Ocean Model Development, Data-driven Parameterizations, and Machine Learning in Ocean Models of the Earth System

A Joint CLIVAR Ocean Model Development Panel and COMMODORE Workshop

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Assessing the performances of a high resolution configuration (convection-permitting in the atmosphere/non-hydrostatic in the ocean) of the Regional Earth System Model RegCM-ES over the northern Italy (Northern Mediterranean region)

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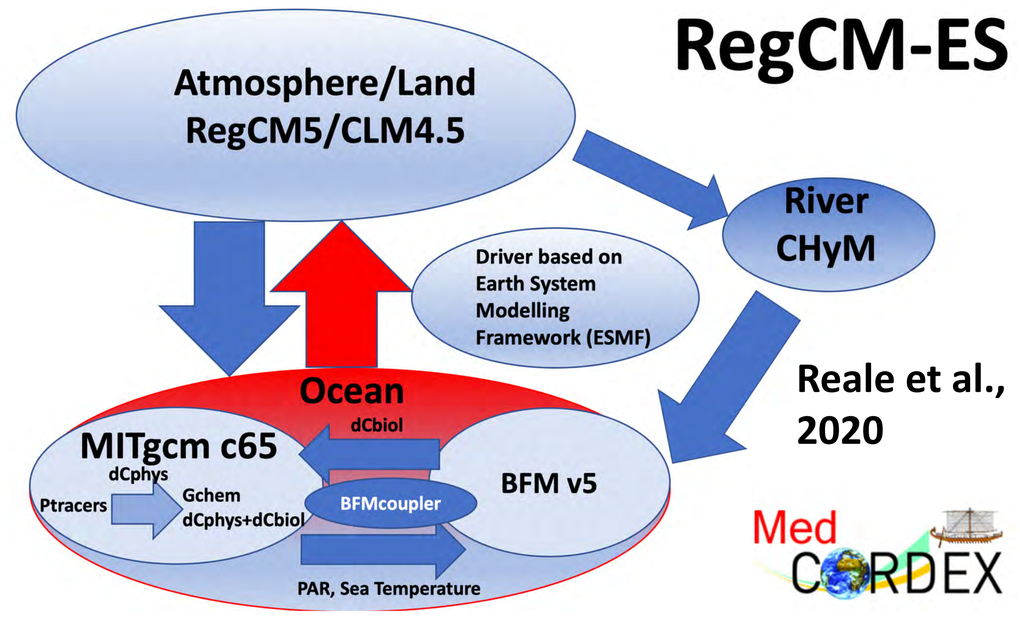
The Northern Italy region

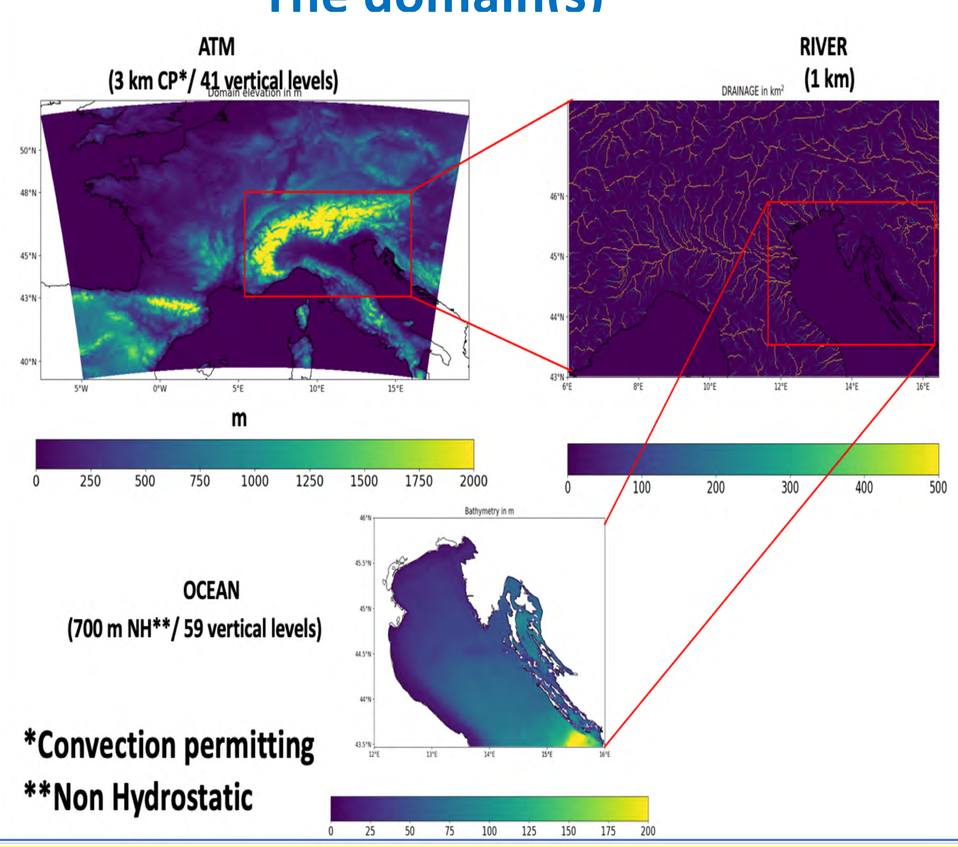
Mid-latitude area characterized by:

- the presence of significant orographic features such as the Alpine arc
- the relatively flat area of the Po Valley
- strong air-sea interactions and deep water formation processes
- complex river network that includes the Po river (one of the major freshwater sources of the Mediterranean Sea).

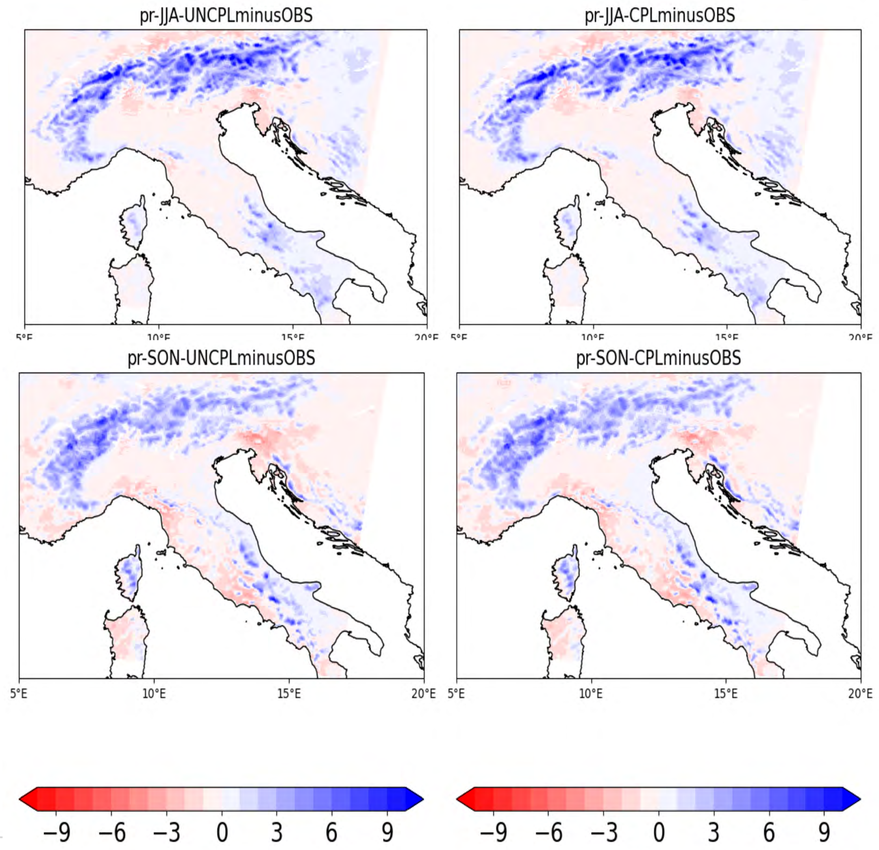
Modeling framework

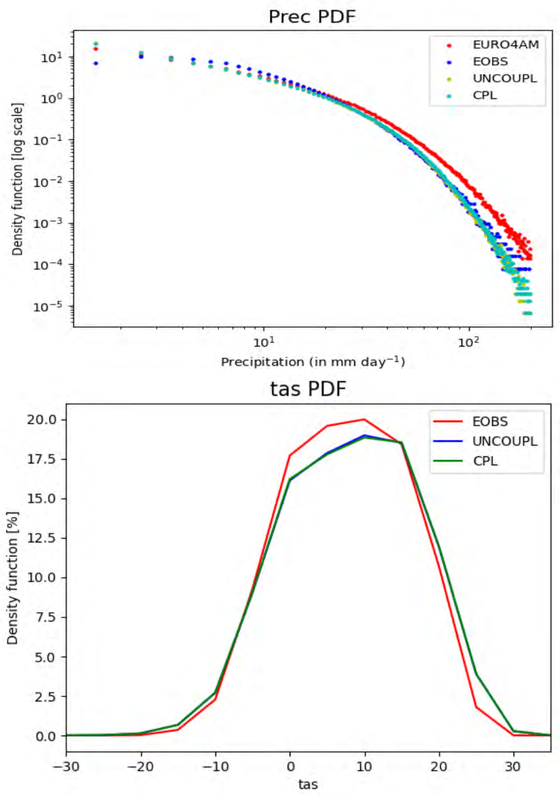


The domain(s)

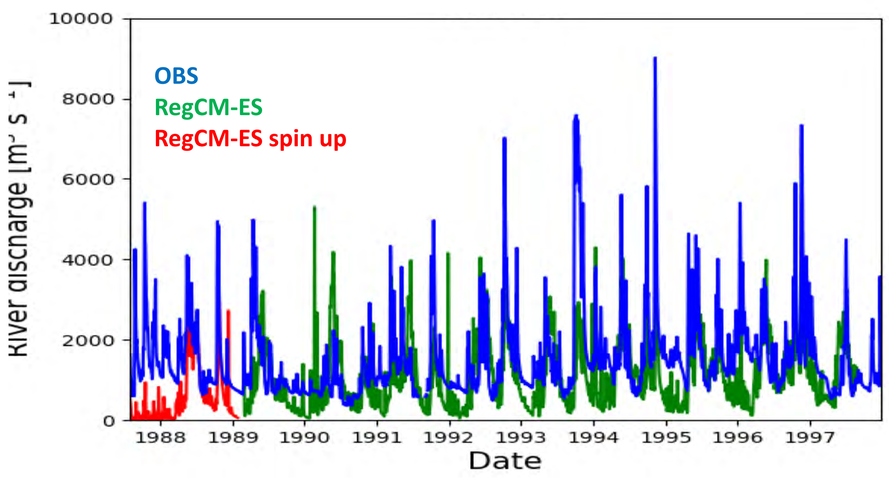


Precipitation and Surface Temperature

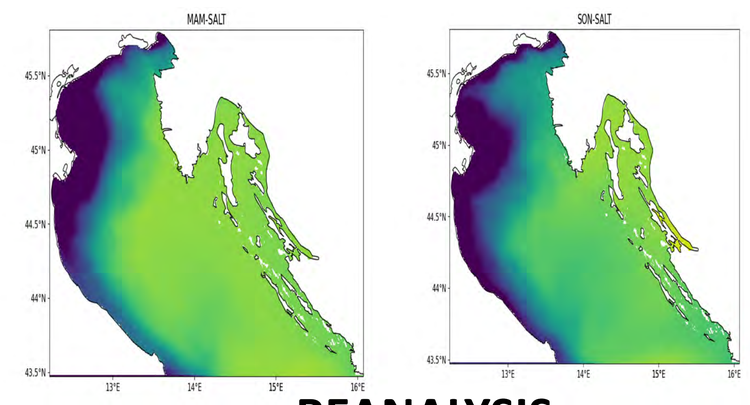




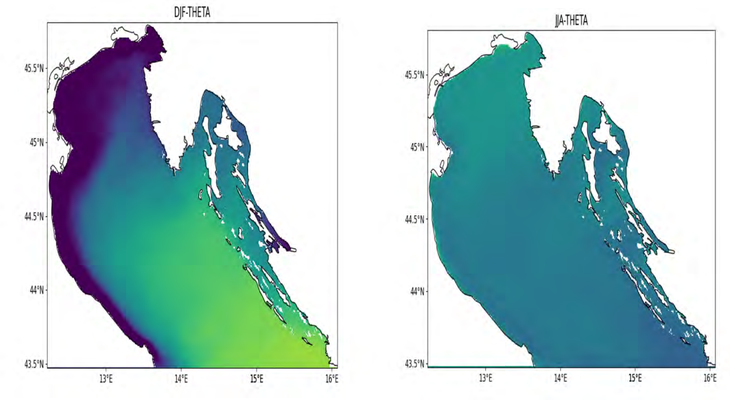
Po RIVER flow



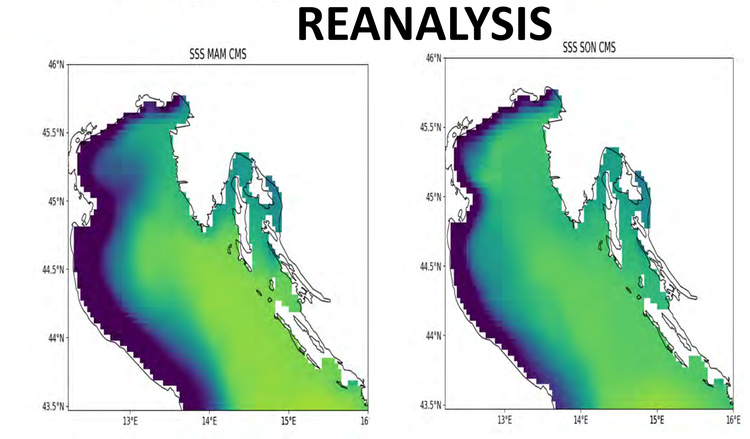
Sea Surface Salinity MODEL



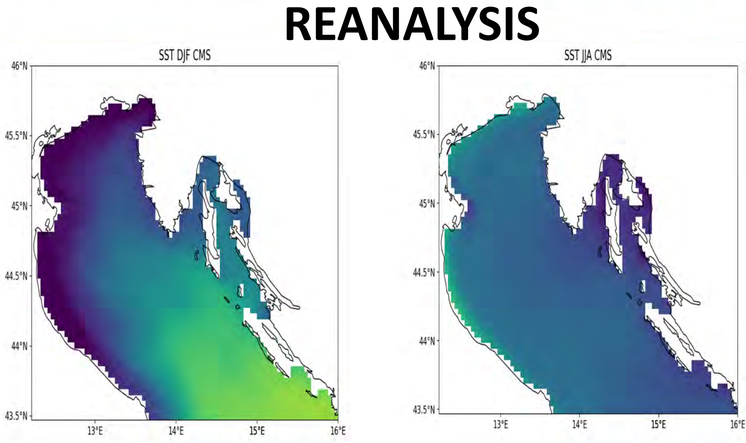
Sea Surface Temperature MODEL



REANALYSIS



REANALYSIS



Conclusions

- **RegCM-ES well captures spatial patterns and environmental gradients characterizing the area and improves the representation of precipitation over the domain**
- **Longer numerical experiments are needed to assess dynamical processes simulations (deep water formation)**
- **The model is currently employed to produce hindcasts and climate projections**