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PARALLEL SESSION C: IMPACTS AND APPLICATIONS
C2: REGIONAL ATMOSPHERIC AND OCEAN CIRCULATION SYSTEMS

Inter-annual variability of the modelled Mediterranean thermohaline circulation in Med-CORDEX simulations and the role of tidal forcing

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The ocean plays a fundamental role in the evolution of the climate on our planet, and the Mediterranean area is one of the regions described as a ''hot spot'' under global warming, thus meaning that climate in this area is expected to significantly respond to global changes. The availability of atmospheric reanalysis products, such as ERA40 and ERA-interim, together with the subsequent numerous regional dynamical downscaling hind-cast simulations performed so far, prompted the HyMeX/Med-CORDEX community to test the ability of current oceanographic models of the Mediterranean Sea to represent the response of the circulation to realistic inter-annual variability in the atmospheric forcing, in the perspective of fully coupled regional ocean-atmosphere models.

This work presents an inter-comparison of recent hind-cast simulations of the Mediterranean Sea Circulation, at resolutions spanning from 1/8° to 1/16°. The inter-annual variability of the modeled Mediterranean thermohaline circulation has been investigated at basin and sub-basin scale, and compared to available observations. We analyze the mean circulation on both the long-term and decadal time scale, and the represented inter-annual variability of intermediate and deep water mass formation processes in both the Eastern and Western sub-basins, finding that models agree with observations in correspondence of specific events, such as the 1992-1993 Eastern Mediterranean Transient, and the 2005-2006 event in the Gulf of Lion. Simulations generally appear to be in good agreement, the main differences being attributable to different initializations and to alternative prescriptions of the Atlantic boundary condition. A special attention is devoted to the representation of water exchange between the Mediterranean and the Atlantic ocean in the Strait of Gibraltar, which is significantly affected by tidal forcing. Such effects on the simulated MTHC are evaluated by comparing results from two hind-cast numerical simulations, with and without tidal forcing, both implementing a high resolution representation of the SoG.

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