CHANGES IN THE AEGEAN SEA THERMOHALINE CHARACTERISTICS IN THE POST-EASTERN MEDITERRANEAN TRANSIENT PERIOD

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Abstract
Monitoring of the thermohaline properties in the Aegean Sea, with CTD surveys and profiling floats observations, and comparison with older data in the region, reveal strong variability in space and time. The results are investigated in the context of recent climatic changes (Eastern Mediterranean Transient), focusing on the evolution of the water column structure in the various sub-basins. It was found that important changes are taking place during the time of the study, related to local processes as well as exchanges with the adjacent sub-basins. In the Cretan Sea, the Transitional Mediterranean Water intrusion is evolving in time altering the stratification of the basin.
Keywords : Aegean Sea, Eastern Mediterranean, Circulation.

Introduction
During the late 80s the thermohaline circulation and the deep-water hydrological properties of the eastern Mediterranean Sea underwent a strong and abrupt change, known as the "Eastern Mediterranean Transient (EMT)" [1]. The Aegean Sea became the new more effective source than the Adriatic Sea, since it produced not only denser water, namely the Cretan Deep Water (CDW), but also higher volumes. From 1988 to 1995, massive outflow of CDW occurred through the Straits of the Cretan Arc towards the Ionian and Levantine basins. The CDW being of particularly high density (29.3 kg/m3) sank into the near-bottom layers, uplifting the older deep waters of Adriatic origin and affecting the exchange between the Aegean and the adjacent basins with the intrusion of Transitional Mediterranean Water (TMW). The origin of the latter is water lying between Levantine Intermediate Water and Eastern Mediterranean Deep Water, which was present in the Cretan Sea intermediate levels (200-600 m) during the first stages of EMT [2]. Since 1995 the EMT event started to decay, but the rate of the Eastern Mediterranean system relaxation as well as its final state (old or modified) remain still unclear.

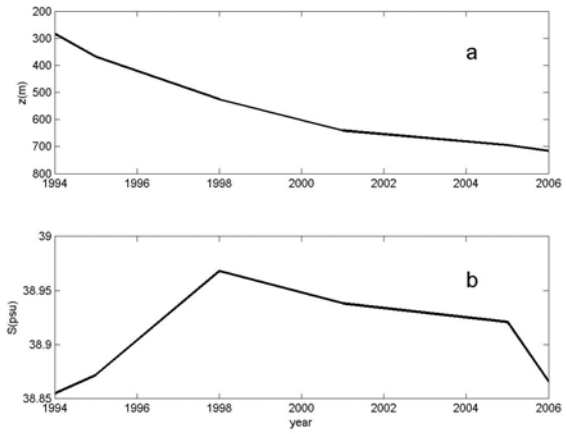

Fig. 1. Evolution of depth (a) and salinity (b) of the TMW intrusion in the Cretan Sea

Observations in the Aegean Sea
Aiming at investigating the variability of the Aegean Sea water column structure and the post-EMT evolution, a series of CTD surveys and profiling float deployments was conducted in various Aegean Sea basins and the adjacent west Levantine region. The acquired CTD data and data derived from profiling floats are being compared with older observations. The changes associated with EMT started to decay dramatically confirming its transitional character but subsequent changes were slower and its signal still remains present. Although changes in the stratification are notable, the basic water masses related to the EMT event are present in the Aegean Sea water column. The Cretan Sea profiles reveal a relatively less saline intermediate layer, produced by the TMW intrusion that is continuously deepening and reached the 800 m during the late observations (Figure 1). Comparison with older observations indicates important mixing processes within and outside the Aegean and a possible evolution of the exchange between the Cretan Sea and the Levantine basin. The Aegean outflow that contributed to the Eastern Mediterranean shallower layers (1500-2500 m), during 1998-99, has been obviously minimized. This current phase is characterized by the strong inflow of the TMW, at least through the deepest strait of Kassos. Changes in the stratification in the Levantine basin outside the Cretan Arc straits and the deflation of the CDW layer in the Cretan Sea, modifies the exchange between the Aegean Sea and the adjacent basins at deep and intermediate levels. The waters just outside the Eastern Cretan Straits, below 1000 m, are a mixture of deep water of Adriatic and Aegean origin, with the former contributing to a higher percentage compared to earlier observations. In the northern Aegean basin important interannual variability is observed (Figure 2). Changes in the water column characteristics in the region are influenced by local formation processes detected during the winter period.

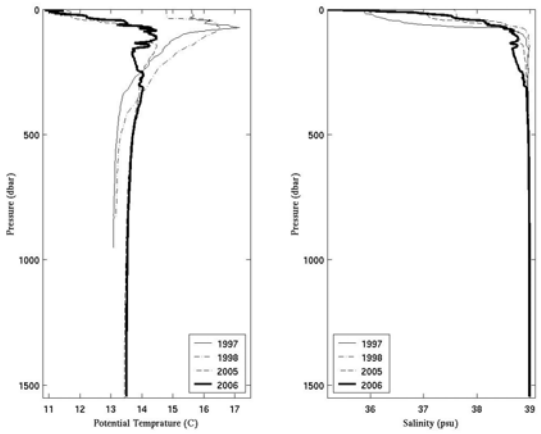

Fig. 2. Temperature (left) and salinity (right) profiles in the Limnos basin (N.E. Aegean) during different years.

References

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