

Winter thermohaline circulation in the Adriatic Sea

by

M.C. HENDERSHOTT* and P. RIZZOLI**

* *Scripps Institution of Oceanography, La Jolla, California (U.S.A.)*

** *C.N.R., Laboratorio per lo Studio della Dinamica delle Grandi Masse, Venise (Italie)*

The winter circulation of the Adriatic Sea is characterised by almost complete vertical mixing in every report we have examined. In the fall of 1965 (L. TROTTI - Crociera Mare Adriatico 1965-66 - dati oceanografici) the density field was relatively homogeneous both vertically and horizontally; by winter 1966 (L. TROTTI - Crociera Mare Adriatico 1965-66 - dati oceanografici) strong horizontal gradients had appeared with very dense water in the Northern Adriatic (but still with appreciable vertical stratification only very near the fresh water river outflow from the Italian coast).

November, December 1965 and February 1966 were characterised by the pronounced Atlantic maritime air over the Adriatic while January 1966 (the period between autumn and winter cruise was characterised by the flow of cold, dry air from Eurasia on the Adriatic from the North East. During this period, evaporation and evaporative cooling of the Northern Adriatic were high, according to estimates based upon prevailing geostrophic wind and surrounding (land) wet bulb depression. We hypothesise that this period of intense evaporation was in large part responsible for the appearance of dense water in the Northern Adriatic.

In order to explore the consequences of such a period of abnormally high evaporation for the winter circulation, we have constructed a vertically integrated mode of the flow which capitalizes upon the observed lack of vertical density structure.

The model accepts estimate of surface wind stress, evaporation and evaporative cooling, river flow into the sea and flow into the opening of the Northern Adriatic and predicts a transport stream function and the horizontal density field. Preliminary results indicate that the formation of heavy water in the Northern Adriatic results in significant local recirculation.

