅
- **Retrackers**
  - Ice-2
  - mle3 ⭐ ✅
  - adaptive ✅
- **Wet**
  - Radiometer ⭐ ✅
  - GPD+ 🚩
  - ERA5 🚩
- **Tides**
  - FES2014 ⭐
  - GOT4V10
  - FES2014 regional ✅

Legend:
- ⭐ GDR
- ✅ Chosen
- 🚩 Not possible
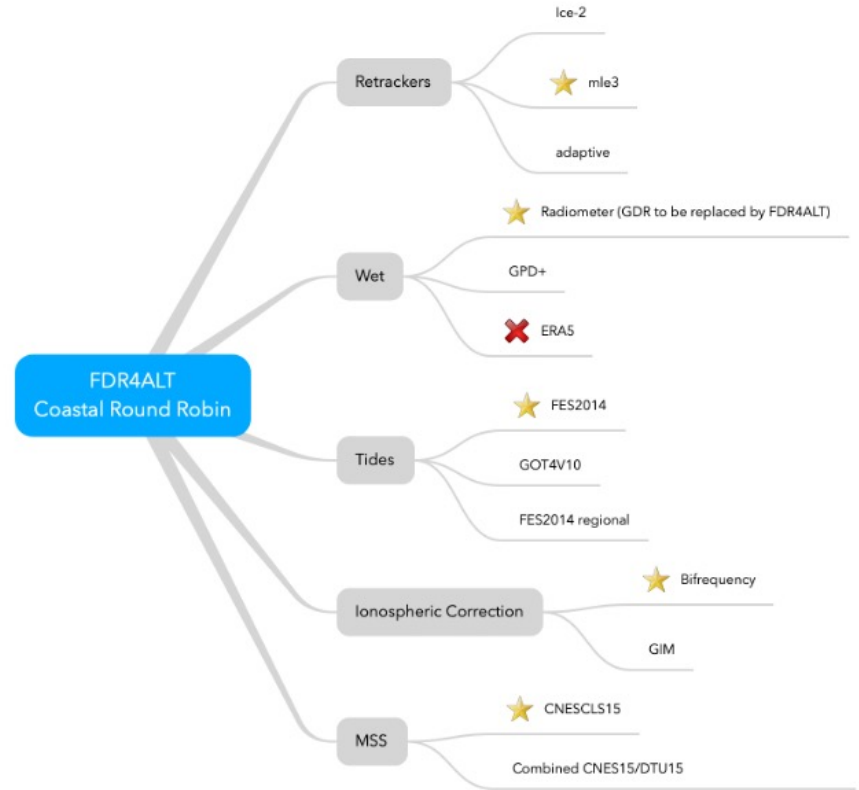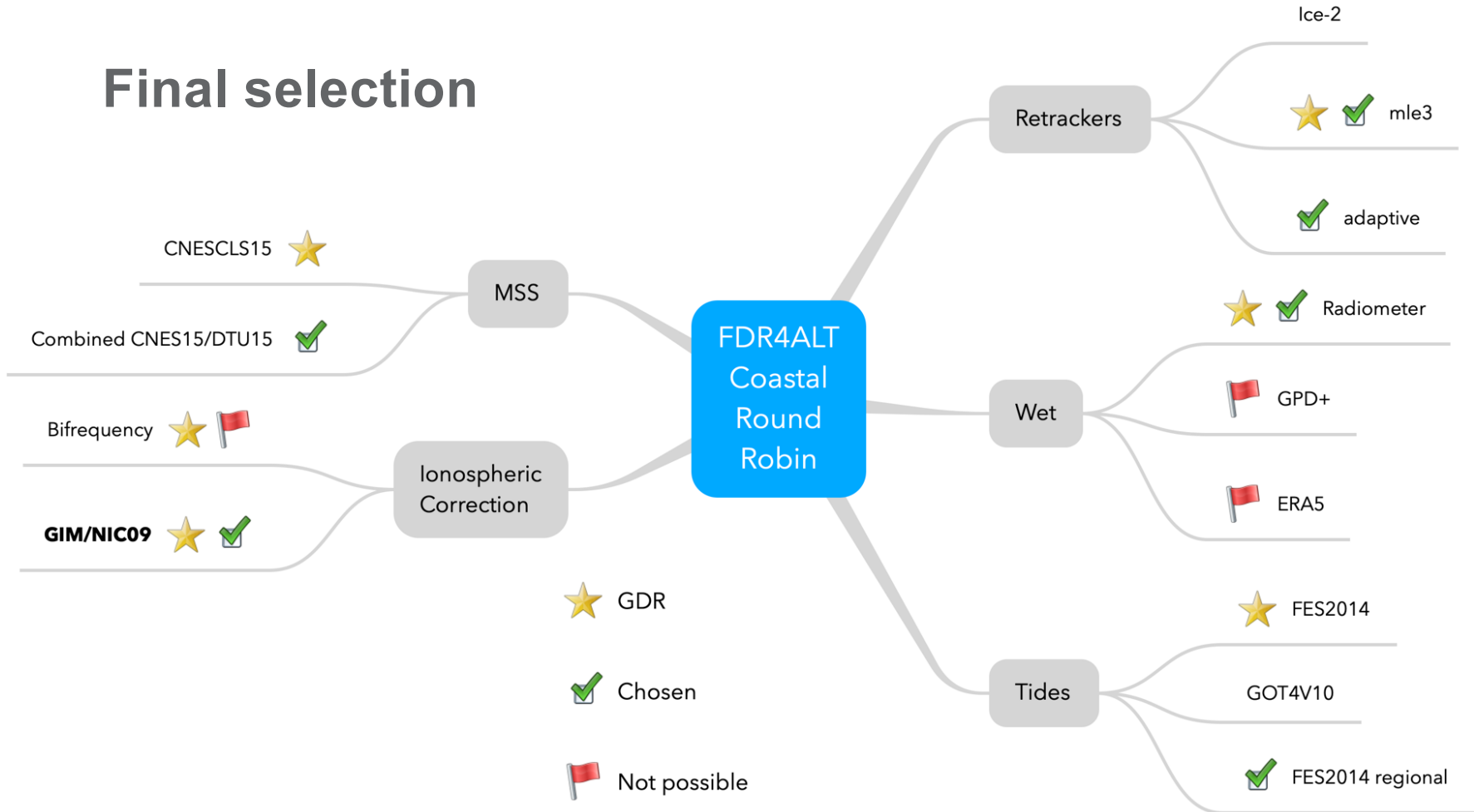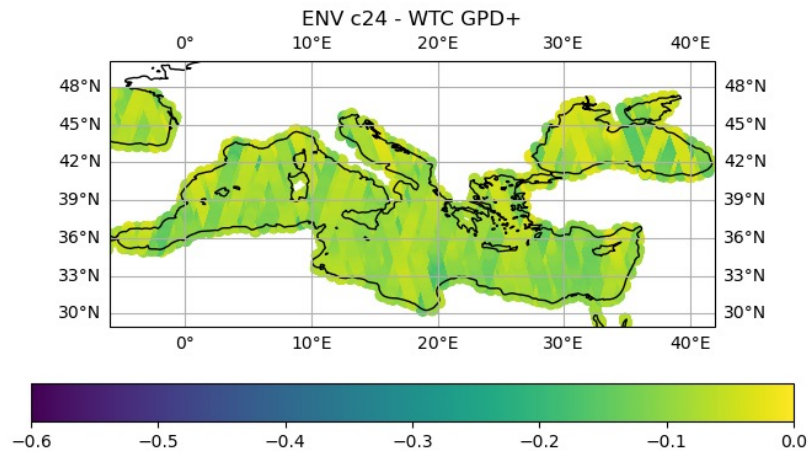
" Coastal TDP for Envisat & ERS-2

WTC issues and strategy

Trace 100 cycle 24
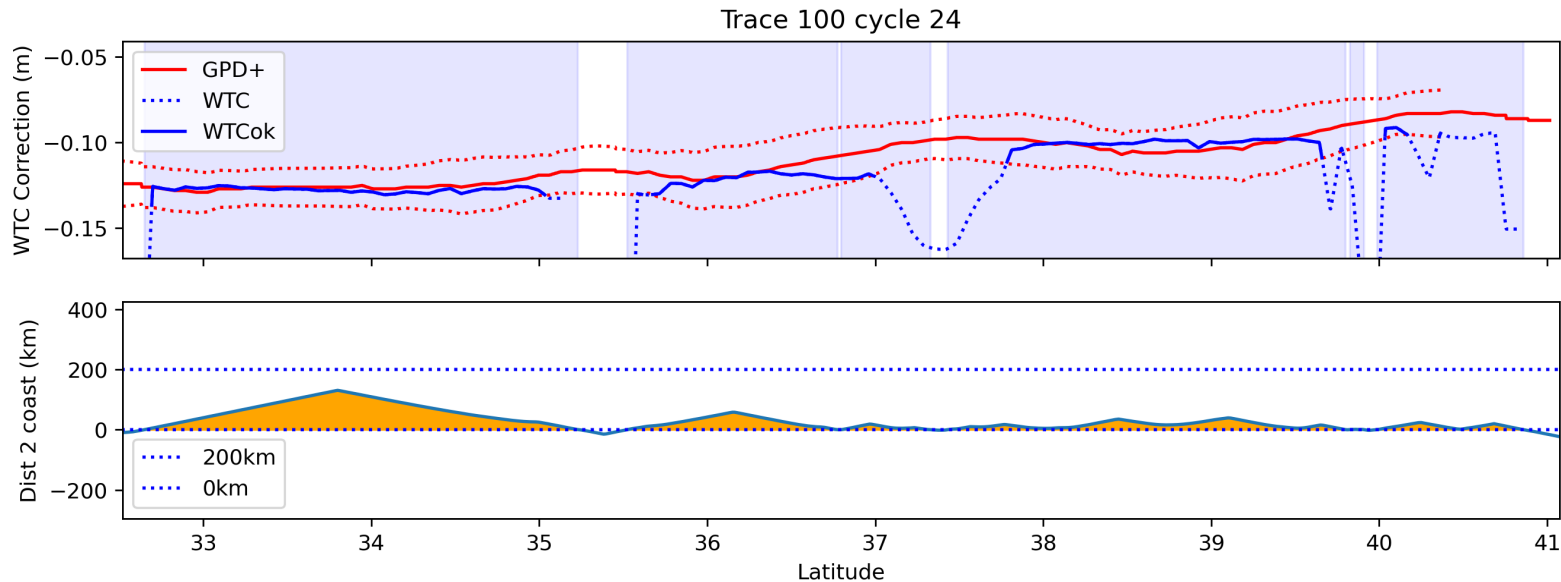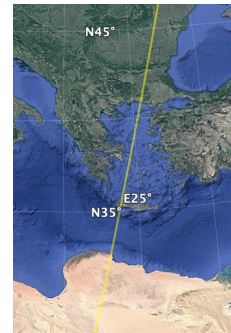
ENV

WTC issues and strategy
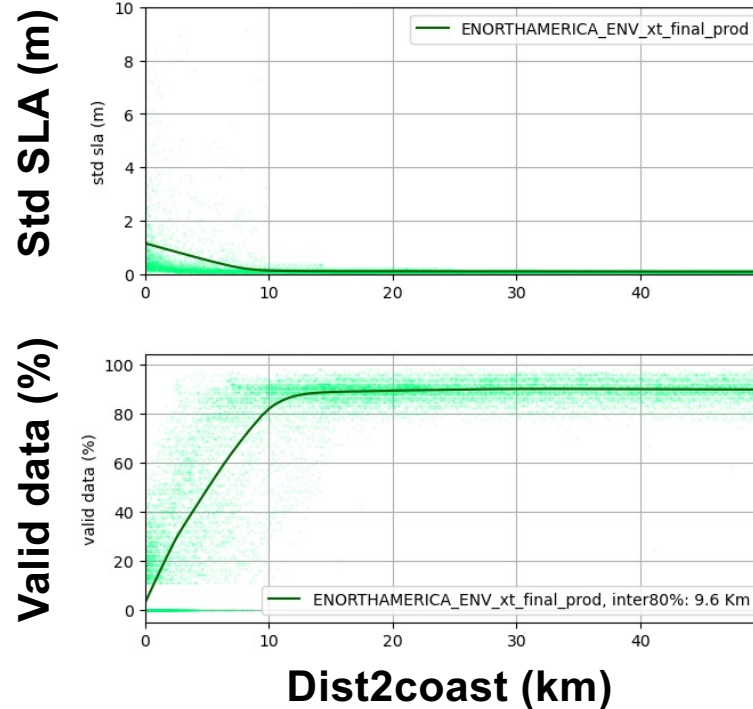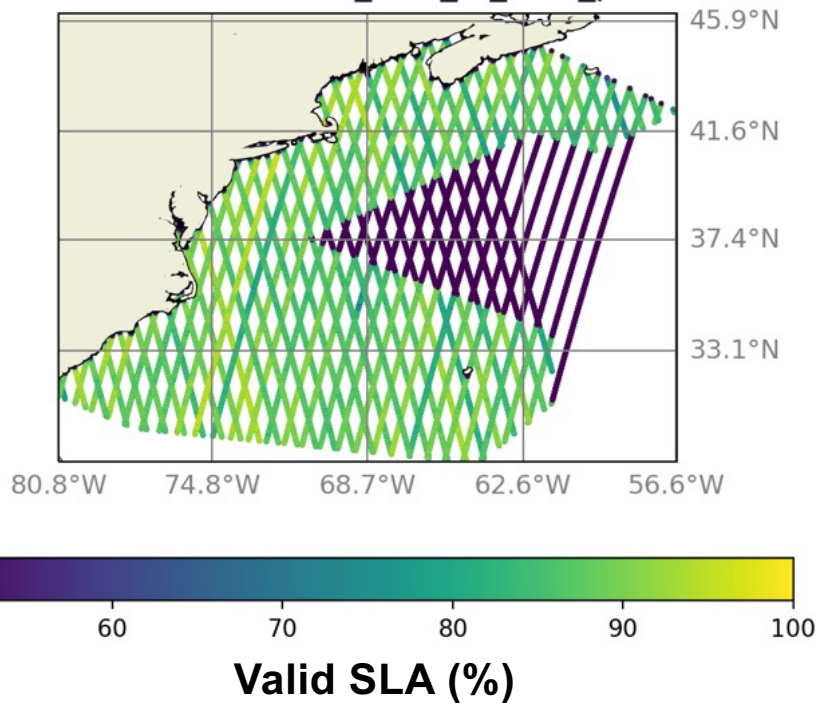
Radiometer

ENV c24 - WTC rad

GPD+
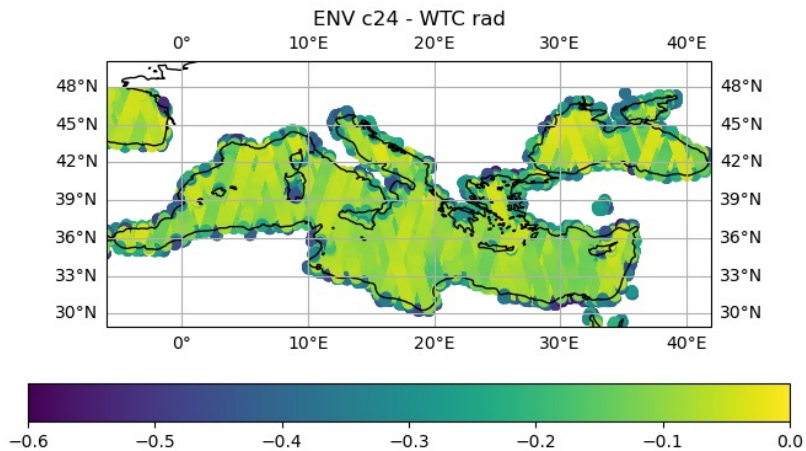
ENV c24 - WTC GPD+

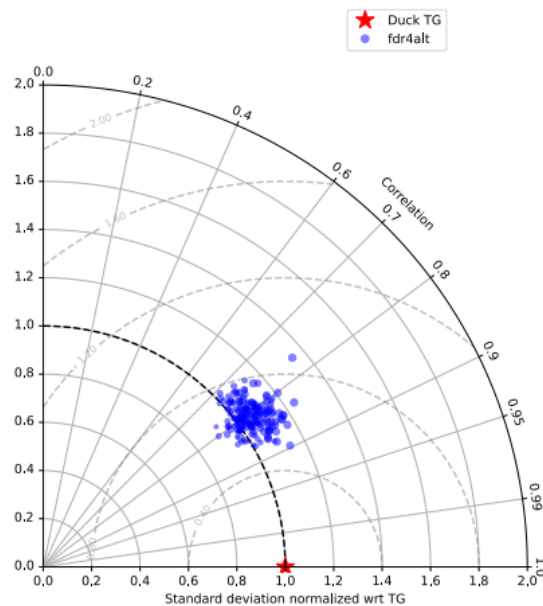*FDR4ALT Follow-On should fix this !*

Eastern North America

ENORTHAMERICA_ENV_xt_final_prod

Valid SLA (%)

Mean statistics of sla

Std SLA (m)

Valid data (%)

Dist2coast (km)

ENORTHAMERICA_ENV_xt_final_prod, inter80%: 9.6 Km

Eastern North America – Duck TG
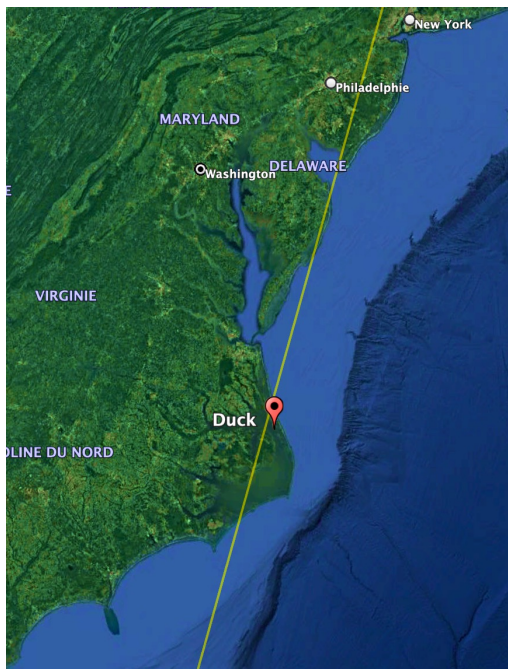
Pass 566 - descending

ENV

ERS-2

Eastern North America

	Dist2station (km)	Dist2coast (km)	Valid data (%)	Correlation	std (m)
TG	-	-	-	-	0.129
fdr4alt	23.603	6.809	94.937	0.897	0.147

	Dist2station (km)	Dist2coast (km)	Valid data (%)	Correlation	std (m)
TG	-	-	-	-	0.129
fdr4alt	46.381	16.39	84.058	0.784	0.141

ENV
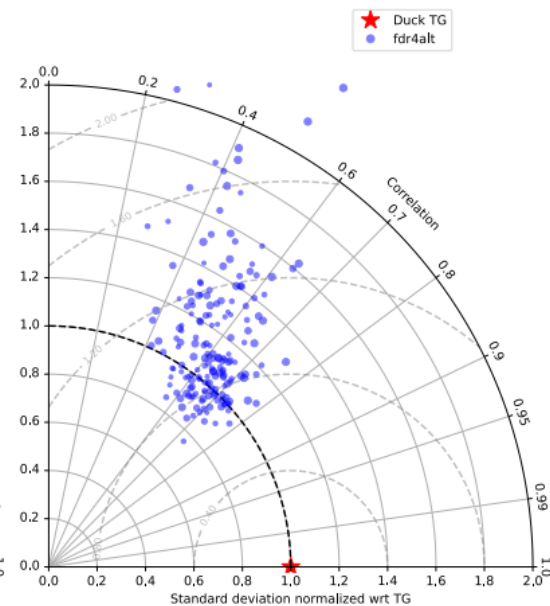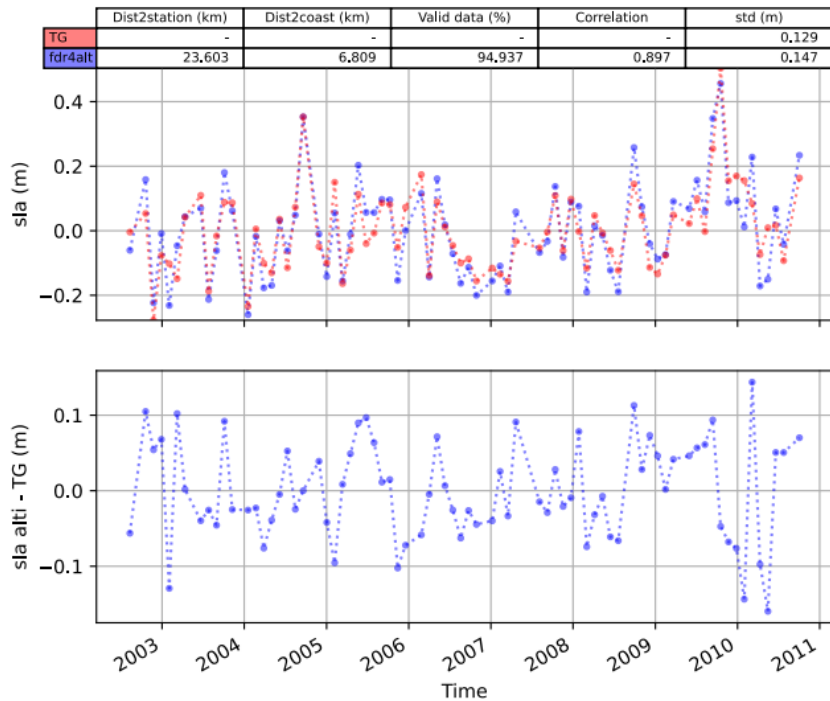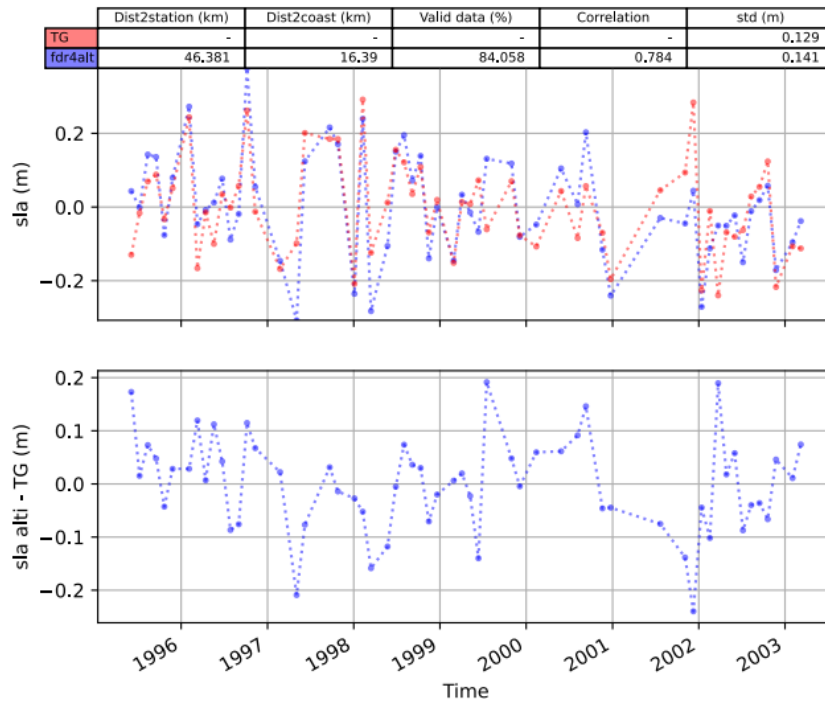
ERS-2

Eastern North America

ENV

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
fdr4alt	96.065	0.801	0.138	0.086

ERS-2

Product	Valid data (%)	Correlation	std (m)	rmsd (m)
fdr4alt	84.536	0.553	0.227	0.206

" Summary

- New coastal processing in TDP product for Envisat and ERS-2
- High-frequency data used
- Data availability, as least as good as standard 1Hz data, but can be better with GPD+
- Very good agreement with tide gauges in the 5 validation regions
- Better quality when using regional tides (NEA & MedSea)

- 17 yrs continuous data on the same orbit: ERS-2 / Envisat: *1995/05 – 2002/05 – 2012/04*

- GPD+ and regional Arctic tide is in the works on FDR4ALT Follow-On

See also today

- *Excellent performances of the newly reprocessed ERS-1, ERS-2 and ENVISAT products for altimetry and radiometry: the FDR4ALT products* in the session Regional and Global CAL/VAL for Assembling a Climate Data Record. F. Piras et al. Thursday 11:15

- https://fdr4alt.org – particularly the user guide