

multi-Risk sciEnce for resilienT commUnities undeR a changiNg climate

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1. Technical references

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Table of contents

1. Technical references	3
2. Document history	4
3. ABSTRACT	6
4. List of Figures	7
5. High resolution modeling tools for coastal regions and open ocean areas	9
5.1 The Northern Adriatic region and the Orbetello lagoon (OGS, UNIFI)	9
5.1.1 Introduction	9
5.1.3 Modelling approaches	11
5.1.4 Results	12
5.1.5 Scientific products and dissemination	21
5.2 Conclusions	22
6. References	23

3. ABSTRACT

The Northern Adriatic region and the Orbetello lagoon, although limited in size with respect to the Mediterranean region, perfectly summarize the complexity often observed in the area. They are in fact characterized by complex land-distribution, by the presence of several important human and industrial settlements, high biodiversity and several hot-spots for fisheries, significant air-sea interaction and freshwater input from the inland. Due to the complexities of the areas under investigation, a proper assessment of the future evolution of the climate and marine ecosystems of the regions under different emission scenarios requires the adoption of modeling tools with a fine spatial resolution (both vertical and horizontal) that consider and solve the interaction among the different compartments of the climate system.

In this task, we introduce newly developed configurations of state-of-the-art climate and biogeochemical modeling tools able to simulate the dynamics of the atmosphere, rivers, ocean and marine ecosystems of the Northern Adriatic region and Orbetello lagoon.

The newly climate and biogeochemical projections dataset produced for the Northern Adriatic region shows a significant warming in the area of both inland and ocean compartments. Moreover, climate simulations project drier conditions over the region, lower river discharges as well as a dramatic increase in the intensity of the rainy events, in particular in the coastal areas between Veneto and Friuli Venezia Giulia. The remarkable warming of the region will also affect the marine ecosystem dynamics: the high-resolution projections of the Northern Adriatic biogeochemistry shows in the future a significant deoxygenation, acidification and decline in the phosphate content of the euphotic layer of the basin. On the other hand, an increase in the nitrate concentration has been observed in some areas of the basin like the Gulf of Trieste, probably related to the changes in local circulation.

For the Orbetello lagoon, the model shows interesting capabilities of describing, with high temporal and spatial resolution, the evolution of key parameters related to the lagoon's trophic state and it is proposed as a decision support tool for lagoon management under climate change conditions.

As already observed on the Mediterranean scale, climate change will dramatically affect the coastal areas and lagoons with significant effects on marine ecosystems and, possibly, on related ecosystem services.

4. List of Figures

Figure 1- The Northern Adriatic region (red box, left panel) and the Orbetello lagoon (panel on the right), with topography and bathymetry (both in m), location and naming conventions for measuring stations.

Figure 2- Simulated by RegCM5_{STD} 2 m Temperature (in °C) and 10 m wind fields (in m/s) on February, 4th 2012 (left panel) and August, 2nd 2003 (right panel). Initial and boundary conditions come from ERA5.

Figure 3- Simulated by RegCM5_{STD} 2 m Temperature in summer (in °C) under GLW1.5 (left panel) and projected changes under GLW3 (central panel) and GLW4 (right panel) under emission scenario SSP3-7.0. Initial and boundary conditions come from EC-EARTH3-Veg.

Figure 4- Simulated by MITgcm_{STD}-BFM Sea Surface Temperature ((in °C), Salinity, Dissolved oxygen (DO, in mmol/m³), pH, phosphate (N1p, in mmol/m³) and nitrate (N3n, in mmol/m³) in the period 1996-2005(left panel) and projected changes in the period 2041-2050 (right panel) under emission scenario RCP8.5. Atmospheric initial and boundary conditions come from HadGEM2-ES.

Figure 5- First row: Simulated by RegCM5_{STD} daily precipitation (in mm) under GLW1.5 (left panel) and projected changes under GLW3 (central panel) and GLW4 (right panel) under emission scenario SSP3-7.0. Second row: as the first row but for r10mm (in number of days). Initial and boundary conditions come from EC-EARTH3-Veg.

Figure 6- Relative frequency of daily values of 2 m temperature (in °C, left panel) and precipitation (right panel, in log scale mm) simulated by RegCM5_{STD} under GLW1.5 (cyan), GLW3 (red) and GLW4 (blue) under emission scenario SSP3-7.0. Initial and boundary conditions come from EC-EARTH3-Veg.

Figure 7- Yearly r20mm according to EURO4M dataset (left panel, in number of days), minimum biases between simulated r20mm and the observations (central panel) and the added value (in %, see the text for the definition) in the period 1989-2003. The contour line represents the minimum bias equal to zero.

Figure 8- River discharges biases in (%) between station-based observations (dots) and CHyM_{STD} (left) and CHyM_{CPL} (right panel) in the period 1989-2003

Figure 9 First row: DO concentrations (in mg/l) simulated with the numerical model and measured in the lagoon at Levante2 station for the year 2021 (left) and zoom on the period 16-31/08/2021- Second Row: – IN (left) and IP (right) concentrations (in mg/l) simulated with the numerical model and measured in the lagoon at the location of MAS-088 sampling point for the year 2021.

Figure 10 – Maps of minimum DO concentration (in mg/l) simulated with the ecological model for the month of August 2021, in the present scenario (a), for the natural circulation (no pumps at the inlet) with the obstruction of grids and gates for fishing activities (b), for the natural circulation without obstructions in the inlets (c) and for the scenario with channels excavated in the bottom (d).