Wide area formation of intermediate and deep water in the Northern Levantine Basin, 1992

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The Rhodes cyclonic gyre is a permanent feature of the Levantine Basin circulation, identified in all seasons in the region south of the Anatolian peninsula and the Island of Rhodes. The heat stored by the upwelling dome of the cyclonic area is substantially lower than the surrounding water masses, and the preconditioning due to homogenisation of the water column (excluding a thin - ~ 50m- surface layer) makes it a candidate for episodes of deep convection. However, either the duration of such events may be short, or they may occur when a sufficiently strong winter forcings are available, and therefore such overturning has not been widely reported. One exception is GERTMAN *et al.* (1990), who observed deep convection during the cold winter of 1987, following earlier suggestions of Deep Water formation in the region by OVCHINNIKOV and PLAKHIN (1984).

Deep convection at the center of the Rhodes Gyre was observed during March 1992, following the cold winter of 1991/1992 (Fig. 1). The thin surface layer overtopping the Rhodes dome during earlier observations of October 1991 has been eroded completely, leading to overturning of central waters to depths in excess of 1000m. Uniform temperature (13.7°C) and salinity (38.7) values are observed throughout the water column within the gyre. Sharp horizontal gradients occur on the northeast side of the uniform region separating it from the more saline (≥ 38.95) Levantine Intermediate Water near the coast.

The intermediate depth convection leading to Levantine Intermediate Water formation was observed in the entire northern Levantine Basin, characterised by uniform profiles of temperature and salinity to depths larger than 300m. The deepest such formation occurred in the Cilician basin, where the base of the convection layer reached 700m.

The well-defined circulation observed in the October 1991 survey prior to the winter cruise is greatly modified by the convection process. Separate patches of cyclonically and anticyclonically tending circulations are found in the March 1992 analyses, which may indicate continuing geostrophic adjustment.

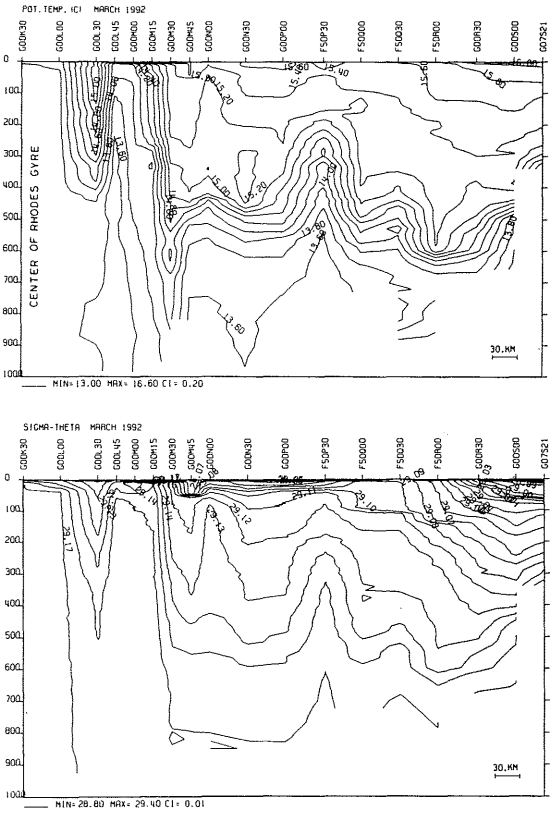

Figure 1. West to east sections along 36°E.

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Aegean influence in the deep layers of the Eastern Ionian Sea (October 1991)

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In the framework of the first general survey of the POEM-II programme, 100 deep CTD stations were occupied by R/V AEGAIO during October/November 1991 in the Eastern Ionian, NW Levantine and South Aegean Seas. Preliminary analysis of the data reveals that in the deep Ionian layers (1000-2000dbars) significant change occurs in the distribution of the hydrological characteristics and the structure of the water column, in comparison with the POEM-I (1986-87) relevant results (THEOCHARIS, 1989; THEOCHARIS *et al.*, 1990; THEODOROU *et al.*, 1988). Temperature and salinity present increased values over a wide region, ranging from 14.0°C and 38.80 to 14.3°C and 38.96 respectively, never reaching down to 2000dbars the characteristic values that correspond to the Eastern Mediterranean Deep Water (T: 13.6-13.7°C and S:38.65-38.70). The circulation is dominated by a large open sea, meandering anticyclonic flow intensified at Pelops gyre, to the south of Peloponnisos. However, mesoscale cyclonic eddies develop near the western Greek coasts, the western Cretan Sea and to the SW of Crete. Therefore, waters are transported southeastwards from the North Ionian, while Aegean waters outflow through the Kitherian Straits. Considerable amounts of the latter relatively warmer and more saline waters form a large tongue in the Ionian. Furthermore, they are trapped by the intense anticyclone and are transported down to great depths affecting considerably the characteristics and the structure of the water column. It is worth to mention that during different seasonal cruises of POEM-I (1986-87) the Aegean contribution was limited in small patches in depths 700-1000dbars. Moreover, previous authors have mentioned that deep Cretan waters were detectable in the vicinity of the Cretan Arc Straits.

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