

Harmful *Ostreopsis cf. ovata* blooms could extend in time span with climate change in the Western Mediterranean Sea.

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April 18, 2024

Abstract

The Mediterranean Sea is a region threatened by fast environmental changes and high coastal human impacts. Over the last decade, recurrent blooms of the harmful dinoflagellate *Ostreopsis cf. ovata* have been recorded in many Mediterranean beaches. Here we investigate whether the spatial-temporal distribution of this microalga and the frequency of its blooms could be altered in future regional climate change scenarios, with a special focus in the Western basin. An ecological niche model forced by physical and biogeochemical high-resolution climate change simulations under the strong greenhouse gas emission trajectory (RCP8.5) was used to characterize how *O. cf. ovata* may respond to projected conditions and how its distribution could shift in this plausible future. Before being applied to the niche model, the future climate change simulations are further refined by using a statistical adaptation method (Cumulative Distribution Function transform) to improve the representativity of the environmental parameters. Our results depict that *O. cf. ovata* abundances are driven by temperature (optimum 23-26 °C), high salinity (> 38 psu) and high inorganic nutrient concentrations (nitrate > 0.25 mmol N·m⁻³ and phosphate > 0.035 mmol P·m⁻³). Future projections suggest no changes in bloom intensity for mid- and end-century. Nevertheless high spatial disparities in future abundances are observed.. Namely, *O. cf. ovata* abundances could increase in the Mediterranean coasts of France, Spain and the Adriatic Sea while a decrease is expected in the Tyrrhenian Sea. The bloom period could also be enlarged, starting earlier and extending later in the year, which could have important consequences on marine ecosystems, human health and economy. From a methodological point of view, this study highlights good practices of ecological niche models in the context of climate change to identify sensitive areas for current and future harmful algal blooms.

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