



Future projections in the Mediterranean Sea under global warming scenarios

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The outputs of 14 Atmosphere-Ocean General Circulation Models (AOGCMs) in the Mediterranean Sea are used to estimate projections of temperature, salinity and steric sea level changes for the 21st century under three different climate scenarios, namely, committed climate change, SRES A1B and SRES A2. Warming and salinification are predicted to occur in the basin compensating each other in terms of steric sea level changes. The predicted basin-average steric sea level change over the Mediterranean ranges between 52 cm and -42 cm with median value of 4 ± 30 cm by the end of the century. Temperature alone would induce, under the A1B scenario, a sea level rise of up to 37 ± 15 cm in the basin, while salinity -34 ± 16 cm. Under A1B and A2 scenarios, thermosteric sea level rise is accelerated, doubling the rates of change by the end of this century with respect to the first decade. Under the committed climate change scenario the thermosteric sea level, although increasing, is decelerated during the 21st century. The inclusion of dynamic sea level changes in the projections does not affect the mean sea level rise in the basin, but increases inter-annual variability. The contribution of future atmospheric pressure changes on sea level in the Mediterranean Sea is a reduction of up to 2 cm. The 20th century model runs indicate that low frequency variability is smaller than the observed variability. Therefore the projected trends could be, at decadal scales, larger. The spatial patterns of steric sea level change are not consistent among the AOGCMs in the Mediterranean Sea.

The total projected sea level change, taking into account regional steric changes, mass addition from melting ice-sheets and glaciers is up to 20 cm. When global volume increase not accounted for by the AOGCMs due to the Boussinesq approximation the expected change can reach up to 35 cm globally.