From the global to the regional warming: the Mediterranean case from observations and modeling analysis

The Mediterranean Sea is a mid-latitude semi-enclosed marginal sea with a maximum depth of over 4000 meters that directly experiences the influence of North Atlantic atmospheric perturbations. In fact the strong air-sea interaction make this basin an evaporative basin that exchanges water with the Atlantic Ocean through the shallow and narrow Strait of Gibraltar. The Mediterranean may give a contribution to the global thermohaline ocean circulation through its exchange of water at intermediate depth with the North Atlantic. The Mediterranean Sea for its own characteristic can be considered as a hot spot basin.

Experimental data spanning several decades show that the circulation of the Mediterranean Sea and the processes of water mass formation that it hosts are subject to pronounced variability and change. The Eastern Mediterranean Transient (EMT), which was detected in the 90s constitutes a direct observational evidence of such variability.

From in-situ data provided by the MEDAR/MEDATLAS data-base was observed trends in the interior of the basin as in the Mediterranean outflow in the gulf of Cadiz. Recent data analysis within the Strait of Gibraltar and in particular at Camarinal Sill South, point out an anomaly warming and salinification, from the early 2000s to today, corresponding to ~0.3 °C and to ~0.06 respectively. However, during the twentieth century also the Mediterranean basin has warmed quite significantly in the deep waters as well as in the surface layer. We also discuss the annual sea surface temperature anomaly (SSTA) during the last 150 years that can be estimated using several datasets. An important characteristic of this mode of SST variability is that the SST anomalies have the same sign across the entire North Atlantic and resemble the Atlantic Multidecadal Oscillation (AMO).

As a future follow-up of these studies the role of the Mediterranean Sea on nearby and remote regions will be investigated in the context of present and future climate using modelling numerical simulations and during this talk some recent results will be presented.

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