RUS

Copernicus

European Commission

esa

A free expert service for EU Sentinel users

serco

NOVELTIS

ALONG-TRACK

ROMANIA

RUS - Research and User Support for Sentinel core products

ICT

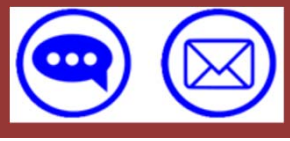
Customized processing platform

- Scalable Virtual Machines tailored to meet users needs
- Preinstalled open source software enabling fast algorithm development and prototyping
- Working environment delivered with user requested data (scripts)

SUPPORT

A comprehensive service organisation

- Common interface access through a dedicated Front Desk supported by a team of experts
- Customized technical solutions provided on request to users
- Expert advice and support for data processing and algorithm integration



TRAINING

Training & capacity building

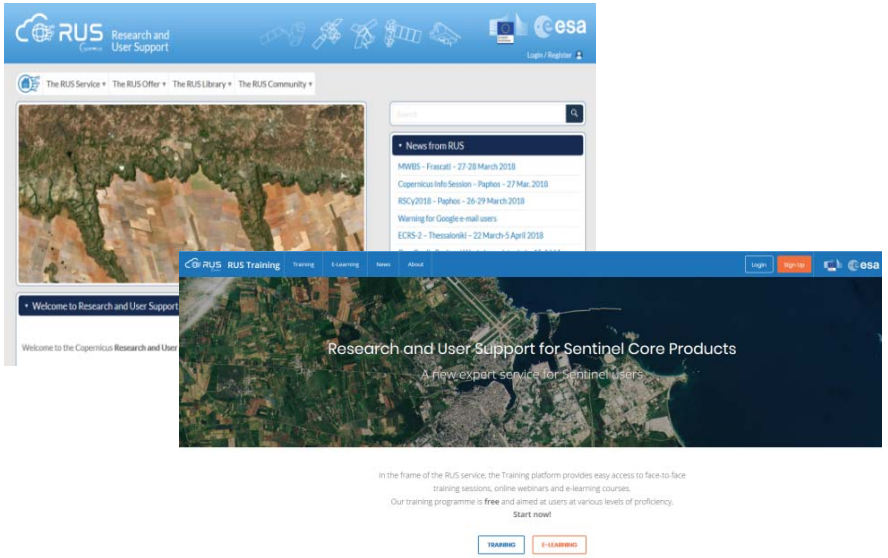
- Hands-on training sessions to handle and process data
- Monthly Webinars free and open to anyone
- Tutorials and on-line documentation
- M-Learning platform for self learning

The RUS project is funded by the EC, managed by ESA and operated by CSSI and its partners.

Join the RUS community

rus-copernicus.eu

rus-training.eu



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RUS Copernicus Training

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JPL ALTIMETRY RULER

This product is a 12" ruler, designed and developed in 2019 as a general public outreach product by JPL, in collaboration with Odysea LLC, and MooreBoeck. Its goal is to highlight how the measurement accuracy of satellite radar altimeters has improved over the decades. The ruler is in English with units in both inches and centimeters.

JPL ALTIMETRY RULER

National Aeronautics and Space Administration

SEA SURFACE HEIGHT FROM SPACE

Measuring sea surface height (SSH) from space has gotten better over history. Accurate SSH shows where ocean heat is stored and how global sea level is changing.

How? Radar altimeters! They send signals, which bounce off the ocean surface and return to the satellite. The round-trip time is related to the distance above the ocean.

1978 – Seasat
NASA's first ocean-focused satellite proved altimeters could measure SSH from space. Accuracy: 13 inches.

1985 – GEOSAT
U.S. Navy's GEOdetic SATellite measured SSH and how gravity affects the shape of the ocean's surface. SSH accuracy: 8.7 inches.

1992 – TOPEX/Poseidon
U.S.-France satellite corrected for factors that affect radar's travel time. It averaged data over a 6-mile area to remove ocean wave effects. Its orbital position was precisely known from GPS and other instruments. SSH accuracy: 1.7 inches.

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2001 – Jason Series
TOPEX/Poseidon's follow-on satellites have improved SSH accuracy to 1 inch!

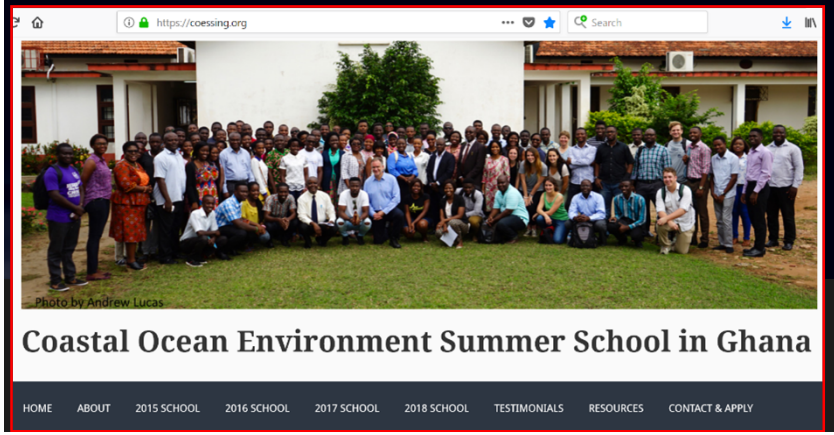
We track **global sea level change** by averaging SSH around the globe every 10 days. This reveals changes as small as 0.2 inches.

www.nasa.gov

Use of satellite oceanography data in The Coastal Ocean Environment Summer School in Ghana

Brian K. Arbic[1] and many collaborators in Ghana, France, Italy, and the US

1. University of Michigan Ann Arbor



The Coastal Ocean Environment Summer School in Ghana

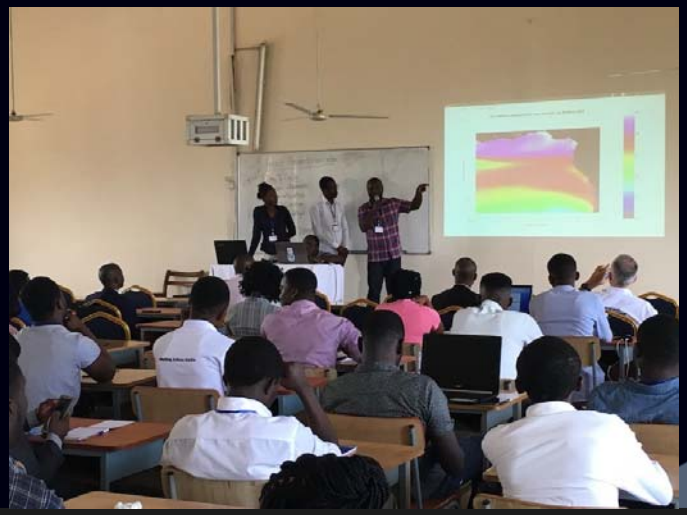
We have been running this school for one week every year since 2015.

Goal is to increase oceanographic capacity in Africa.

I gave a longer talk on this at the 2018 meeting.

Update—this year we had more participants doing research projects, including one with Dimitris Menemenlis of NASA JPL, on regional modeling using MITgcm ECCO results…the ECCO project assimilates altimeter and other oceanographic data…

The Coastal Ocean Environment Summer School in Ghana

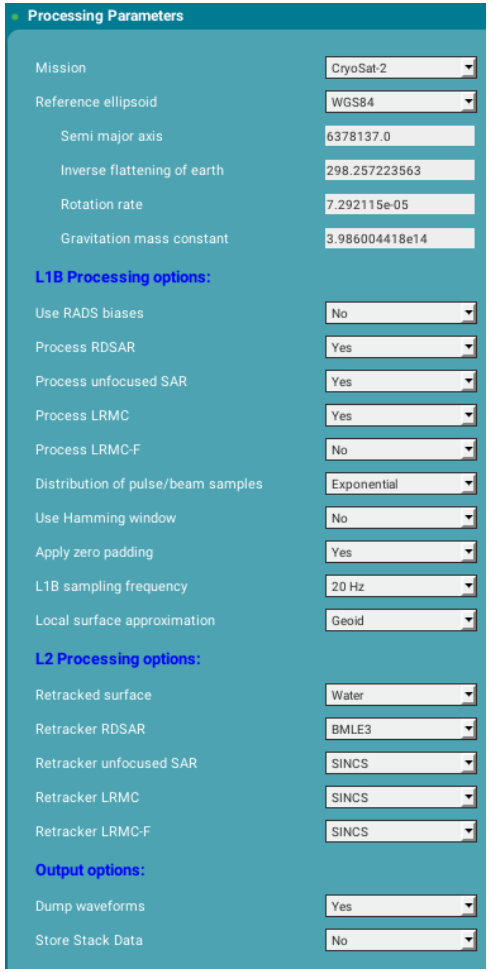


TUDaBo:
The SAR-RDSAR Processing Service on G-POD

Luciana Fenoglio, Christopher Buchhaupt
Institute of Geodesy and Geoinformation, University of Bonn

TUDaBo SAR-RDSAR software processing prototype for SAR mode L1a-> L2

Available on the ESA G-POD (Grid Processing on Demand) service



Processing parameters

Mission	CryoSat-2 Sentinel-3A Sentinel-3B	**Reference Ellipsoid**	WGS84 TOPEX GRS80

L1B proc. Options

Processing Mode	RDSAR SAR LRMC LRMC-F	**Local Surface Approximation**	Sphere Ellipsoid Slopes Geoid
Pulse Distribution	Exponential Zero Skewness Weibull	**Use Hamming**	Yes No
L1B Sampling Frequency	20 Hz 40 Hz 80 Hz	**Zero Padding**	Yes

L2 proc. Options

Retracked Surface	Water Ocean All None	**Retracker RDSAR**	BMLE3 SINC2 TALES NONE
Retracker SAR	SINCS SINCS-OV NONE	**Retracker LRMC/ LRMC-F**	SINCS SINCS-OV NONE

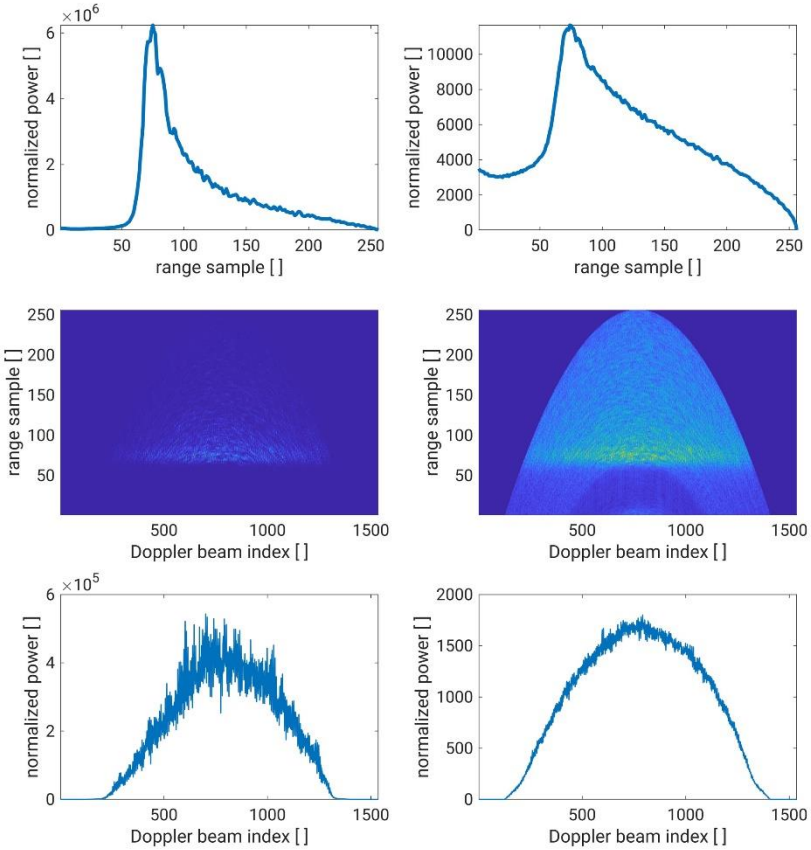
Output Options

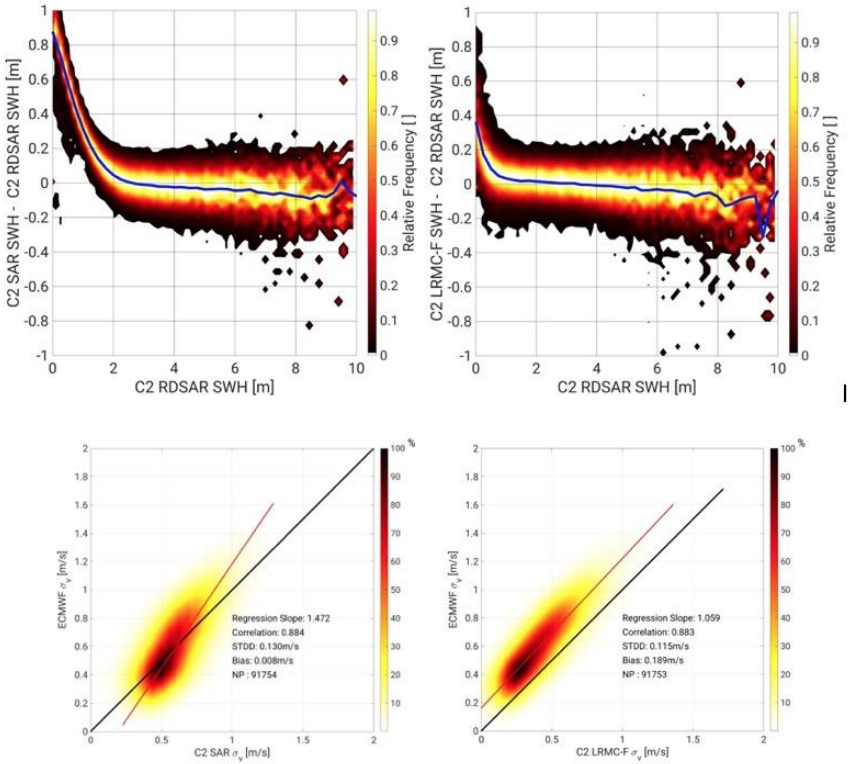
Dump waveforms	Yes No	**Dump stacks**	Yes No

Novelties:

1. VMWV (vertical motion of wave particles)
2. sample in stack → distribution ~ normal (zero skewness (ZSK))

Novelties





sample in stack → distribution ~ normal (zero skewness, ZSK)

→ The SNR improves

VMWV (vertical motion of wave particles)

SAR SINCS-OV and ZSK perform better except than for SWH < 2 m

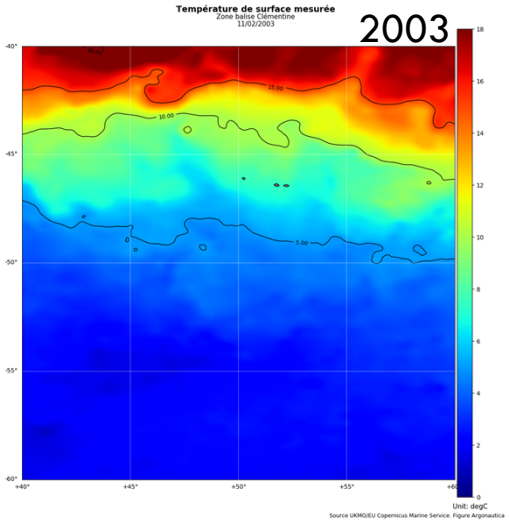
Conclusions on TUDABO

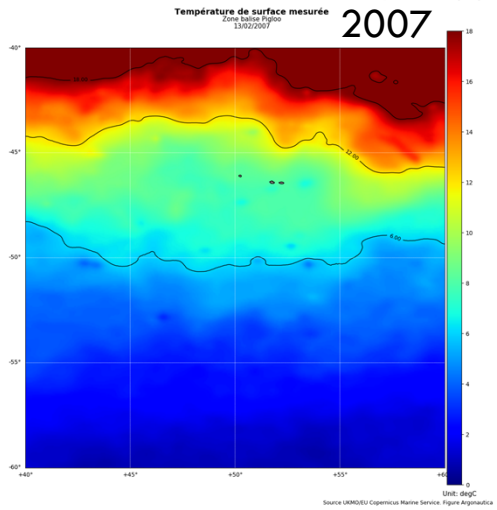
- flexible processing tool with several options
- provides RDSAR coastal product
- SAR comparable to SARvatore SAMOSA+ SAR in open ocean
- online access to S3 and CS-2 archive without need to download the input
- support by GPOD team for successive integration of versions, user authorization and generic user support

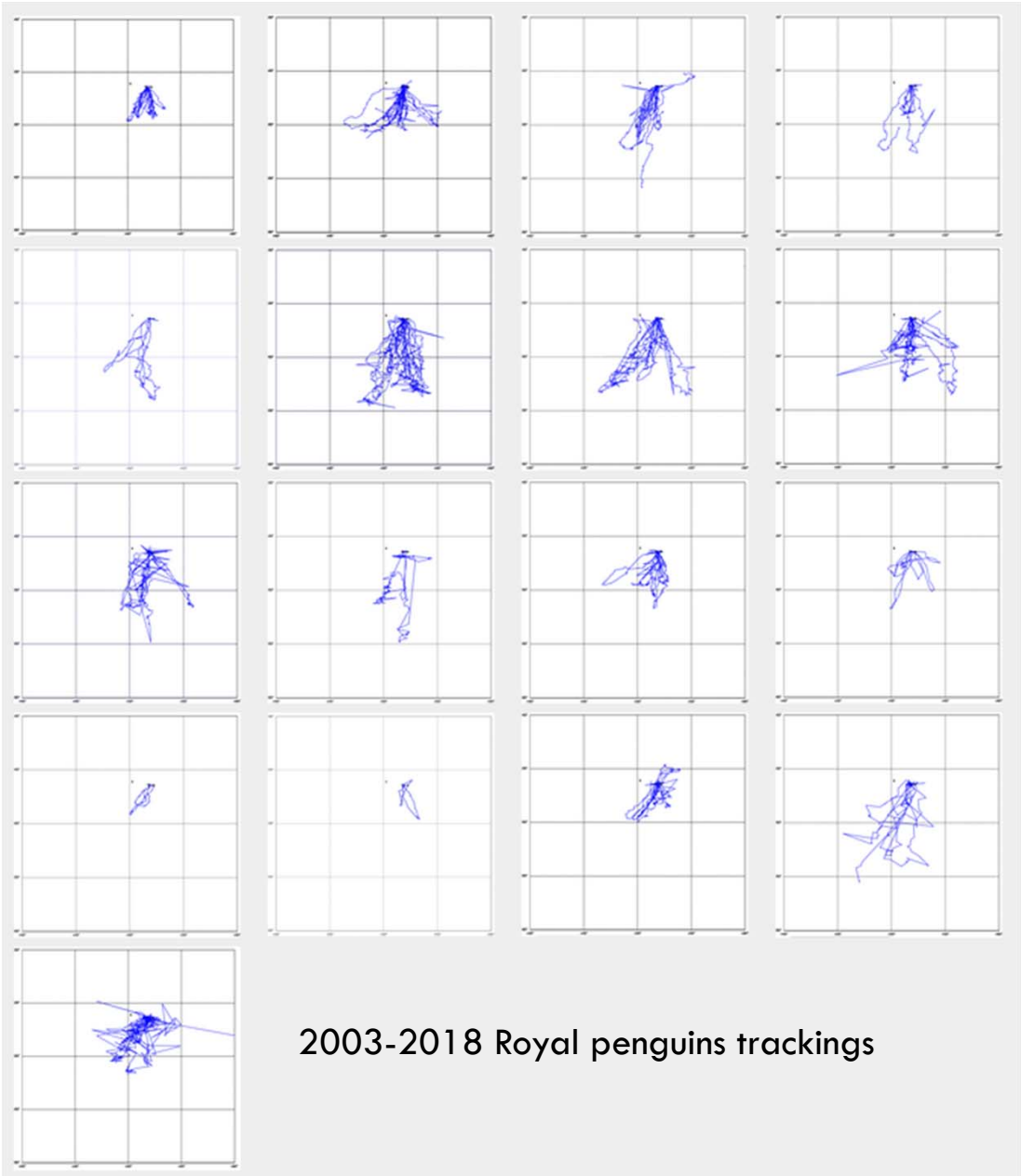
Argonautica complete reprocessing

Complete reprocessing following change of mapping code
→ using homogeneous data (no more change in ref. surface, ChlA format, etc.)
→ homogeneous plots & scales
→ beginning at the very first Argonautica operation (2002)

➔ multi-year comparisons are now possible







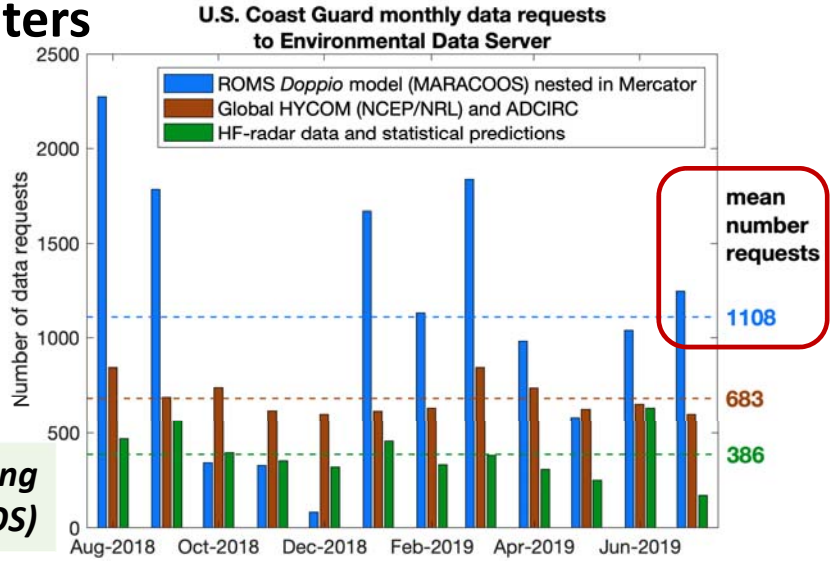
2003-2018 Royal penguins trackings

ROMS *Doppio** regional model of northeast U.S. coastal waters

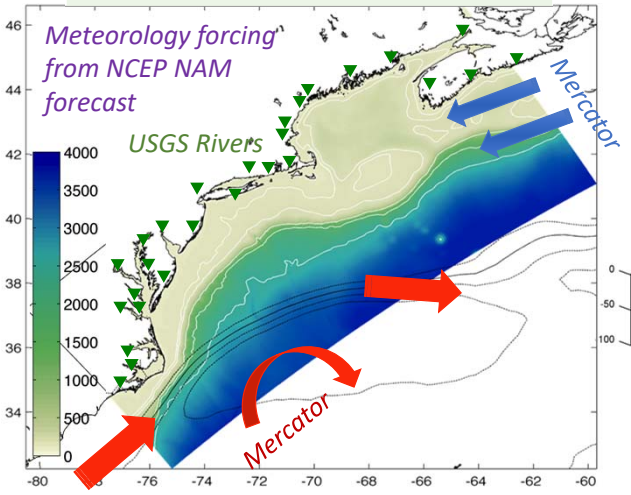
John Wilkin – Rutgers University, New Jersey, USA

- Downscales global Mercator-Océan open boundary data from Copernicus
- Adds 4D-Var data assimilation of data from **all altimeter satellites (J-3, AltiKa, Cryosat, S-3)** and regional in situ coastal ocean observing system
- Analysis runs operationally every day to initialize a 3-day forecast
- Analysis/forecast products go to U.S. Coast Guard (USCG) Search and Rescue Optimal Planning System (SAROPS) via RPS Environmental Data Server (EDS™)

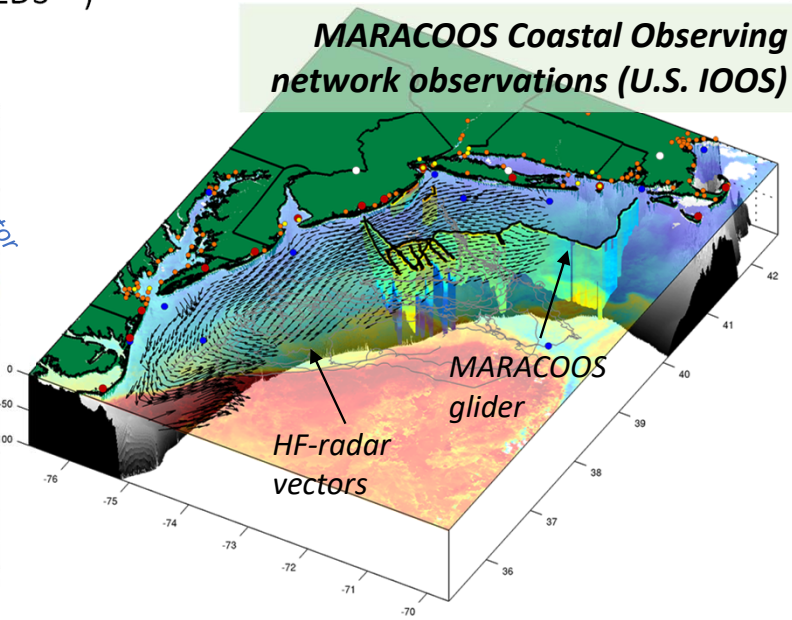
USCG District 1 (Northeast)



ROMS Doppio model domain



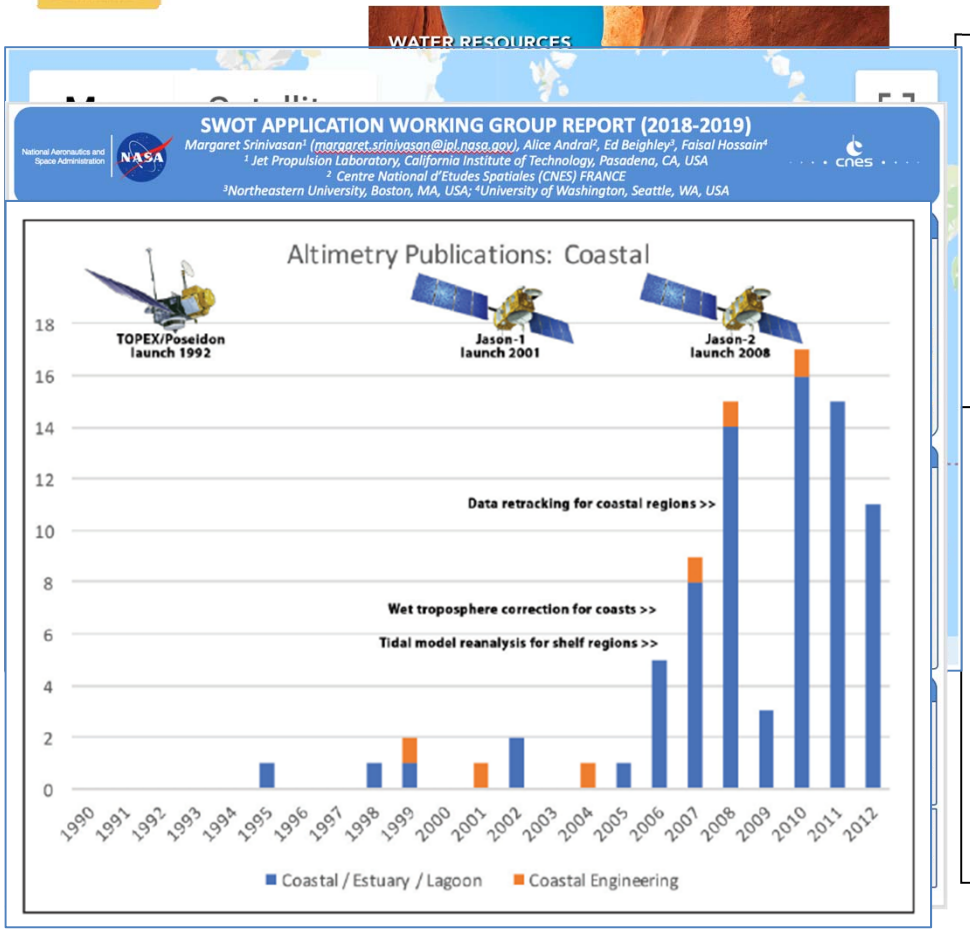
MARACOOS Coastal Observing network observations (U.S. IOOS)



For USCG Northeast District (D1) ROMS *Doppio* velocity is the surface current guidance *most downloaded by SAROPS* operators (over 1100 requests per month)

*Wilkin, J., J. Levin, A. Lopez, E. Hunter, J. Zavala-Garay, and H. Arango, (2018), A coastal ocean forecast system for the U.S. Mid-Atlantic Bight and Gulf of Maine, In: New Frontiers in Operational Oceanography, E. Chassignet, A. Pascual, J. Tintoré and J. Verron (Eds.), GODAE OceanView, 593-624, doi: 10.17125/gov2018.ch21

SWOT Applications



SWOT will support decision makers and orgs focused on science-based mitigation activities for water resources challenges. A broad range of applications may inform inland and coastal managers and marine operators of onshore and offshore conditions and currents relevant to their regions.

- NASA & CNES collaboration
- Applications workshops (x3)
- SWOT Applications Working Group-SAWG
- 15 Early Adopters to date
- Engage/expand altimetry user community
- Hydrology, oceanography, coastal user focus
- PO.DAAC collaborations

See swot.jpl.nasa.gov/applications

SWOT Applications Program highlights;

- **Joint, international applications program for NASA Applied Sciences Program**
- **International working group (SAWG)**
- **Joint/Coordinated plans, communications, & user workshops**