



Updates from other centres



**South Africa
(Jennifer Veitch)**

Sustainable Ocean Modelling Initiative: a South African Approach (SOMISANA)

Giles Fearon, Nkululeko Memela, Philile Mvula, Gustav Rautenbach, Jennifer Veitch



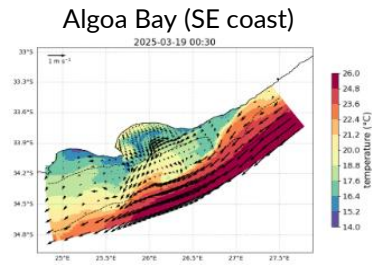
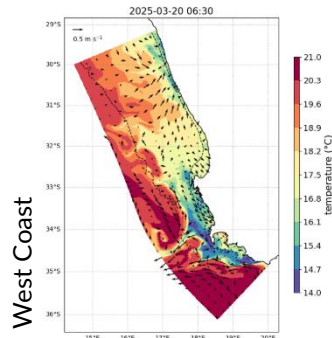
science, technology
& innovation
Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA



SAEON
South African Environmental
Observation Network

EXISTING OPERATIONAL SYSTEM

- ▶ Operational systems using **CROCO** of high-use, well-monitored and sensitive regions of the South African coastline
- ▶ 4 'members' forced with **freely available** ocean (CMEMS & Hycom) and atmospheric (GFS & South African Weather Service) forecasts.
- ▶ **NO assimilation**
- ▶ High resolution (~500m – 3 km), 5-day forecasts of sea state supports various **decision support tools for stakeholders**
- ▶ **Free and FAIR** outputs (<https://catalog.somisana.ac.za/catalog/>)
- ▶ Fully documented **workflow**, **freely available with tutorials**
- (<https://github.com/SAEON/somisana-croco>)



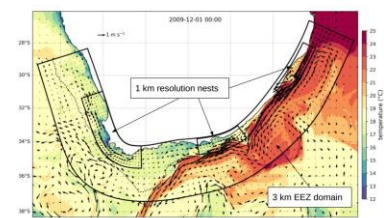
CURRENT DEVELOPMENTS

- ▶ Expansion of the domain to include South Africa's full shelf region (✓), with high resolution nests
- ▶ Coupling CROCO with WW3 (✓ for west coast)
- ▶ Assessment of Forecast Skill (✓ for west coast)
- ▶ New visualization portal underway

Visualization Portal: soon to go live!



Full SA shelf & proposed nests



WHAT's NEXT?

- ▶ Data Assimilation
- ▶ Exploring the use of additional global atmospheric and ocean boundary forcings

<https://somisana.ac.za/ja.veitch@saeon.nrf.ac.za>

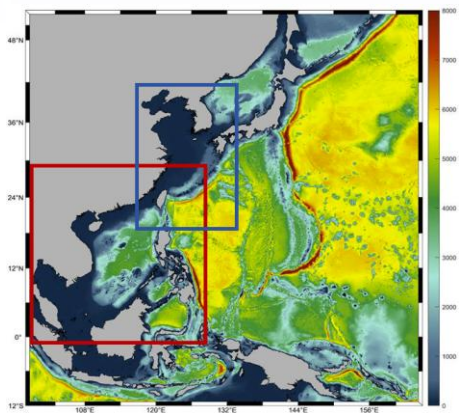


China
(Liying Wan)

update

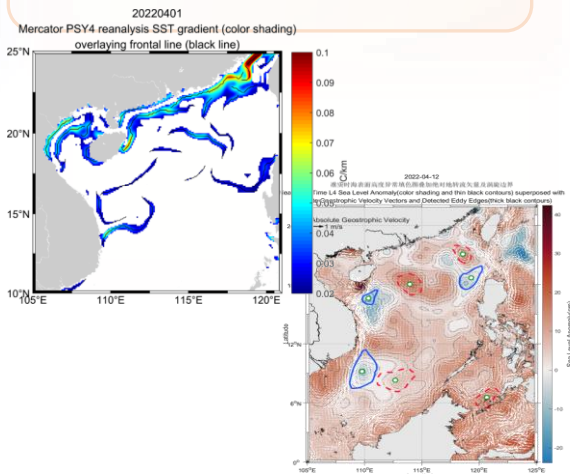
Regional Systems

Based on MaCOM v2.0 a set of regional numerical forecasting systems has been established.
Northwest Pacific system(5 km)
East China Sea system(1 km)
South China Sea system(1.5 km)



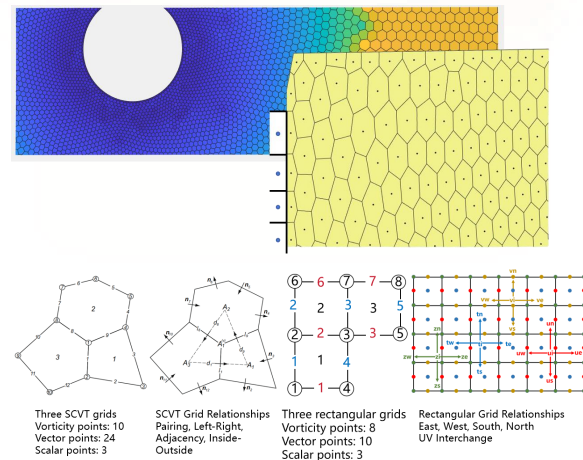
New Products

New products such as marine heatwaves, ocean fronts and mesoscale eddies have been provided.



MaCOM v2.0

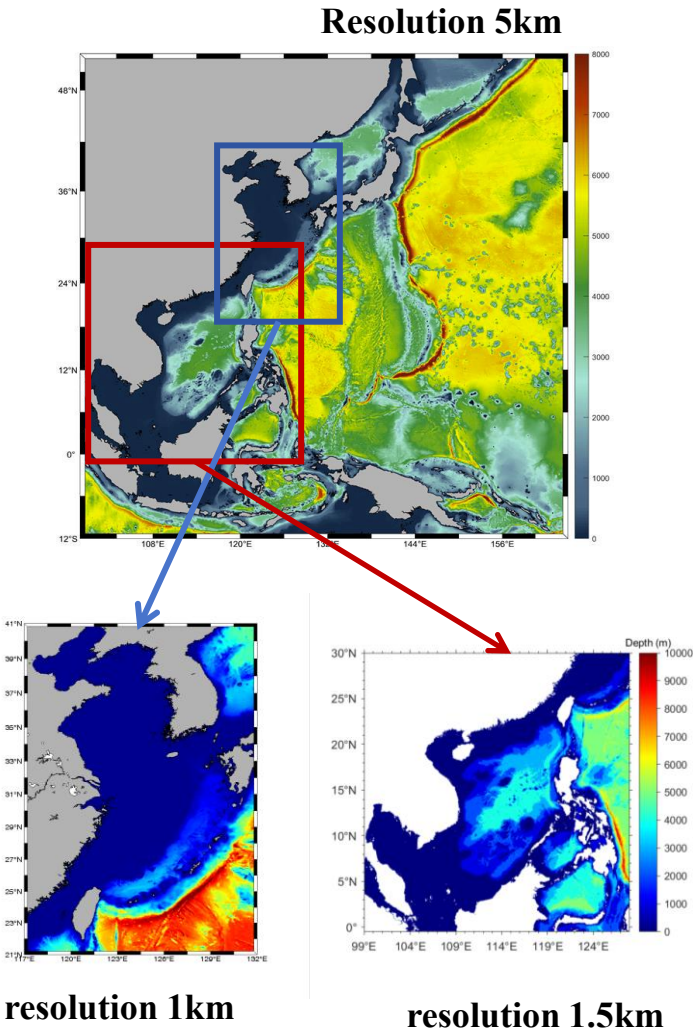
MaCOM 2.0 supports SCVT grids, enabling the development of a new global ocean prediction system with 5 km global resolution and 1 km local refinement.



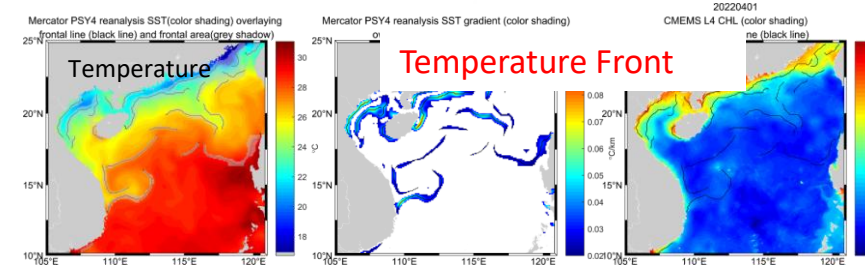
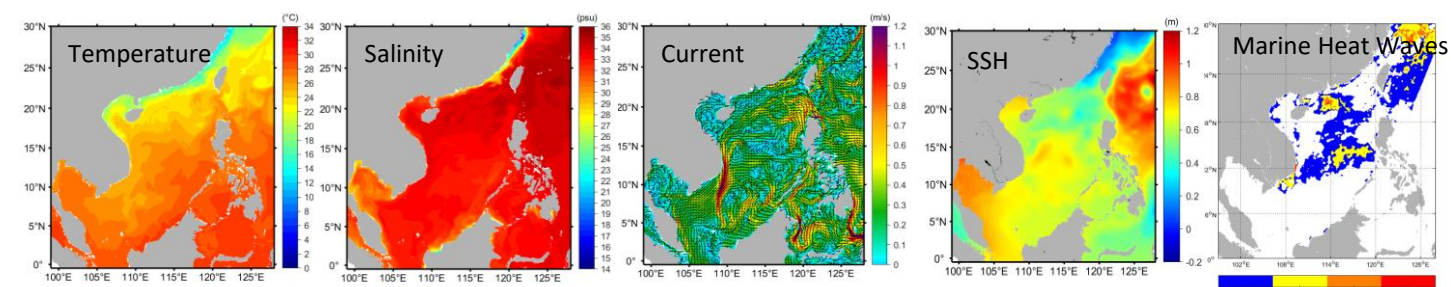
Regional systems by using MaCOM v1.0

	Northwest Pacific	South China Sea	East China Sea
Cover	98°~165°E, 12°S~52°N	99°~128°E, 0.5°S~30°N	117°~132°E, 21°N~41°N
Resolution	1/24°×1/24° 75 layers	1/72°×1/72° 75 layers	1/120°×1/120° 75 layers
Tide	12tides	12 tides	12 tides
DA	EnOI/A-4DEnVAR	EnOI	EnOI
Atmospheric Forcing	JRA55	JRA55	JRA55
	operational: GFS	operational: GFS	operational: GFS

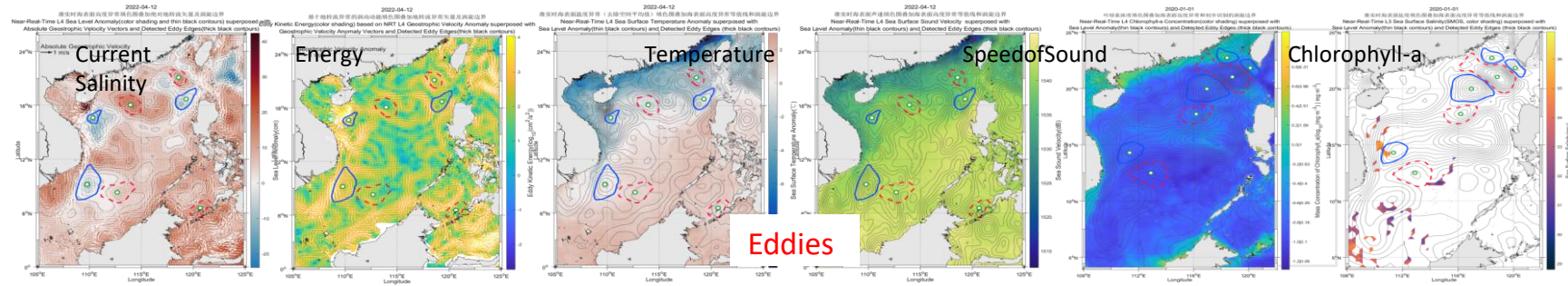
12 Tides: 'M2' 'S2' 'N2' 'K1' 'M4' 'O1' 'MN4' '2N2' 'Q1'
'P1' 'K2' 'MS4'



Example Products of South China Sea



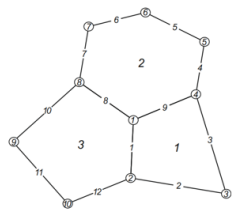
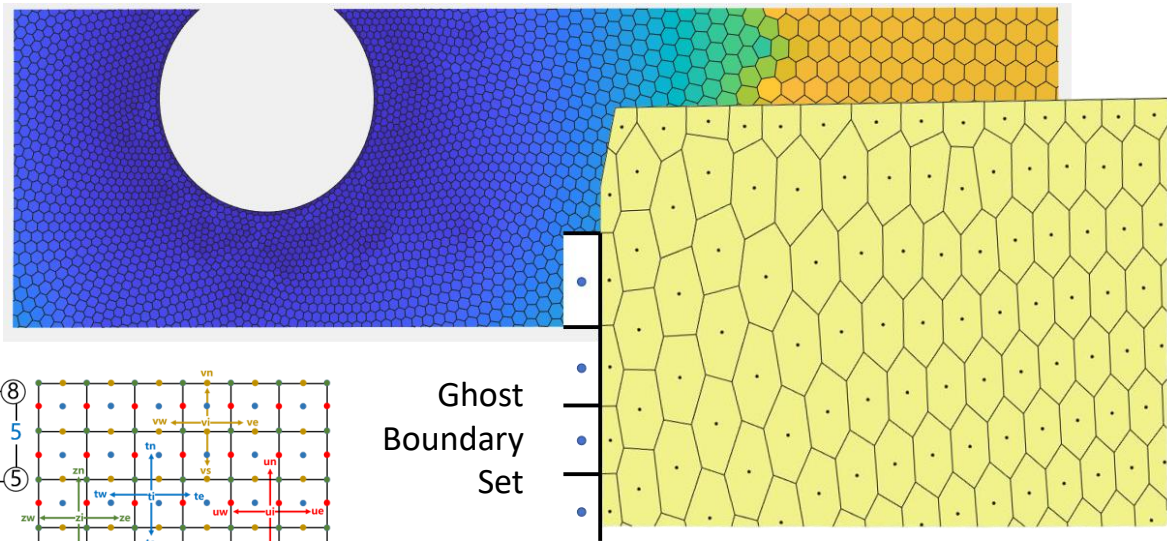
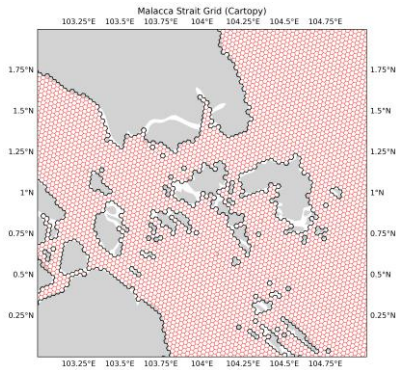
In addition to conventional forecast variables including temperature, salinity, currents and dynamic height, the regional operational ocean forecasting system has been upgraded to provide new products such as marine heatwaves, ocean fronts and mesoscale eddies.



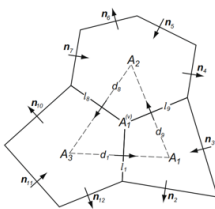
Eddies

MaCOM 2.0 Mass Conservation Ocean Model

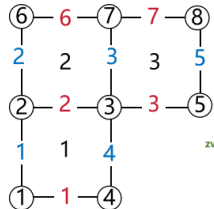
Support for SCVT mesh



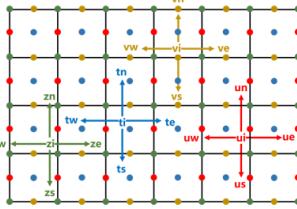
Three SCVT grids
Vorticity points: 10
Vector points: 24
Scalar points: 3



SCVT Grid Relationships



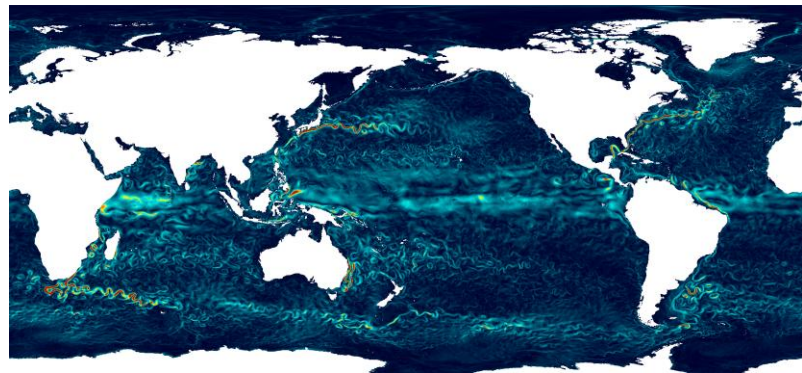
Three rectangular grids
Vorticity points: 8
Vector points: 10
Scalar points: 3



Rectangular Grid Relationships

East, West, South, North

UV Interchange



MaCOM 2.0 has added support for SCVT grids. With the flexible refinement capability of SCVT grids, a new global ocean dynamic environment numerical prediction system is under development, featuring a global horizontal resolution of 5 km and local refinement to 1 km.



Norway
(Laurent Bertino)



Danmarks
Meteorologiske
Institut

Arctic Monitoring Forecasting Center
marine.copernicus.eu

Report from TOPAZ - Norway

L. Bertino, and colleagues at NERSC, MET Norway, IMR, DMI



The TOPAZ forecasting system



Arctic Ocean Regional System

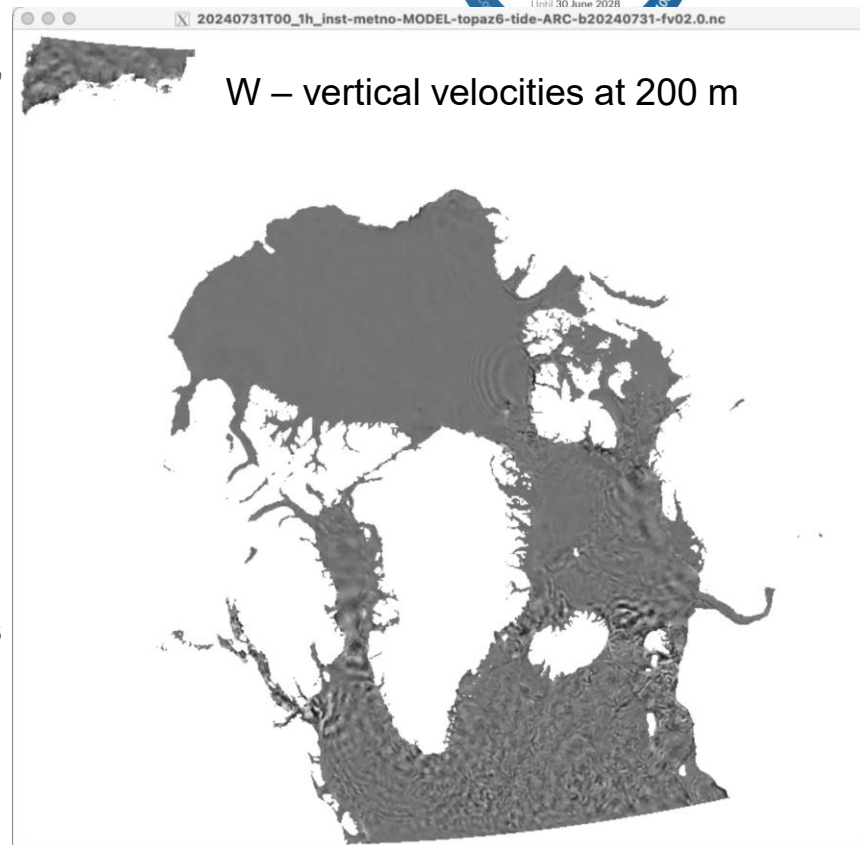
- Ocean Sea ice model HYCOM-CICE
- Biogeochemical system ECOSMO (online coupled, FABM)
- Data Assimilation: EnKF (100 members)

Recent activities (2025)

- Sea ice algae (important for zooplankton)

Upcoming in Nov. 2026

- Post-processed sea ice concentrations, Polar Code standard probabilities of exceeding 10% and 20% ice concentrations (using ML and quantile regression)
- **TOPAZ6: Double resolution (3km), 3D tides, wave-induced mixing, initiated from the TOPAZ5 EnKF. Internal tides.**
- ECOSMO: Diel migration of zooplankton
- neXtSIM: Assimilation of DMI automated ice charts (merged Sentinel-1 and AMSR).





Italy
(Emanuela Clementi)

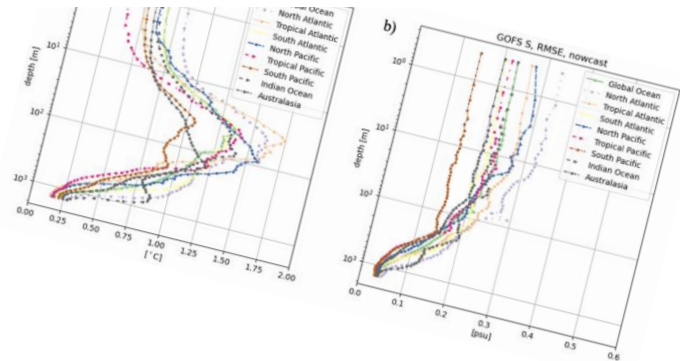
CMCC Operational Forecasting system updates

Global Ocean Forecasting System: GOFS16

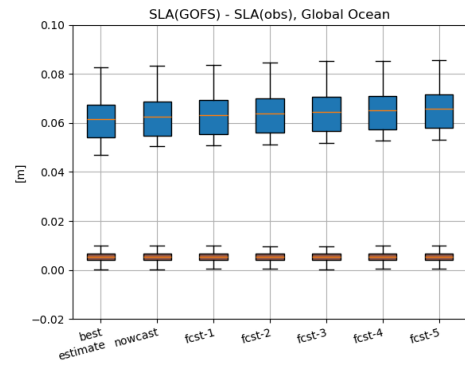
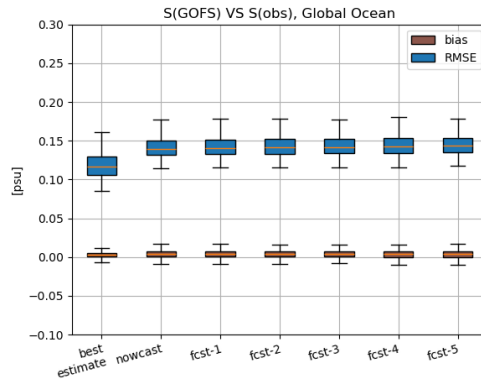
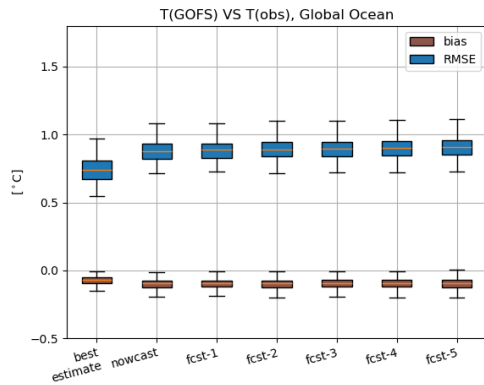
	GOFS16 (1/16 deg, 98 lev.)
Present activity on validation chain	The validation dataset is going to be entirely supported by ECCO and MOI with a new format. Our Validation system is in the updating phase (main change: from potential temperature to insitu)
Next activity	Reprocessing the full 2025 with the new format

Masina et al, submitted to GMD, open for discussion:

<https://doi.org/10.5194/egusphere-2026-887>



➤ Validation statistics for Temperature [0-1500m], Salinity [0-1500m] and SLA
No SST data available in 2025

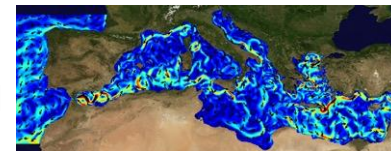


Period:
Jan-Dec
2025

CMCC Operational Forecasting system updates

Mediterranean Operational System for the Copernicus Marine Service: MedFS

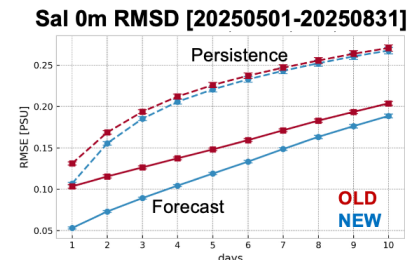
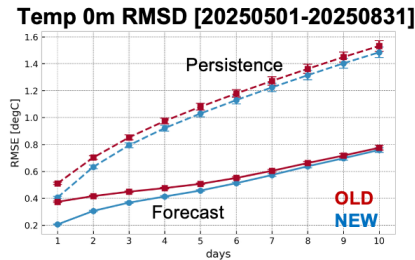
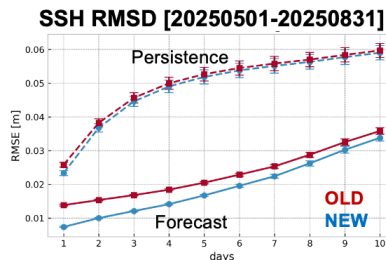
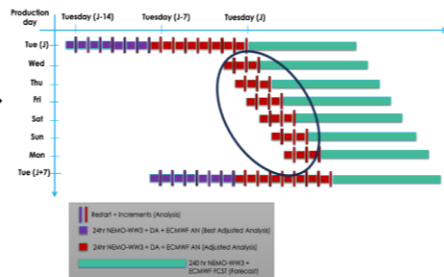
- December 2025: an upgraded Mediterranean Forecasting System became operational



	Copernicus Marine Mediterranean op. system MedFS EAS10 (1/24 deg, 141 lev. NEMO4.2 + tides + WW3)
1. Updated data assimilation	Updated Assimilation system (OceanVar2.0, Oddo et al., 2026): Assimilation of T/S ARGo, XBT, Gliders Assimilation of SLA up to 100m with barotropic model operator (before limit to 1000m with dynamic height operator)
2. Upgraded Operational Chain	Each day the forecast is initialized with an analysis run covering the previous 3 days (before only once a week)

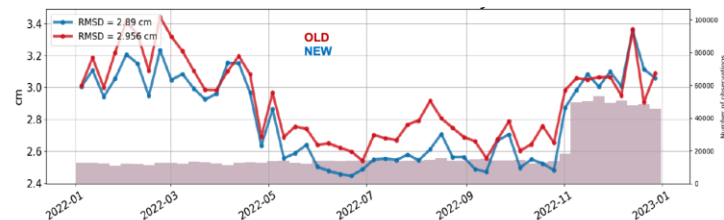
Oddo et al., 2026: Geosci. Model Dev., <https://doi.org/10.5194/gmd-19-423-2026>

2. Updated operational chain



Forecast skill of SSH (left), surface temperature (middle) and salinity (right) using the new (blue) and previous (red) operational chain.
→ Forecast Error decreases for all variables especially in the first forecast days

1. Updated Data Assimilation: Mediterranean averaged RMSD of SLA wrt satellite data



Time series of SLA RMSD with respect to satellite altimeter observations with updated data assimilation (blue) wrt previous system (red) → error decrease especially close to coasts thanks to barotropic model operator



Brazil
(Luiz Claudio)



Recent Developments achieved by the Brazilian Navy - REMO Team



- **Deep Ocean Modeling - HYCOM**
 - **Multivariate Data Assimilation**
- **Coastal Modeling – ADCIRC and Delft3D**
 - **Ports of Vitória (ES) and Suape (PE).**
- **Marine Environmental Forecast (PAM) – Web Page**
 - **Tide Tables**
 - **Notice to Marines and SAR**
 - **Weather and Sea Bulletins**





Upcoming Challenges

- **Deep Ocean Modeling - HYCOM**
 - **SWOT Data Assimilations**
- **Coastal Modeling – ADCIRC and Delft3D**
 - **Tramandaí (RS) approaches**
 - **São Marcos (MA) Bay**
 - **Port of Maceió (AL)**
- **Web-Based Oil Spill Model (CMOP)**





Thank you!