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Important aspects of Eastern Mediterranean large-scale variability revealed from data of three fixed observatories

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Long-term variations of temperature and salinity observed in the Adriatic and Aegean Seas seem to be regulated by larger-scale circulation modes of the Eastern Mediterranean (EMed) Sea, such as the recently discovered feedback mechanisms, namely the BiOS (Bimodal Oscillating System) and the internal thermohaline pump theories. These theories are the results of interpretation of many years' observations, highlighting possible interactions between two key regions of the EMed.
Although repeated oceanographic cruises carried out in the past or planned for the future are a very useful tool for understanding the interaction between the two basins (e.g. alternating dense water formation, salt ingressions), recent long time-series of high frequency (up to 1h) sampling have added valuable information to the interpretation of internal mechanisms for both areas (i.e. mesoscale eddies, evolution of fast internal processes, etc.). During the last 10 years, three deep observatories were deployed and maintained in the Adriatic, Ionian, and Aegean Seas: they are respectively, the E2-M3A, the Pylos, and the E1-M3A. All are part of the largest European network of Fixed Point Open Ocean Observatories (FixO3, http://www.fixo3.eu/).
Herein, from the analysis of temperature and salinity, and potential density time series collected at the three sites from the surface down to the intermediate and deep layers, we will discuss the almost perfect anti-correlated behavior between the Adriatic and the Aegean Seas.
Our data, collected almost continuously since 2006, reveal that these observatories well represent the thermohaline variability of their own areas. Interestingly, temperature and salinity in the intermediate layer suddenly increased in the South Adriatic from the end of 2011, exactly when they started decreasing in the Aegean Sea. Moreover, Pylos data used together with additional ones (e.g. Absolute dynamic topography, temperature and salinity data from other platforms) collected along the typical pathway of the Levantine/Cretan intermediate waters towards the Adriatic Sea, reveal variability of the subsurface/intermediate layers (100-400m depth), which could possibly be attributed to seasonal variability or influences from dynamical features such as the Pelops Gyre.

References

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