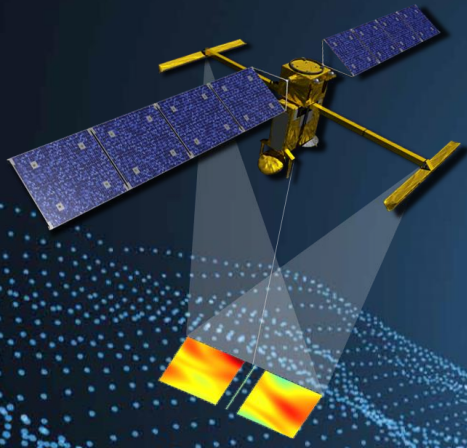
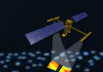


DUACS DT2021: 28 years of reprocessed sea level altimetry products

Yannice Faugère, Guillaume Taburet, Maxime Ballarotta, Isabelle Pujol,
Jean Francois Legeais, Gwenola Maillard, Chloe Durand, Quentin
Dagneau, Marine Lievin, Antonio Sanchez Roman, and Gerald Dibarboure





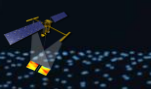
- Full reprocessing every 3- 4 years in the Copernicus Marine Service, **driven by user needs**



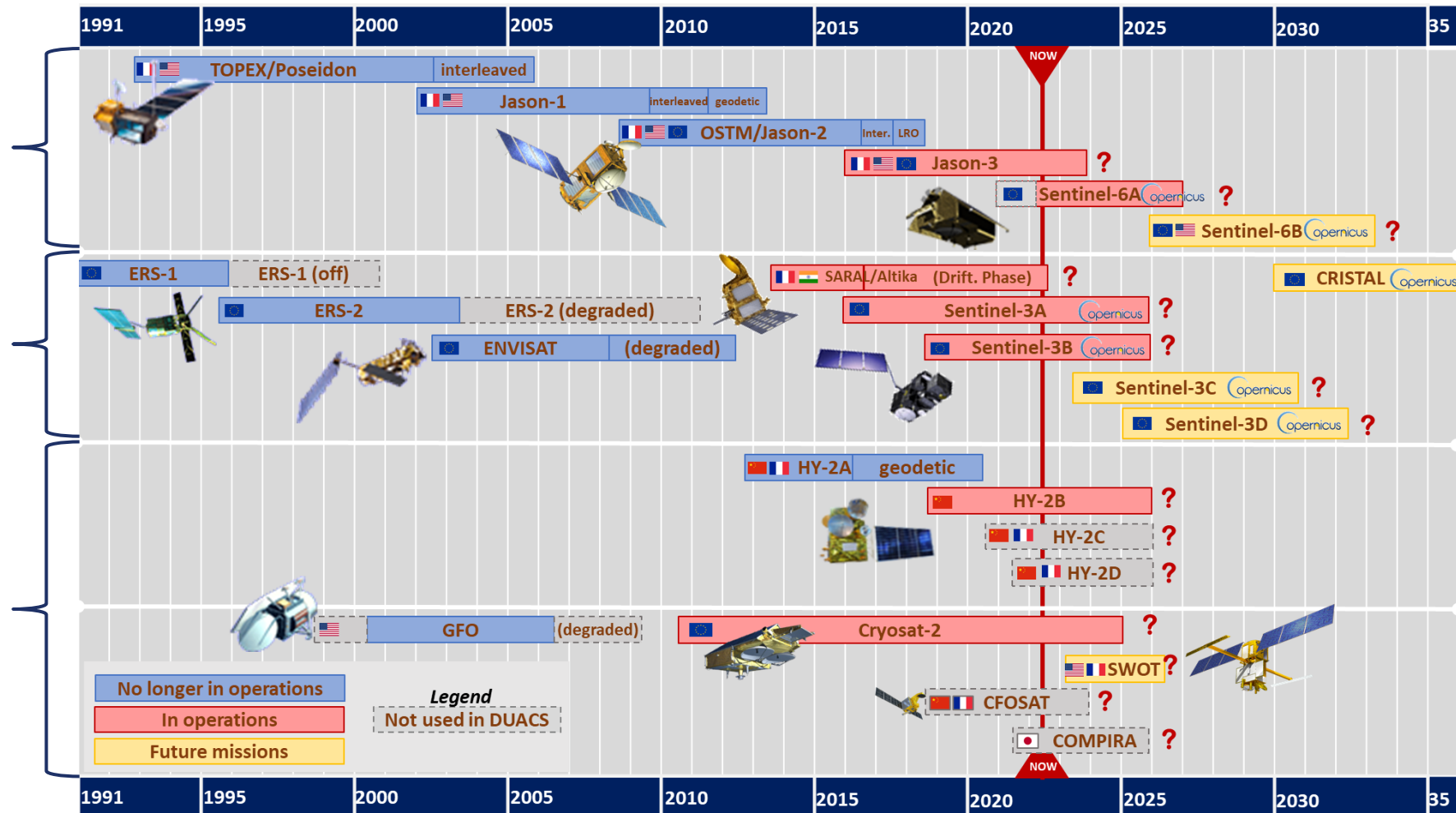
- Main Goal Improve the **homogeneity and quality** of the time series

Product Level	DT 2021 improvements	
	Small scales	Large scales
2/2P Instrumental & geophysical Standard	✓ <i>New GDR from space agencies</i>	
	<ul style="list-style-type: none"> ✓ Atmospheric corrections TUGO+ERA 5 ✓ Barotropic tide <i>FES 2014b</i> ✓ Internal tide <i>Zaron, 2019</i> 	<ul style="list-style-type: none"> ✓ New Orbit Solution <i>GDR-F & GSFC-STD18</i> ✓ New calibration of the reference missions
3 Cross Calibration & denoising	<ul style="list-style-type: none"> ✓ More permissive editing ✓ New Mean Sea Surface & Mean Profiles ✓ New Global & regional MDT 	<ul style="list-style-type: none"> ✓ TP correction (WCRP, 2018) ✓ New Long Wave Length Error interpolation
4 mapping & Eddy tracking	<ul style="list-style-type: none"> ✓ Improved Optimal Interpolation parameters <i>e.g. correlation scales</i> ✓ Bathymetry constraint 	<ul style="list-style-type: none"> ✓ Sea ice mask added





- SL-TAC System relies on reference altimeter (for climate)
Topex/Poseidon, Jason series and now Sentinel-6 to retrieve large climate scales.
- **Coverage altimeters (ERS1/2, Envisat, Sentinel3A/B)**, are needed to retrieve the mesoscale signals.
- Same for **collaborative missions (GFO, SARAL, HY2B)** and **opportunity missions (Cryosat-2, CFOSAT)**

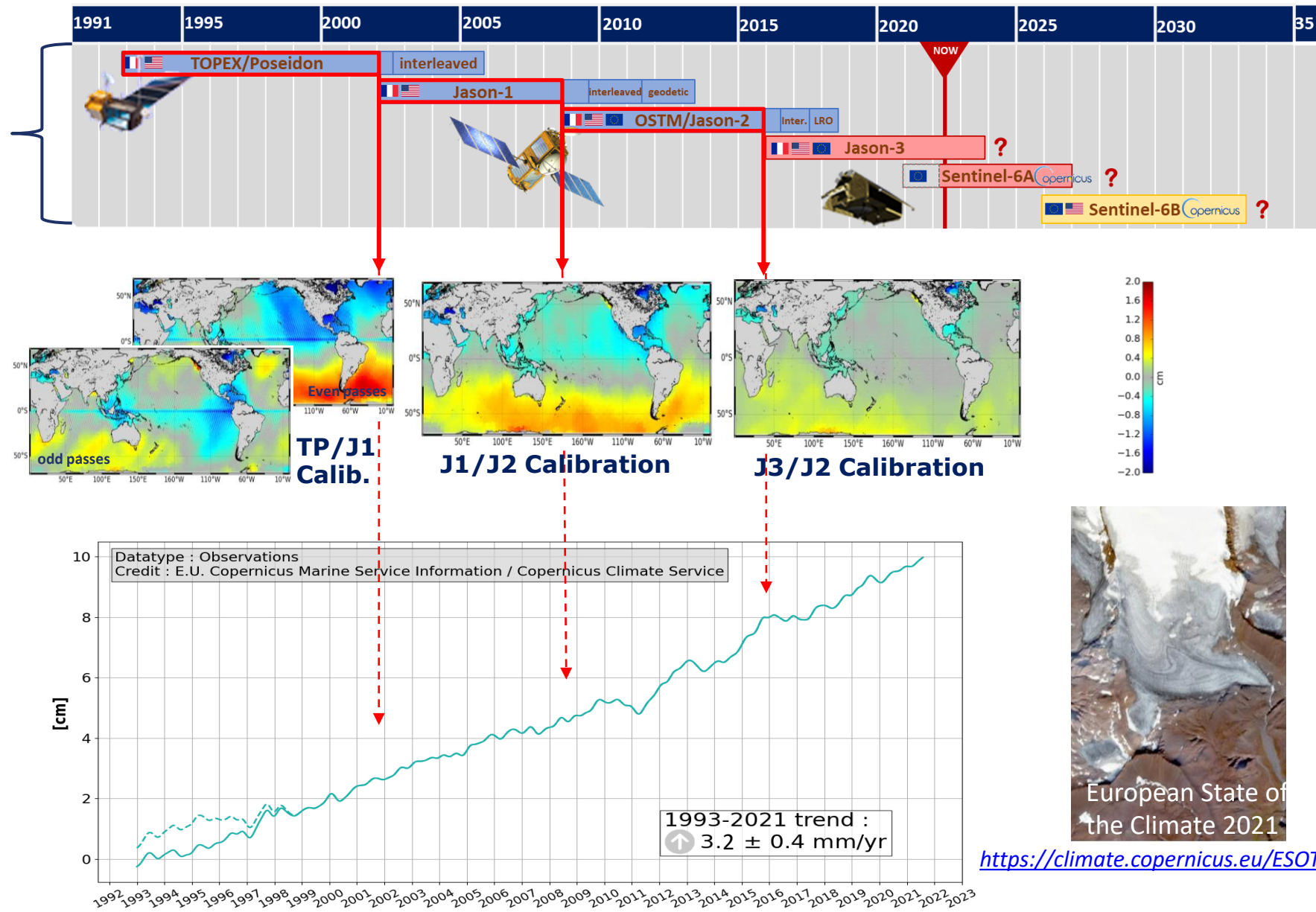


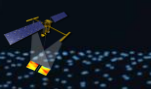
15 missions ingested over the past 27 years (100+ years cumulated data)

- SL-TAC System relies on reference altimeter (for climate)
Topex/Poseidon, Jason series and now Sentinel-6 to retrieve large climate scales.

- Fine calibration during tandem mission ensure the continuity

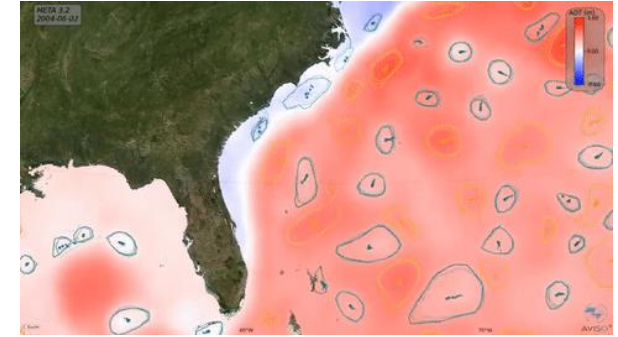
- Global mean sea level has increased by ~9 cm over 1993-2021, ~2/3 of this increase occurs during the second half of this period



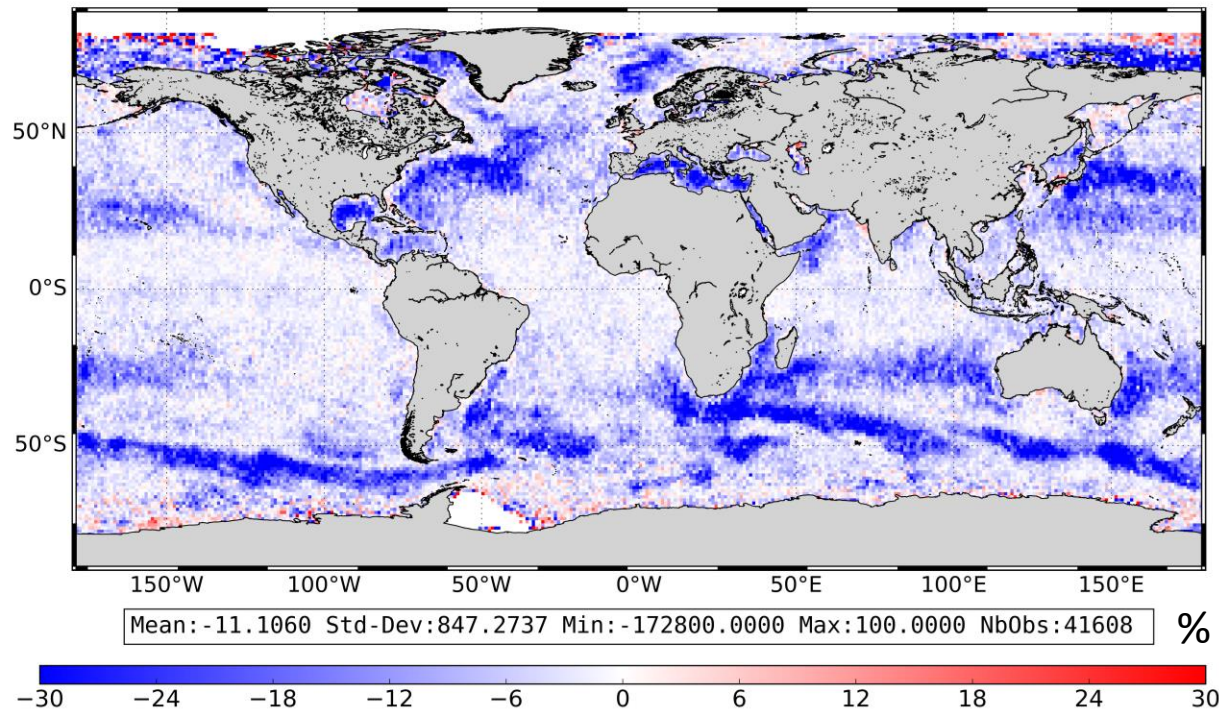


- L2/L3/L4 improvement lead also to a better description of the mesoscale in DT2021
=>10% Improvement of gridded Sea Level at Global scale relative to DT2018
- Regional distribution of this improvement (in blue):
=>20% Improvement on at mesoscales in high variability regions
- Result confirmed on the current by comparison to drifting buoys

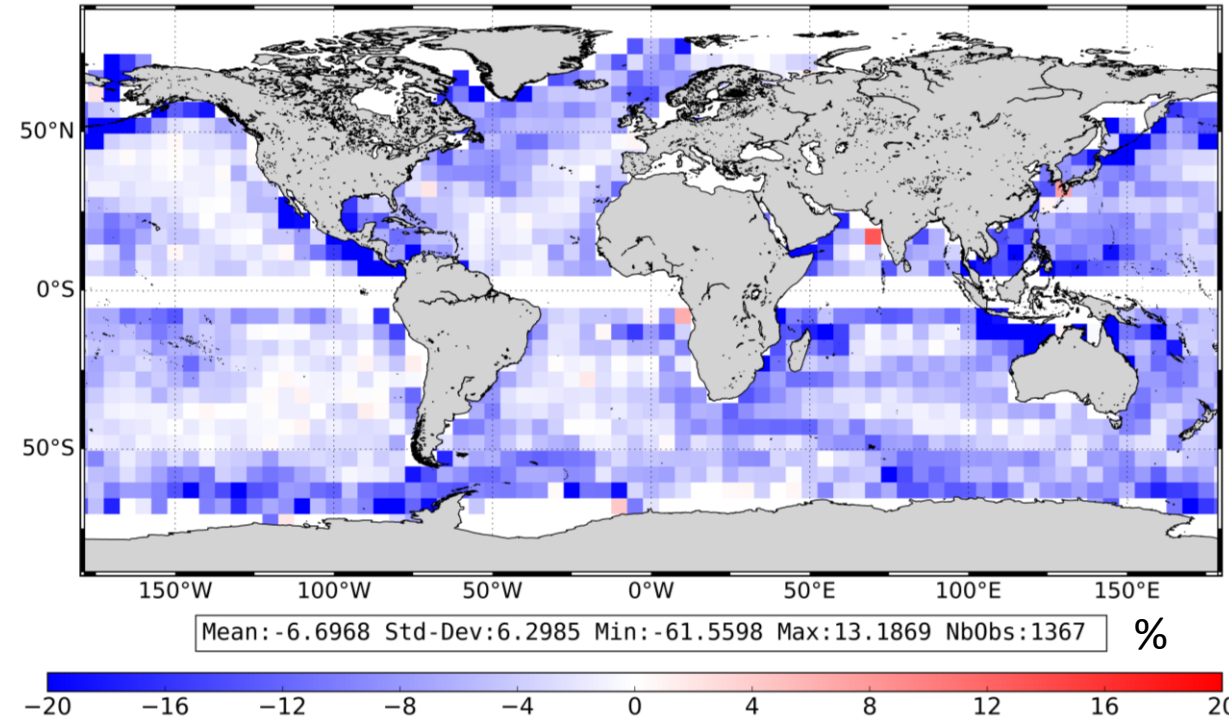
<https://www.youtube.com/watch?v=xw-XsFqD3GU>



Error reduction using independent altimetric mission
(2016-2020, focus on 65-500km wavelength)



Error reduction using independent drifting buoys corrected from
NIO & Eckman (2015-2020)

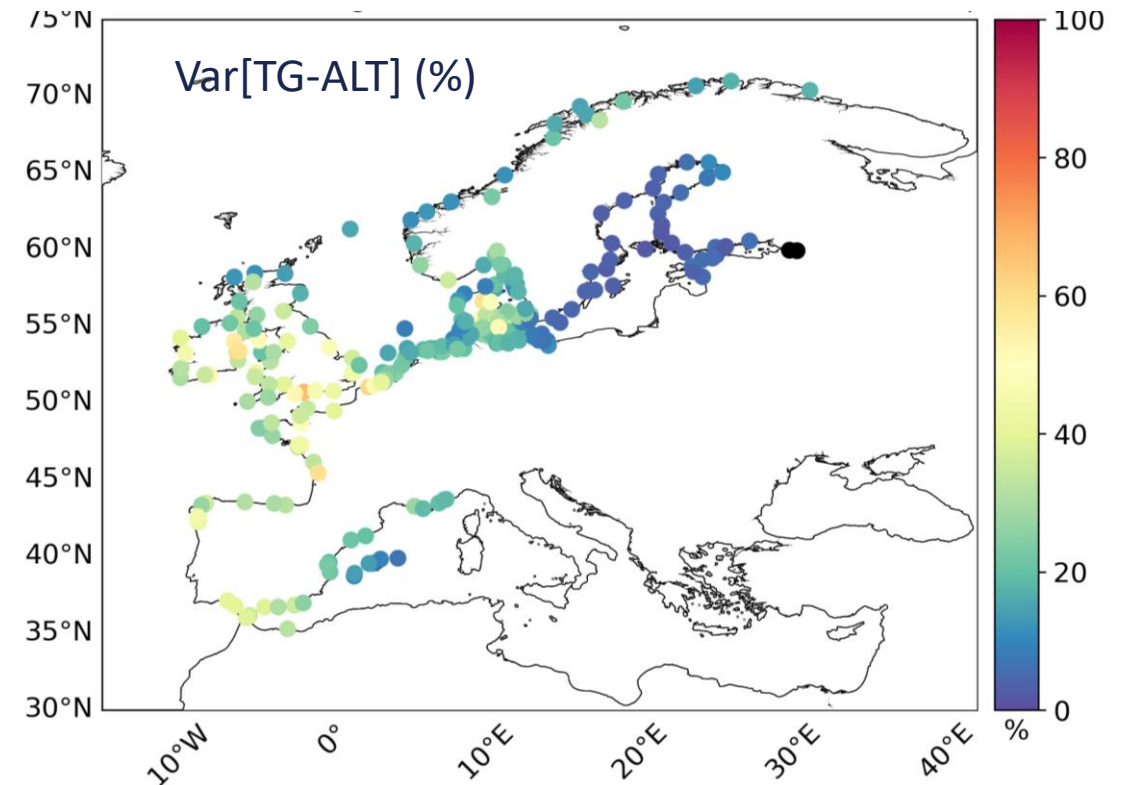




Altimetry vs Tide Gauges (1993-2020)

GLOBAL PRODUCTS	DT2021	DT2018	improv. DT2021
R	0,90	0,90	—
rmsd (cm)	4.38 (0,01)	4.48 (0,01)	2 %
var TG (cm ²)	104 (1)		
var ALT(cm ²)	92 (1)	91 (1)	
var TG-ALT (cm ²)	19 (1)	20 (1)	5 %
Distance TG	83 km	89 km	7 %
data pairs	1.464.531	1.457.377	0.5 %
nStations	266		

() uncertainties (error bars) computed from the bootstrap method using 1000 iterations



- DT2021 product with larger variance. Better results in terms of RMSD and variance diff.



Sea Level products and associated documentation are available at several :



2-Satellite Global gridded maps
Global MSL

[Climate Data Store](#)



All Satellite Global along track Sea level
All Satellite Global gridded Sea level and current
Regional products (Europe, Arctic)
Global & Regional MSL
Climatology and other Ocean Index

[Marine Service Catalogue](#)



L2p products altimetry products
Eddy Atlas
Lyapunov exponent
Experimental products

[CNES/Aviso Catalogue](#)

For more info see <https://duacs.cls.fr/>

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