



Future Evolution of Marine Heat Waves in the Mediterranean: Coupled Regional Climate Projections

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The Mediterranean area is identified as a « Hot Spot » region, vulnerable to future climate change with potentially strong impacts over the sea. By 2100, climate models predict increased warming over the sea surface, with possible implications on the Mediterranean thermohaline and surface circulation, associated also with severe impacts on the ecosystems (e.g. fish habitat loss, species extinction and migration, invasive species). However, a robust assessment of the future evolution of the extreme marine temperatures remains still an open issue of primary importance, under the anthropogenic pressure. In this context, we study here the probability and characteristics of marine heat wave (MHW) occurrence in the Mediterranean Sea in future climate projections. To this end, we use an ensemble of fully coupled regional climate system models (RCSM) from the Med-CORDEX initiative. This multi-model approach includes a high-resolution representation of the atmospheric, land and ocean component, with a free air-sea interface. Specifically, dedicated simulations for the 20th and the 21st century are carried out with respect to the different IPCC-AR5 socioeconomic scenarios (1950-2100, RCP8.5, RCP4.5, RCP2.6). Model evaluation for the historical period is performed using satellite and in situ data. Then, the variety of factors that can cause the MHW (e.g. direct radiative forcing, ocean advection, stratification change) are examined to disentangle the dominant driving force. Finally, the spatial variability and temporal evolution of MHW are analyzed on an annual basis, along with additional integrated indicators, useful for marine ecosystems.