Alterations in the thermo-haline structure and hydrodynamical circulation within the deltaic regions and continental platforms adjacent to the San Francisco and Parnaiba rivers (NE Brazil) due to the effects of global climate changes

Introduction: Study Regions & Motivation
- Large river, delta-front estuaries are key interfaces between continents and the oceans: the Sao Francisco & Parnaiba rivers;
- Their deltaic cliniforms are source of underestimated info on environmental changes= precious proxies!
- Focus on the hydro- and T-S dynamics of two major NE rivers to investigate modifications affecting the Brazilian Tropical Atlantic.

Scientific Questions:
- Identify & Analyse the variability scales of the physical properties;
- Qualify & quantify their seasonal and interannual cycles.

Methodology
THE MODEL: run realistic numerical simulations of the ocean circulation in the Western Tropical Atlantic, using the Regional Ocean Model System (ROMS, see ‘Schectepkin & McWilliams, 2005’). 2 main setups (with tide & without):
- i. 1/12º with 50z, having climatologies for forcings, lateral & initial conditions;
- ii. 2-way nested configuration, parent grid at 1/12º & 2 child domains at 1/36º.

OUTPUT VALIDATION: against satellite products (SMOS, TropFlux, AVISO, OSCAR... model data-obs)

Preliminary Results
- Mean Salinity Transports’ Times Series
- Tidal solution shows higher values for both deltas, being generally positive for the Sao Francisco and negative for the Parnaiba

Next Steps
- Interannual run of the whole South-Atlantic, with realistic forcings, & boundary conditions from future projections (2050 and 2100) of the Coupled Model Inter-comparison Project 6
- Lagrangian offline tool for the tracking of microplastics within the estuaries

Conclusions
- ROMS= a reliable numerical tool to reproduce coastal-estuarine processes and their thermo-haline distribution;
- Short spatio-temporal scales of variability characterise circulation patterns, hydrodynamics and T-S structure offshore the two estuaries;
- Hints of subsurface-intensified eddies of both signs within the study areas;
- Across the shelf, off the deltas, strong turbulence at the surface & at depth: impact of the plumes + NBC rings?

References