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Development of a Wave Forecasting System for Uruguay

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Uruguay's Coastline

- 672 km total:
 - 452 km Río de la Plata
 - 220 km Atlantic Ocean
- ~70% of population lives in coastal region
- Economy strongly linked to ports & beach tourism



Colonia Del Sacramento.



Atlántida.



Montevideo.



Piriápolis.



Punta del Este.



La Paloma.



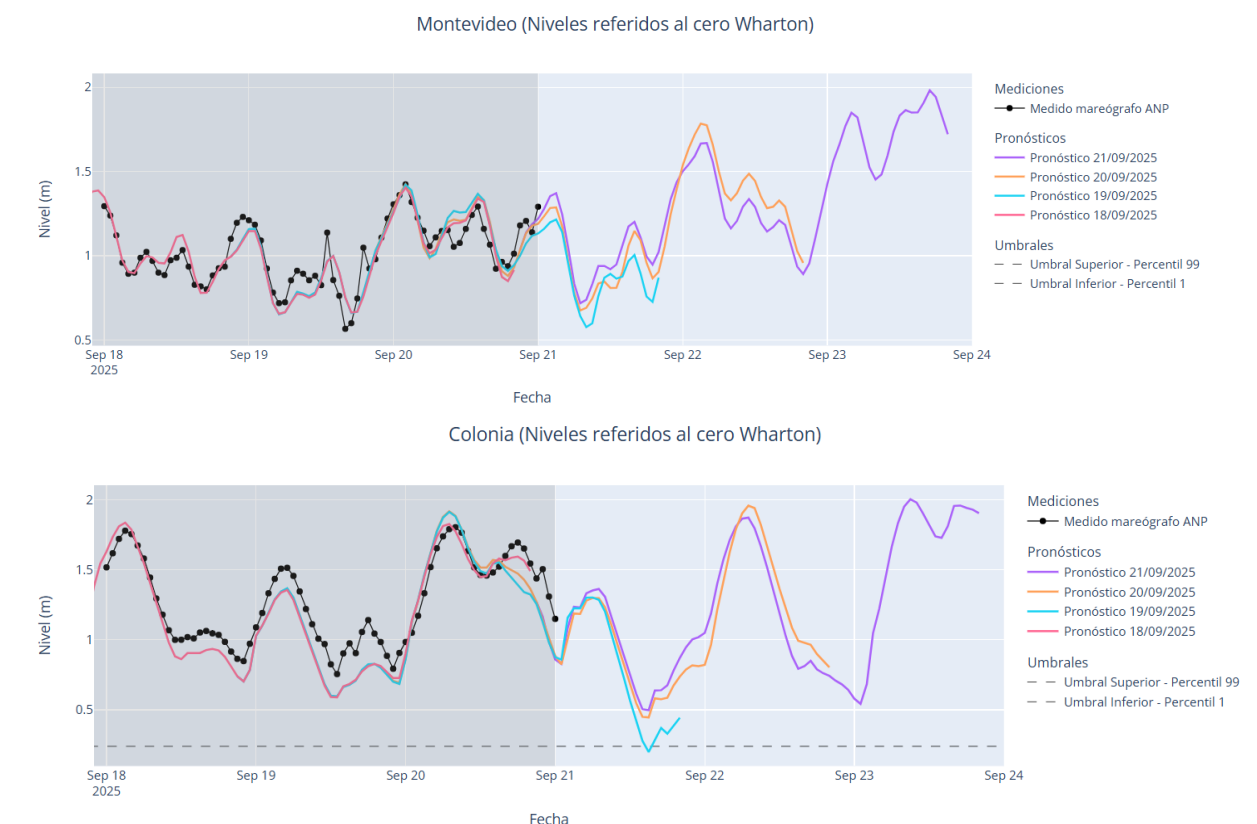
PronUy_RPFM

Integrated computational platform supporting coastal management and risk assessment



- Operative forecasts: water levels & currents (Fossati et al., 2022)
- Expanding to include:
 - Wave forecasting (WAVEWATCH III model)
 - Temperature & salinity forecasting (MOHID model)

This work focuses on the wave module implementation



Model

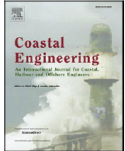
WAVEWATCH III® v7.14

- Starting point: Hindcast (Alonso & Solari, 2020)
 - ST4, DIA, JONSWAP
- Spectrum:
 - Freq 25: 0,04118Hz - 0,40561Hz
 - Dir 36: 10°

Name	Resolution	Longitude range	Latitude range	No. of points
South Atl.	0.50° x 0.50°	70.0° W - 20.0° E	79.0° S - 10.0° N	181 x 179
Regional	10' x 10'	66.0° W - 42.0° W	42.0° S - 22.0° S	145 x 121
Local	2' x 2'	59.0° W - 51.5° W	36.5° S - 33.5° S	226 x 91
Costal	40" x 40"	59.0° W - 51.5° W	36.5° S - 33.5° S	676 x 271



Contents lists available at [ScienceDirect](#)
Coastal Engineering
journal homepage: <http://www.elsevier.com/locate/coastaleng>



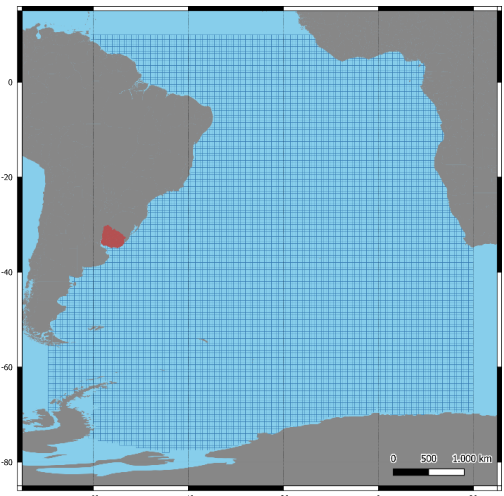


Improvement of the high-resolution wave hindcast of the Uruguayan waters focusing on the Río de la Plata Estuary

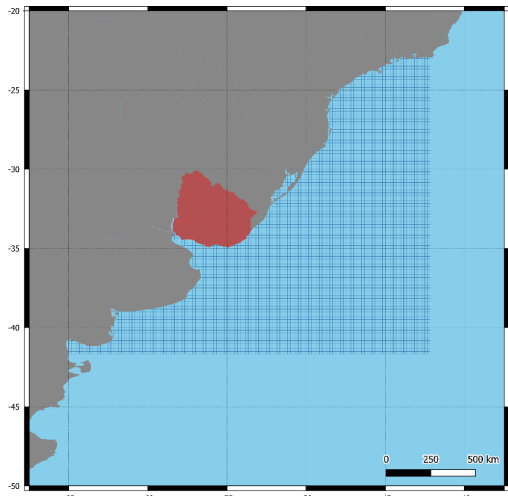
Rodrigo Alonso*, Sebastián Solari

Universidad de la República, Facultad de Ingeniería Instituto de Mecánica de los Fluidos e Ingeniería Ambiental, Julio Herrera y Reissig 565, CP 11300, Montevideo, Uruguay

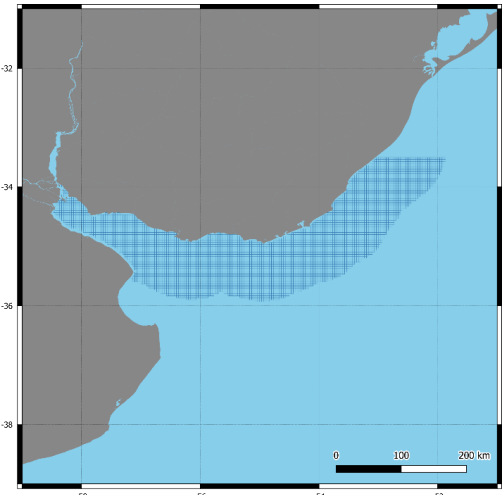
South Atlantic



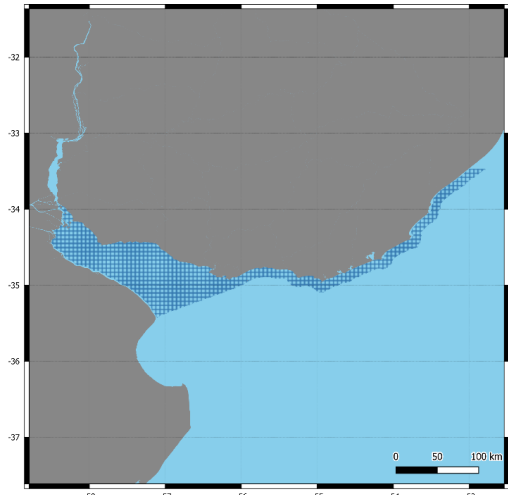
Regional



Local



Coastal

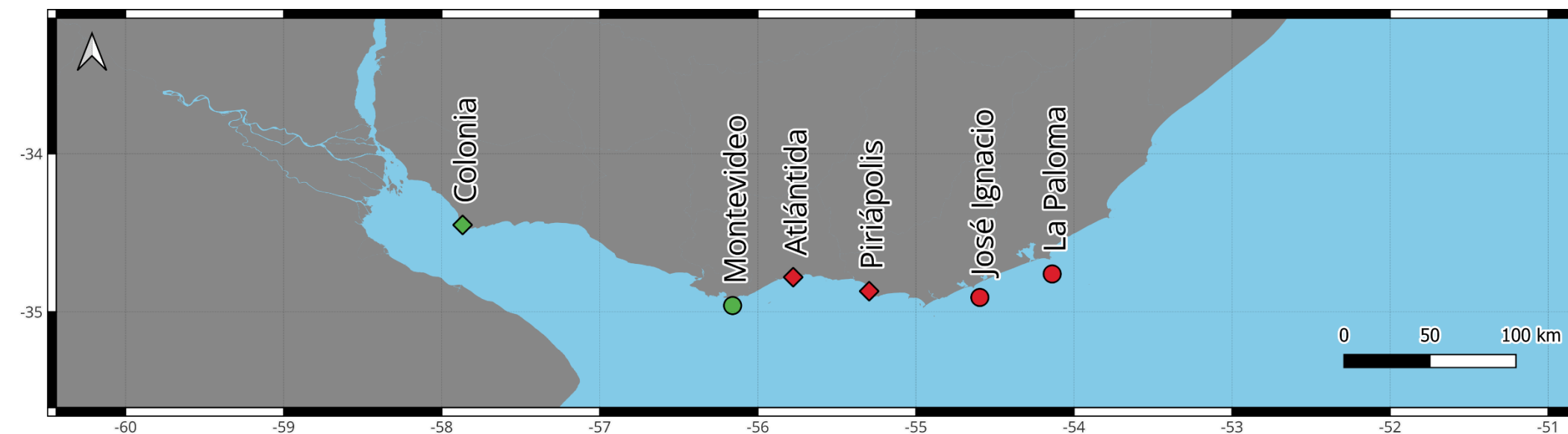


Model Modifications

- Interaction with PronUy_RPFM
- Improve performance
 - Specially for specific sites and extreme events to support EWS for coastal flooding and erosion
- Reduce computational time

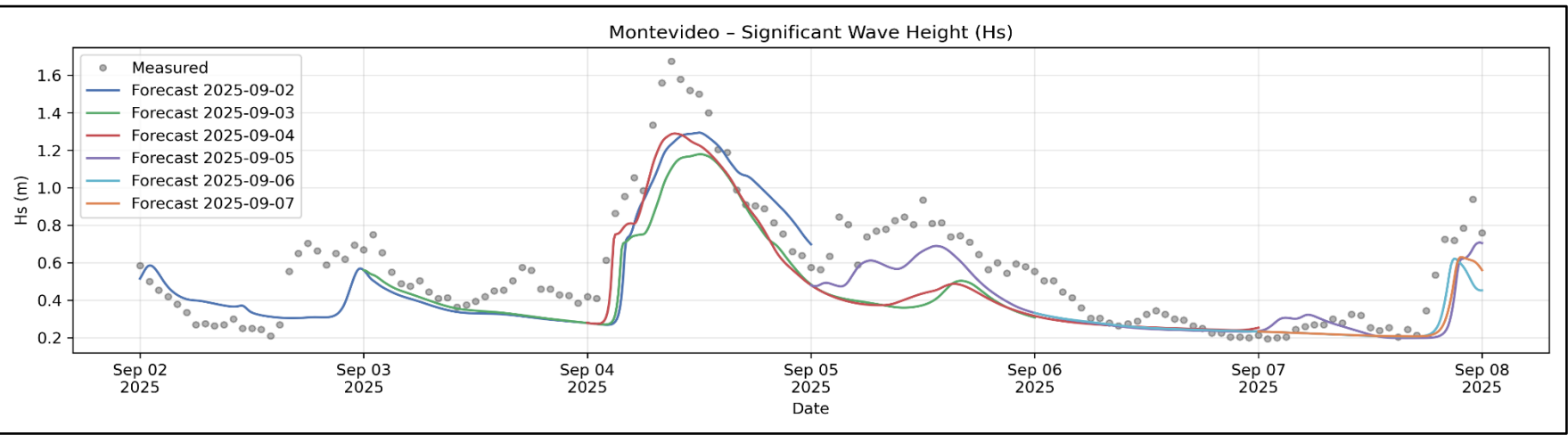
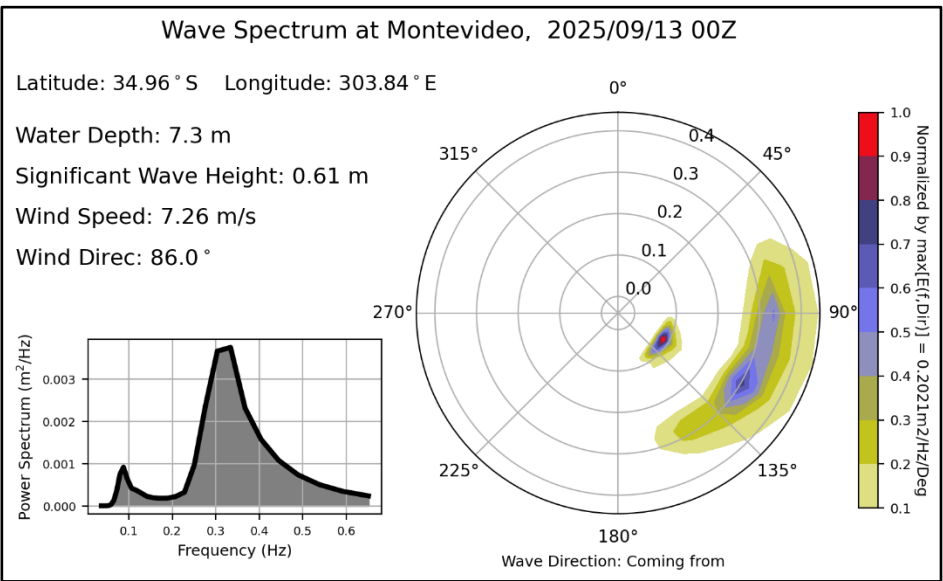
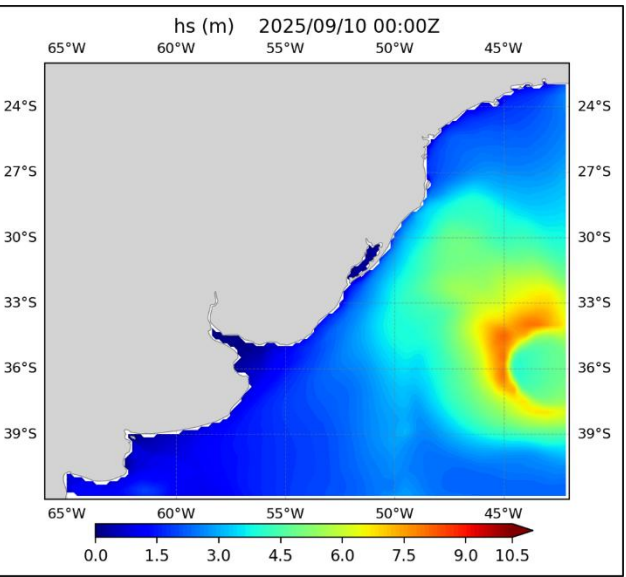
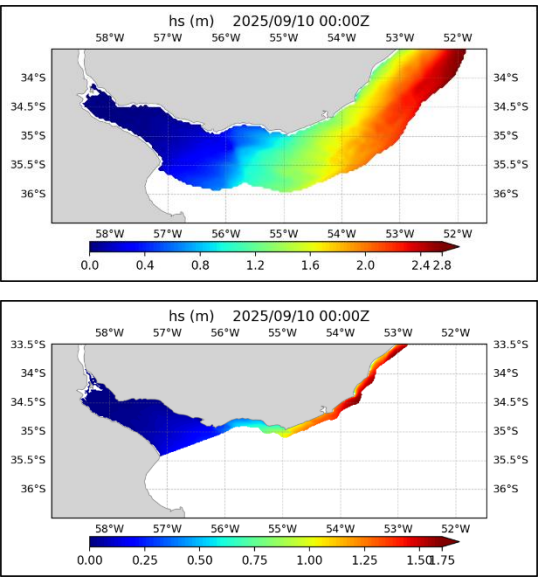
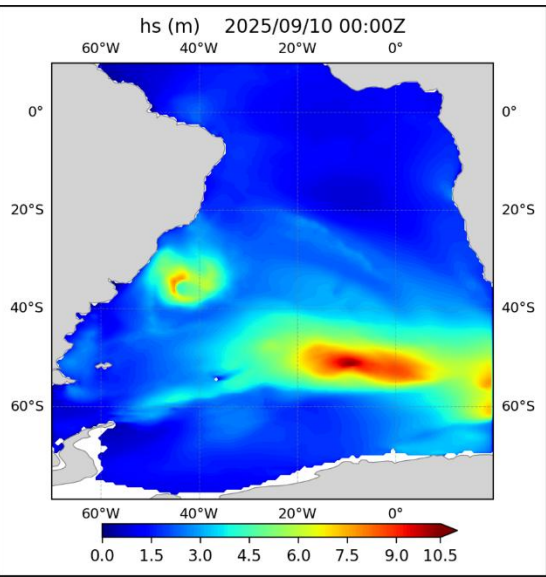
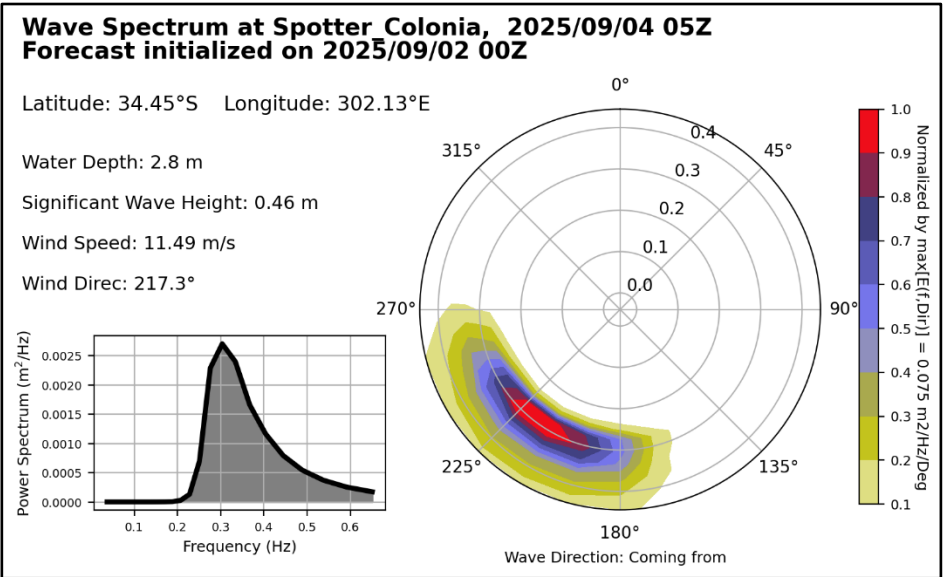
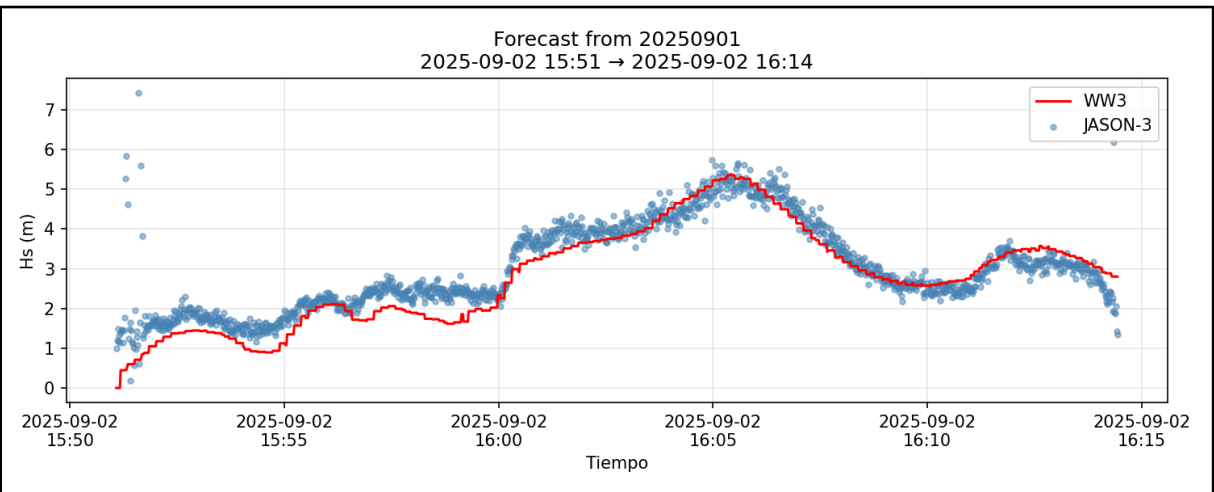
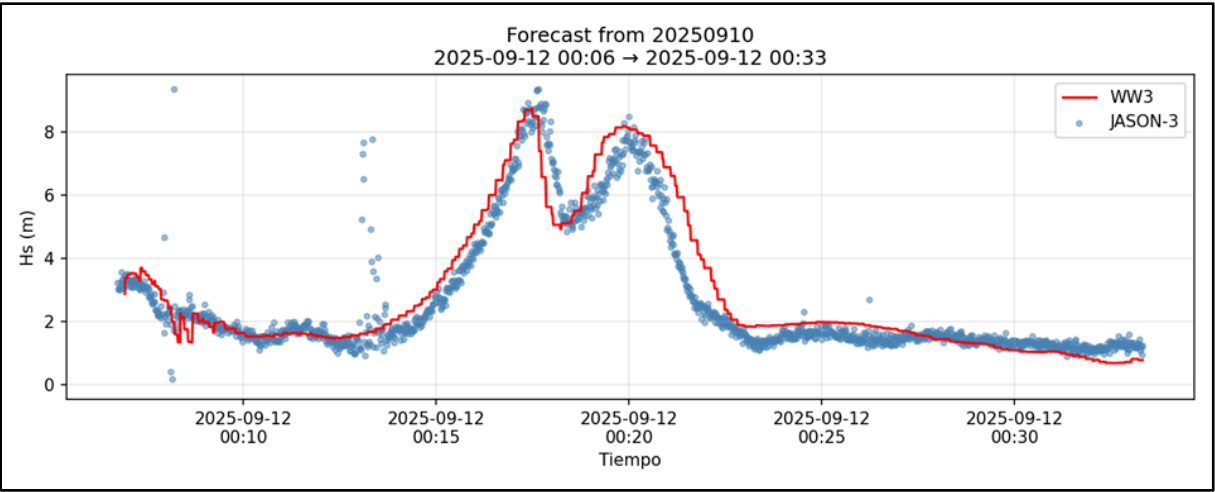
Database

- Forcing
 - NOAA GFS .25° Winds – Atmospheric forcing
 - PronUy_RPFM water levels - Oceanic forcing - **To be incorporated**
 - PronUy_RPFM currents - Oceanic forcing - **To be incorporated**
- Calibration, validation and forecast evaluation
 - Coastal Buoys (ground truth)
 - Altimeter Satellites (ground truth)
 - Global forecast (for comparison)



Results

- Directional Spectra
- Gridded Fields
- Point Time Series





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Thanks

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