



Connecting the world around
ocean forecasting



OceanPredict Science Team (OPST) Meeting - 2024

Developments achieved by REMO-Navy Team and Challenges

Capt(Ret) Luiz Claudio



9th Annual Meeting of the OceanPredict Science Team (OPST-9) - July, 22nd 2024





SUMMARY - Developments

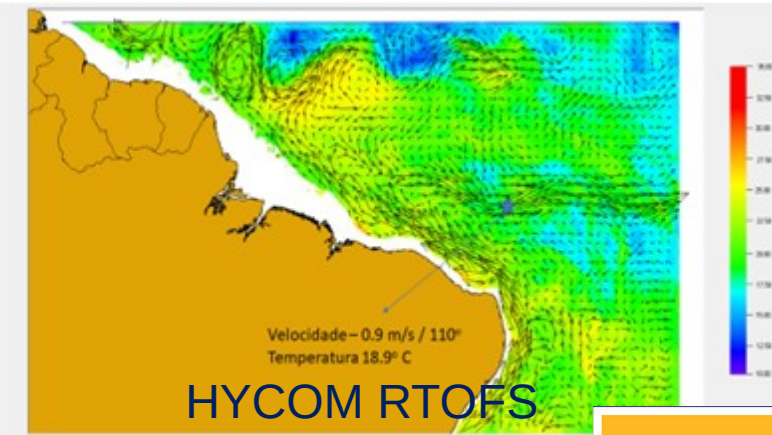
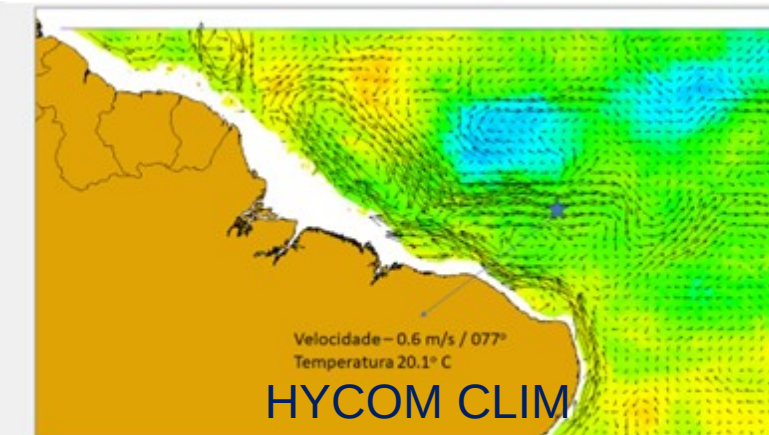
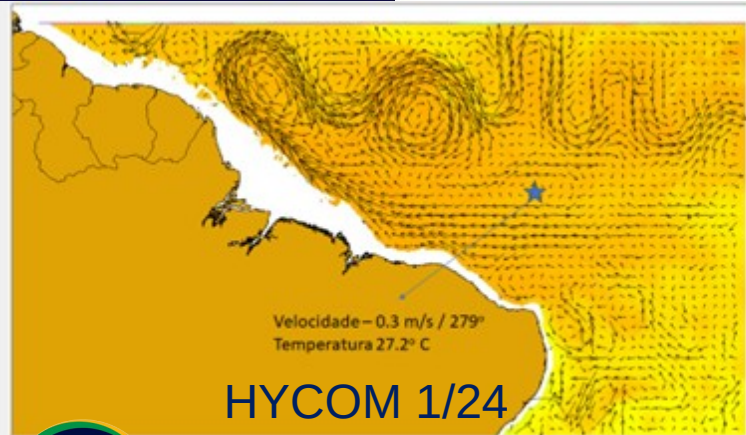
- **Deep Ocean Modeling - HYCOM**
- **Coastal Modeling – ADCIRC**
- **Wave Modeling – WW3**
- **Oil Spil Model - CMOP**
- **Marine Environmental Forecast (PAM) – Web Page**





HYCOM

- A discrepancy in our results was identified mainly in the equatorial region in which the depth of the mixed layer was larger than expected.
- Consequently, the temperature and speed presented were inconsistent.
- Two strategies were adopted:
 - 1) Reanalysis with assimilation of climatological Temperature and Salinity data.
 - 2) Remapping a model with similar characteristics with coherent results. in this case the NCEP/NOAA Real-Time Ocean Forecast System – RTOFS model.

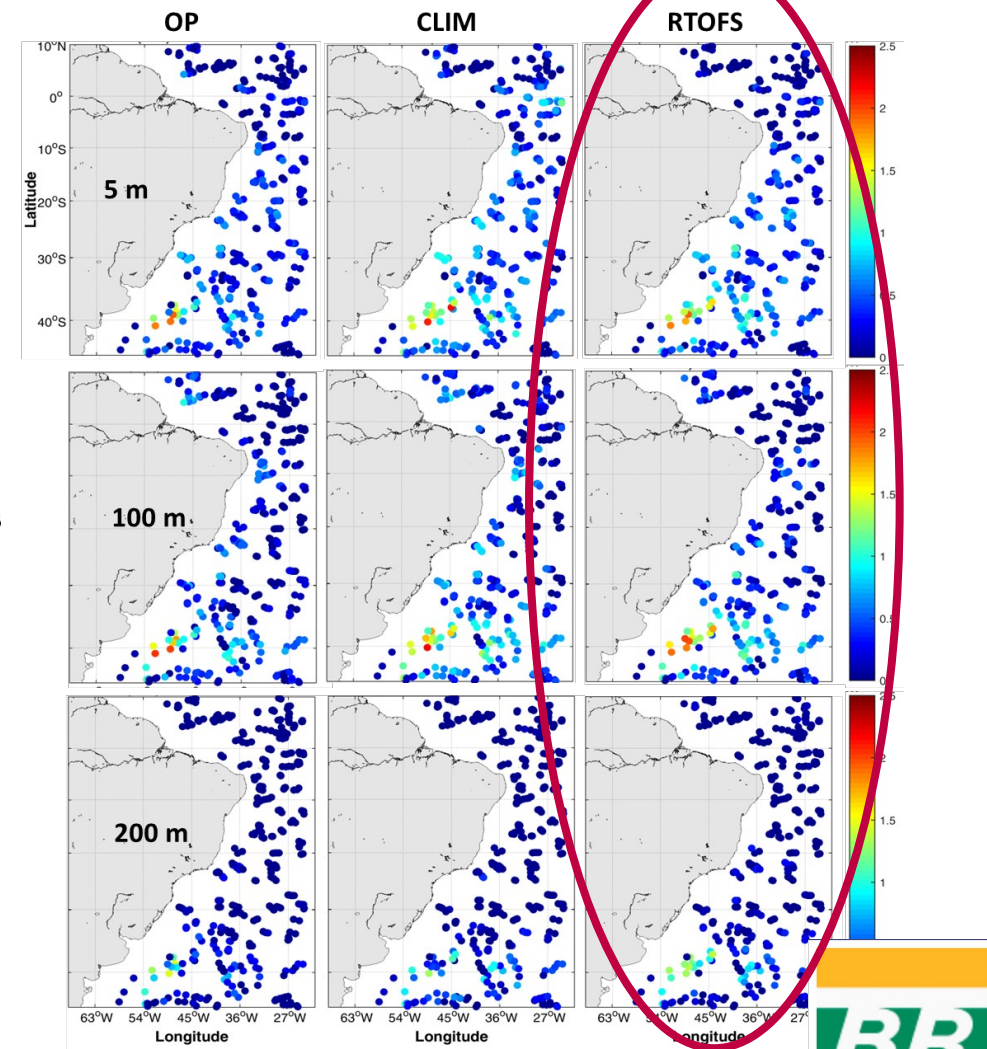
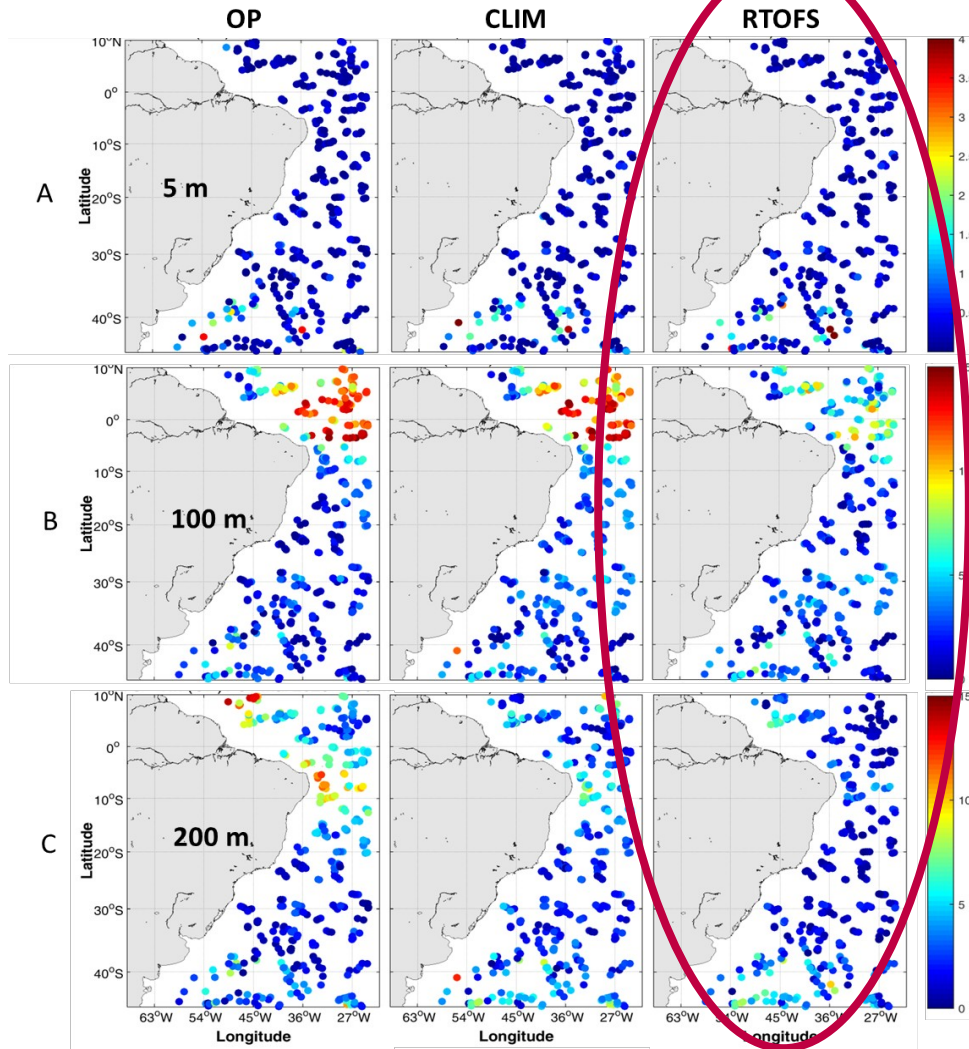




Diference Between Model x Obs

Temperatura

Salinidade

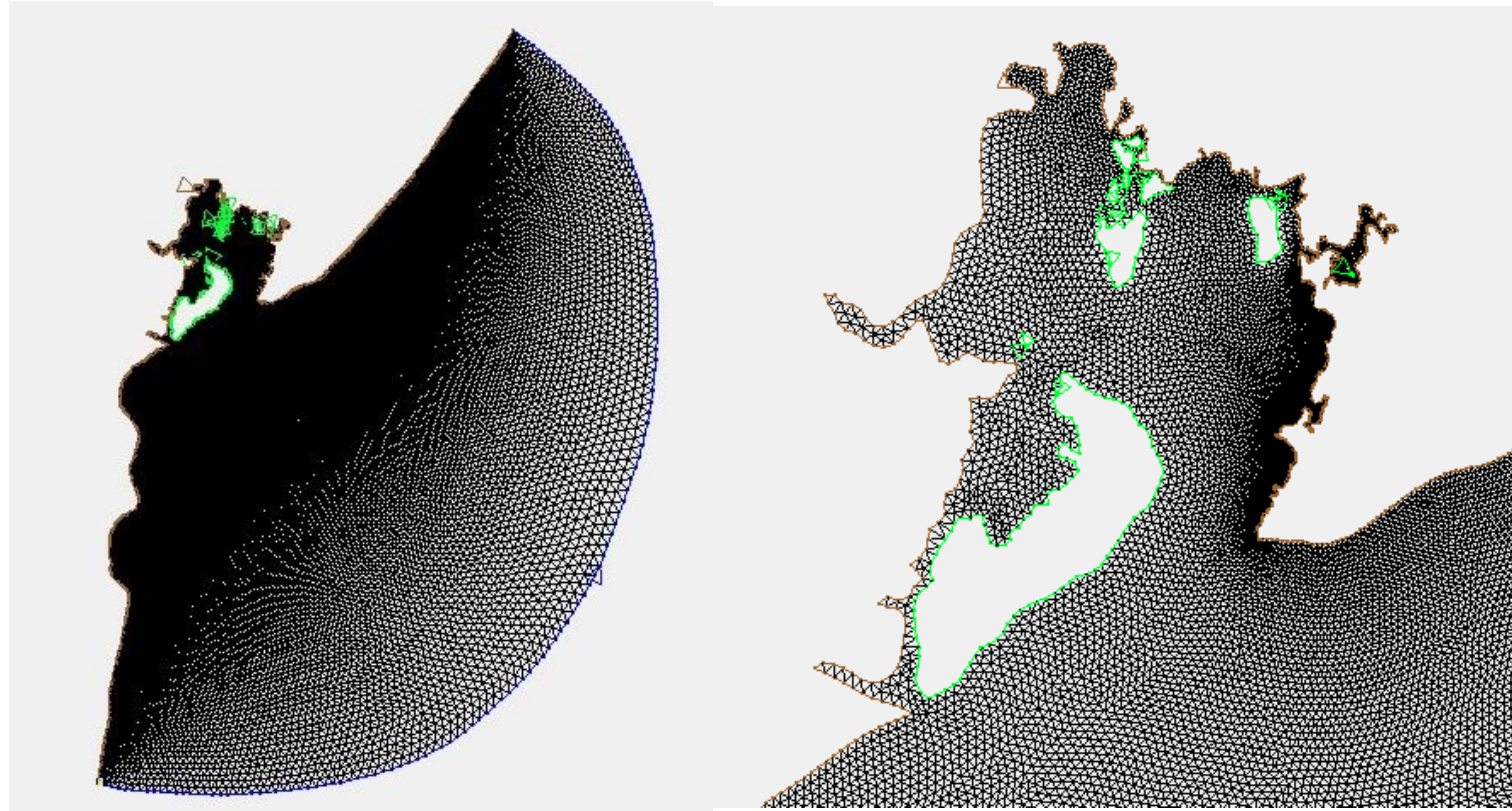




ADCIRC

- Implemented the Advanced Circulation Model (ADCIRC) on the coastal areas of Salvador and Vitória.
- Enhancing modeling capabilities in these critical regions.
- Providing more accurate and reliable coastal forecasts, supporting decision-making in these areas.

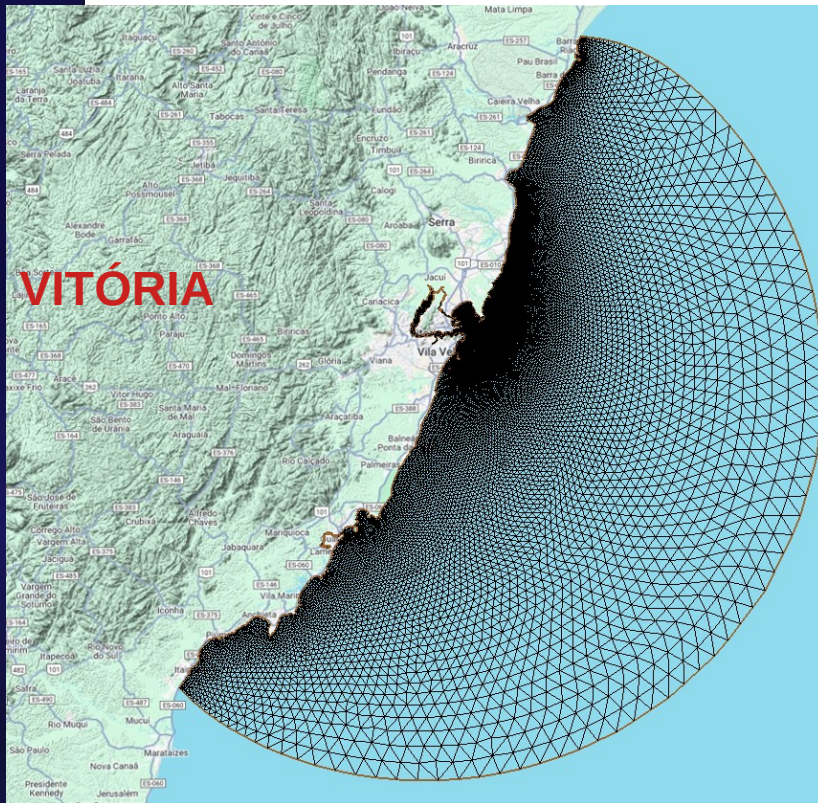
SALVADOR





ADCIRC

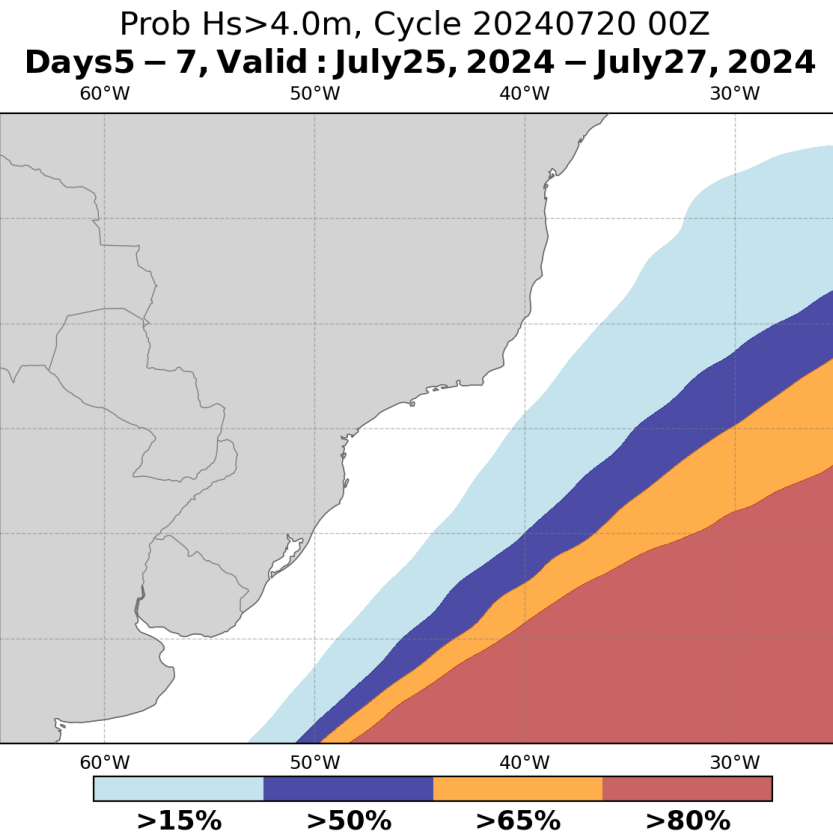
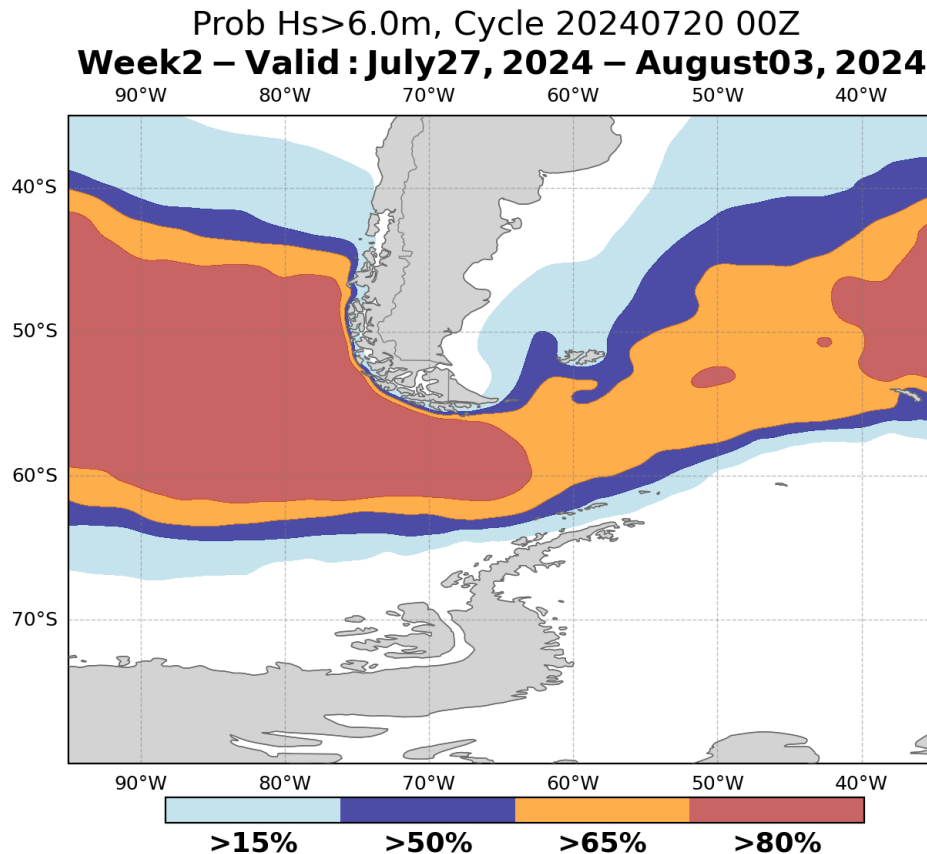
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WW3 - Probabilistic Forecasts

- Developed 5-7 and 7-14 days probabilistic forecasts, improving predictive insights. Covering Antarctica, the South Atlantic, and the North Atlantic areas.
- Leveraging the Global Ensemble Forecast System Version 12 (GEFS V12) results.





OIL SPILL MODEL - CMOP

Coupled Model for Oil spill Prediction – CMOP

- Coupling between Surface (advection / diffusion) and Subsurface (blowout) modules.
- Input data from a shape file.
- Developed a new, intuitive interface for better accessibility and usability of the oil model.

CMOP 0.1.8

DEFINE SIMULATION PARAMETERS

SIMULATION PERIOD

Start Date: 27/05/2024
Hour: 0, Minute: 0, Second: 0
Time step: [input field]
Running time in hours: [input field]
Output frequency in hours: [input field]

RELEASE INFORMATION

LAT: [input field] LON: [input field]
Volume (m³): [input field] Number of particles: [input field]
 Reverse in time
Please, turn on physical chemical processes

PROCESSES

Dissolution
 Emulsification
 Evaporation
 Entrain
 Theoretical
 Dissolved phase

SPILL AND DISPERSION

Type of oil: [dropdown menu] **Oil specs**
Horizontal dispersion coefficient: [input field]
Depth of spill (negative): [input field] Wind coefficient: [input field]
Duct width: [input field] % of water in spill (0-10): [input field]

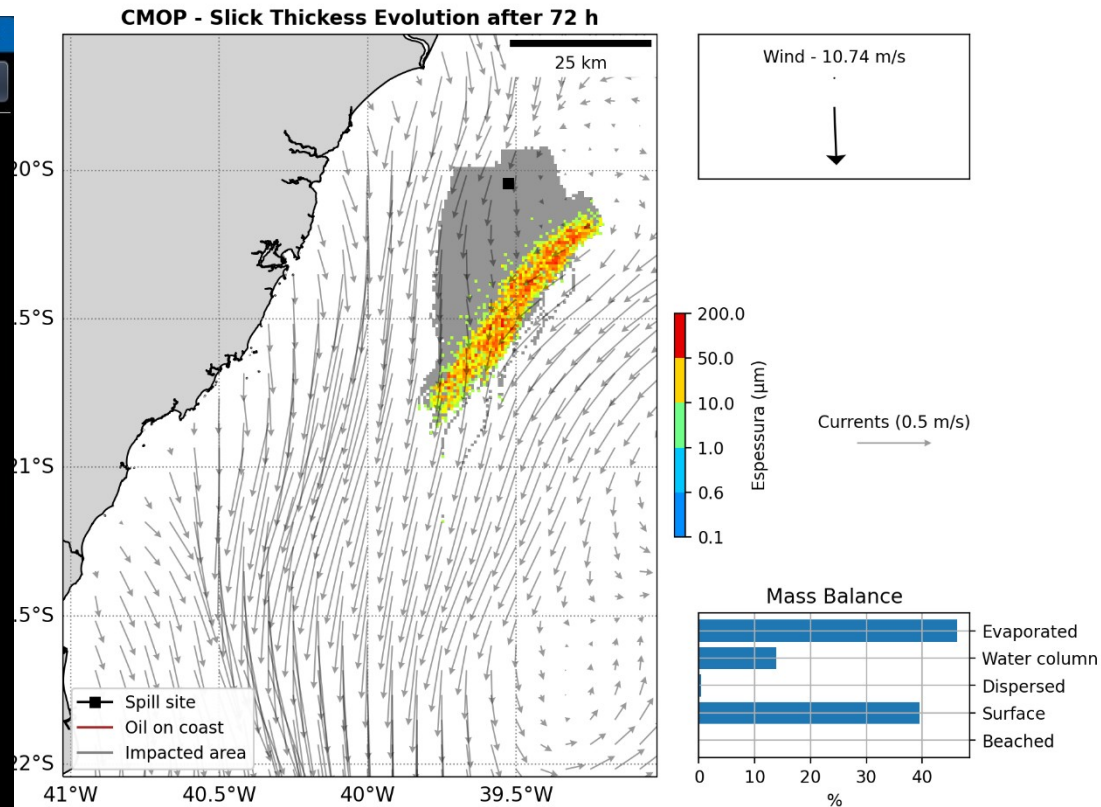
WIND THEORETICAL AND OTHER OPTIONS

Wind theoretical *Off: Read U and V from files*
UWD: [input field] VWD: [input field]
 Avel *Additional velocity of object*
Object velocity (avel): [input field] Object direction (odir): [input field]
Time finish (0 is instantaneous): [input field]

COUPLING

Coupling *Turn on/off coupling*
Load from input.dat
Save to input.dat
Inputs
View results
Start Simulation

CMOP
Coupled Model for Oil spill Prediction
Rede de Modelagem e Observação Oceanográfica



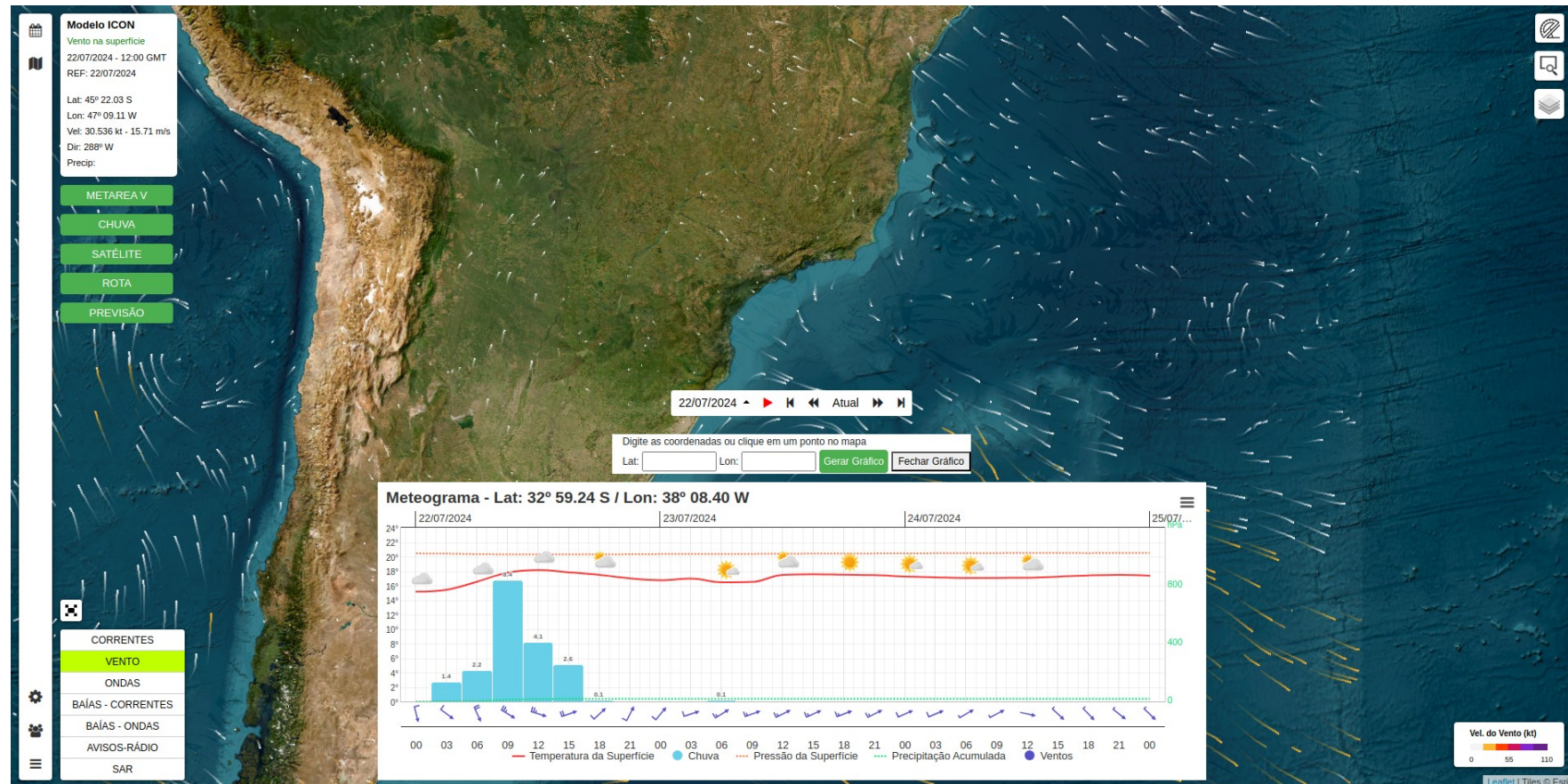


MARINE ENVIRONMENTAL FORECAST (PAM)



https://pam.dhn.mar.mil.br/index_en.html

- Developed a new, innovative meteogram presentation for enhanced visualization of marine environmental data.





Upcoming challenges

- Multivariate Data Assimilation - HYCOM.
- SWOT Data Assimilation - HYCOM.
- ADCIRC in equatorial region - Belém and Mouth of the Amazon.
- Machine Learning post processing products to increase accuracy and predictability.
- Operationalize of CMOP in a Singularity Container.
- Development of new visualization products to PAM.





THANK YOU !!!



“There will always be a lot left to do...”

Capt(Ret) Luiz Claudio
luiz.claudio@marinha.mil.br

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