Flows and water mass exchanges between the Aegean and Ionian Seas through the Straits of Kithira and Antikithira (late summer, 1987)

A. THEOCHARIS, E. PAPAGEORGIOU and G. ZODIATIS

National Centre for Marine Research, Hellenikon 16604 (Greece)

Circulation patterns in the region of the Western Cretan Straits and water mass distribution and exchange between the Aegean and Ionian Seas, in late summer 1987, are presented. The results are based on hydrographic and current measurements obtained on board R/V "Aegaio" in the framework of the POEM-5-87 major cruise. CTD data from 47 stations in the SW Aegean and Eastern Ionian are combined and discussed with current measurements from two moorings placed at Antikithira and Kithira Straits.

The surface layer is mostly occupied by waters of high salinity (38.90-39.26) with an exception in the NW Cretan Sea and Antikithira Strait, where waters of relatively lower salinity (38.85) are detected, coming from the N and W Aegean. The LIW occupies a thick (600-800m) intermediate layer on the Ionian side, while on the Aegean side waters of the same characteristics can be detected down to the bottom (1300m). The Deep Water of the Eastern Mediterranean is present only in the Ionian below 1200m.

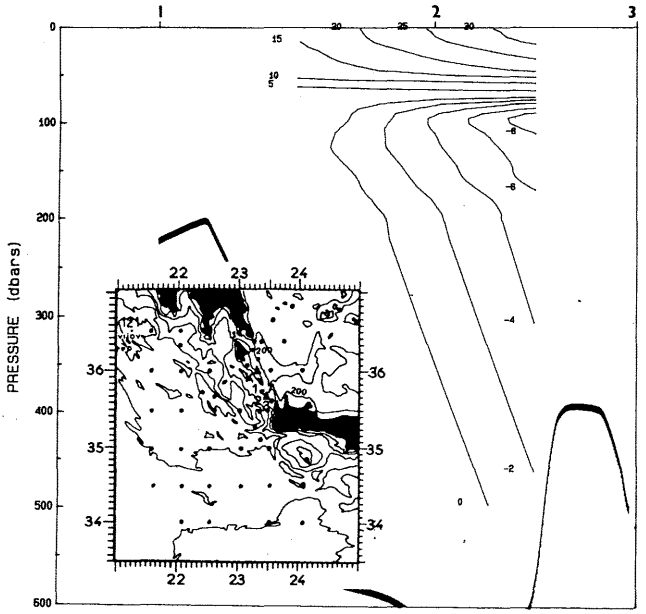
The surface dynamic topography relative to 500dbars reveals: (i) a large but relatively shallow cyclonic eddy southwest of Crete; (ii) the large and deep anticyclonic gyre, named "Pelops", southwest of Peloponnisos; (iii) an anticyclonic flow surrounding the islands of the Kitherian Straits and influencing the surface circulation in the Straits; and (iv) a cyclonic flow region in the western Cretan Sea.

Branch of the AW coming from the western Ionian and propagating towards the Levantine Basin is recirculated in the Ionian by the large cyclone SW of Crete. Portions of this AW are transfered by the existing anticyclone into the Aegean through the Kithira Strait. The "Pelops" anticyclone, on the other hand, entraps the core of the LIW and carries it in deeper layers (>500m).

Through the Antikithira Strait a surface (0-80m) outflow from the Aegean to the Ionian is indicated by both the geostrophic calculations (figure) and current measurements. The surface geostrophic velocities reach 30cm/sec while at 50m depth the geostrophic and currentmeter velocities show the same values, 12-15 cm/sec. At the Southern part of this strait in intermediate (300m) and deeper (700m) layers a rather weak inflow is observed with velocities decreasing with depth and ranging from 8 to 2 cm/sec

In the Kithira Strait an inlfow at surface is detected. The current measurements performed at the Aegean side of the strait show intermediate and deep currents with a westward component more pronounced. Velocities range between 5 to 10 cm/sec at 300m, while at 700m they do not exceed 3 cm/sec.

Apart from the above described flows through the Kitherian Straits, which correspond to the period of CTD measurements, a temporal evolution of current regime is derived from the long-term



Geostrophic Velocities in cm/sec across the Antikithira Strait (25 September, 1987)

(25/9-15/11/87) current measurements. The directions of the currents most of the time were steady during this period. At Antikithira Strait currents at 50m have a westerly direction with mean velocity 9 cm/sec, at 300m NNE direction with mean velocity 5.5 cm/sec while at 700m a SSE direction with mean velocity 3cm/sec. The above directions indicate continuous outflow at surface, weak outflow in deep layers and inflow at intermediate depths. At Kithira Strait (Aegean side) the intermediate (300m) and deep (700m) current measurements show that currents follow the bottom topography having a constant SSE direction and mean velocities 5.5 and 2 cm/sec respectively.