

{rokbox title=|Domain and bathymetry of the region of interest :: Image: Authors|
thumb=|images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-assessment-red-sea-temperatures-agulles-et-al-2021-thumb.jpg|}images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-assessment-red-sea-temperatures-agulles-et-al-2021.jpg{/rokbox}

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[Assessment of Red Sea temperatures in CMIP5 models for present and future climate.](https://doi.org/10.1371/journal.pone.0255505)
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Abstract: The increase of the temperature in the Red Sea basin due to global warming could have a large negative effect on its marine ecosystem. Consequently, there is a growing interest, from the scientific community and public organizations, in obtaining reliable projections of the Red Sea temperatures throughout the 21st century. However, the main tool used to do climate projections, the global climate models (GCM), may not be well suited for that relatively small region. In this work we assess the skills of the CMIP5 ensemble of GCMs in reproducing different aspects of the Red Sea 3D temperature variability. The results suggest that some of the GCMs are able to reproduce the present variability at large spatial scales with accuracy comparable to medium and high-resolution hindcasts. In general, the skills of the GCMs are better inside the Red Sea than outside, in the Gulf of Aden. Based on their performance, 8 of the original ensemble of 43 GCMs have been selected to project the temperature evolution of the basin. Bearing in mind the GCM limitations, this can be an useful benchmark once the high resolution projections are available. Those models project an averaged warming at the end of the century (2080–2100) of $3.3 \pm 0.6^{\circ}\text{C}$ and $1.6 \pm 0.4^{\circ}\text{C}$ at the surface under the scenarios RCP8.5 and RCP4.5, respectively. In the deeper layers the warming is projected to be smaller, reaching $2.2 \pm 0.5^{\circ}\text{C}$ and $1.5 \pm 0.3^{\circ}\text{C}$ at 300 m. The projected warming will largely overcome the natural multidecadal variability, which could induce temporary and moderate decrease of the temperatures but not enough to fully counteract it. We have also estimated how the rise of the mean temperature could modify the characteristics of the marine heatwaves in the region. The results show that the average length of the heatwaves would increase ~15 times and the intensity of the heatwaves ~4 times with respect to the present conditions under the scenario RCP8.5 (10 time and 3.6 times, respectively, under scenario RCP4.5).

Keywords: