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TITLE: From global to regional and back again: common climate stressors of marine ecosystems relevant for adaptation across five ocean warming hotspots

AUTHOR: ['Ekaterina Popova', 'Andrew Yool', 'Valborg Byfield', 'Kevern Cochrane', 'Andrew C. Coward', 'Shyam S. Salim', 'Maria A. Gasalla', 'Stephanie Henson', 'Alistair J. Hobday', 'Gretta T. Pecl', 'W. H. H. Sauer', 'Michael J. Roberts']

ABSTRACT:

Abstract Ocean warming ?hotspots? are regions characterized by above?average temperature increases over recent years, for which there are significant consequences for both living marine resources and the societies that depend on them. As such, they represent early warning systems for understanding the impacts of marine climate change, and test?beds for developing adaptation options for coping with those impacts. Here, we examine five hotspots off the coasts of eastern Australia, South Africa, Madagascar, India and Brazil. These particular hotspots have underpinned a large international partnership that is working towards improving community adaptation by characterizing, assessing and projecting the likely future of coastal?marine food resources through the provision and sharing of knowledge. To inform this effort, we employ a high?resolution global ocean model forced by Representative Concentration Pathway 8.5 and simulated to year 2099. In addition to the sea surface temperature, we analyse projected stratification, nutrient supply, primary production, anthropogenic CO 2 ?driven ocean acidification, deoxygenation and ocean circulation. Our simulation finds that the temperature?defined hotspots studied here will continue to experience warming but, with the exception of eastern Australia, may not remain the fastest warming ocean areas over the next century as the strongest warming is projected to occur in the subpolar and polar areas of the Northern Hemisphere. Additionally, we find that recent rapid change in SST is not necessarily an indicator that these areas are also hotspots of the other climatic stressors examined. However, a consistent facet of the hotspots studied here is that they are all strongly influenced by ocean circulation, which has already shown changes in the recent past and is projected to undergo further strong change into the future. In addition to the fast warming, change in local ocean circulation represents a distinct feature of present and future climate change impacting marine ecosystems in these areas.

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