



Projected extreme oligotrophication of the marine ecosystems of the Adriatic Sea

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The Adriatic Sea is home to diverse marine ecosystems, showing rich biodiversity and distinctive ecological dynamics. Its complex coastal habitats and waters support a variety of species, playing a crucial role in the region's ecology and economy. Understanding the impact of ongoing climate changes on this delicate environment is vital for the basin's future preservation. To address this, we developed a comprehensive biogeochemical model for the entire basin, featuring a horizontal resolution of approximately 2 km and 120 vertical levels. This model is driven by atmospheric, hydrological, and ocean circulation projections from 1992 to 2050, downscaled from one Med-CORDEX model under the RCP8.5 emission scenario, developed within the AdriaClim project. The projected changes between 1992-2011 and 2031-2050 were evaluated in distinct trophic ecoregions identified by means of a k-medoid classification. The results reveal a strong oligotrophication tendency, particularly pronounced in the northern estuarine area. This trend can be largely attributed to a significant decrease in river discharge projected by our modelling system for the rivers of the Po Plain. This scenario of unproductive resources, ongoing warming, salinization, and acidification poses concerns about the long-term resilience of the Northern Adriatic food web structure, adapted to thrive in high trophic conditions. Our study provides the stakeholders with insights into how potential long-term decreases in Northern Adriatic river regimes might impact the marine ecosystem and its future goods and services.