

# RENEWAL OF DEEP WATER IN VICINITY OF THE EASTERN LEVANTINE SLOPE

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## Abstract

During the winter of 2012-2013 the deep water mass in the vicinity of the Eastern Levantine Slope had a three layer structure: the old water, originating from Adriatic Sea (400-1100m); the water that originated from the Aegean Sea during the Eastern Mediterranean Transient (EMT) (1100-2000m); and a new water (deeper than 2000m) that originated from the Adriatic Sea after the EMT relaxation.

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Before the EMT [1], only about 800 casts in the abyssal regions (deeper than 1500 m) of the Levantine Basin reached the bottom (PERSEUS Cast DB: [http://isramar.ocean.org.il/perseus\\_data/CastMap.aspx](http://isramar.ocean.org.il/perseus_data/CastMap.aspx)). Based on that data, the Eastern Mediterranean Deep Water (EMDW) was seen as a homogeneous water mass with quite stable thermohaline properties ( $38.67 \pm 0.02$ ;  $13.35 \pm 0.02^\circ\text{C}$ ) and the large residence time (of about one hundred years [1]). The discovery of the EMT in 1995 contradicted that notion and motivated scientists to investigate the variability of the EMDW. After a series of cruises, it was discovered that the new formed deep water was of Aegean origin (EMDW\_AG) and propagated through the Cretan Passage westward and eastward, following bottom depressions [1]. In the deep region (>2000m) south of Cyprus, the EMDW\_AG were first observed using the R/V Meteor in 1995 [1]. In 1996 they were found near the continental slope, west of the Israeli shelf [2]. During the period of 1996-2002, the salinity and potential temperature of the bottom water near this slope increased due to advection from the west, by approximately  $0.1 \pm 0.02$  and  $0.25 \pm 0.02^\circ\text{C}$ . A stabilization of the deep water salinity and potential temperature ( $38.77 \pm 0.01$ ;  $13.60 \pm 0.01^\circ\text{C}$ ) was observed after 2002. During the winter of 2012-2013 a large CTD survey was carried out using the R/V Shikmona within the exclusive economic zones of Cyprus and Israel. The core of the old deep water (EMDWold) was found as an intermediate minimum of salinity and potential temperature ( $38.75 \pm 0.01$ ;  $13.58 \pm 0.01^\circ\text{C}$ ) at a depth of about 900m (Fig.1).

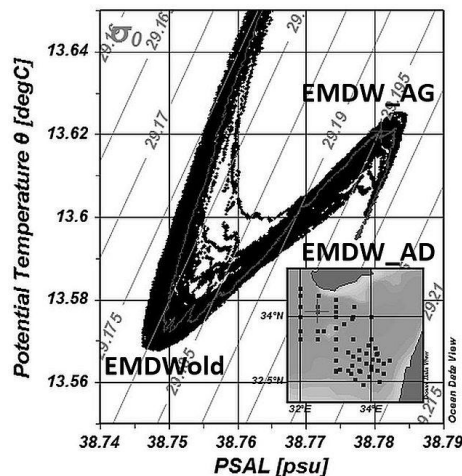


Fig. 1. Three layers of different origins within the Eastern Mediterranean Deep Water (winter of 2012-2013).

Below this water mass, inversions of salinity and potential temperature were observed at each station. These inversions are signatures of the deep water formed in the Aegean Sea (EMDW\_AG) during the EMT. In the regions where the bottom depth is lower than 2000m, salinity and potential temperature reach maximal values at the bottom layer ( $38.78 \pm 0.005$ ;  $13.62 \pm 0.005^\circ\text{C}$ ). In regions where the bottom depth is greater than 2000m, the EMDW\_AG appears to be an intermediate water mass located above a colder and less saline water mass that occupies the bottom layer. This bottom layer, which wasn't observed during the EMT before, had a stronger

signal at the western and deeper stations (Fig. 2). Apparently, this water is of Adriatic origin (EMDW\_AD). A front between the EMDW\_AD and the EMDW\_AG was observed in zonal sections at approximately  $24^\circ\text{E}$  (Meteor-2001) and  $27^\circ\text{E}$  (Shikmona-2008) [1,2]. The three observed positions of the front can be used to construct a timeline of the propagation. The eastward propagation of the EMDW\_AD suggests a regular generation of deep water of Adriatic origin since 1999 [1], after a relaxation to typical hydrologic conditions occurred.

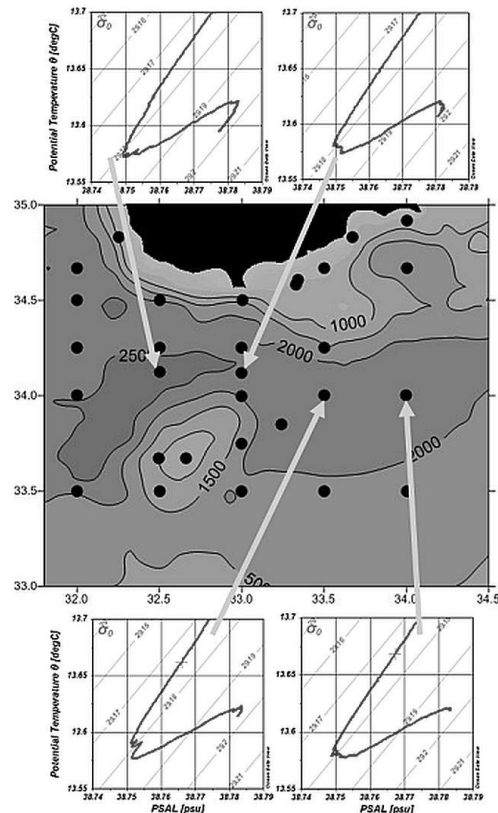


Fig. 2. Disappearance of the Adriatic Sea deep water signal eastward along the depression in the south of Cyprus.

## References

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