

THE LARGE SCALE CIRCULATION OF THE MEDITERRANEAN SEA  
TRACED BY TRITIUM

by

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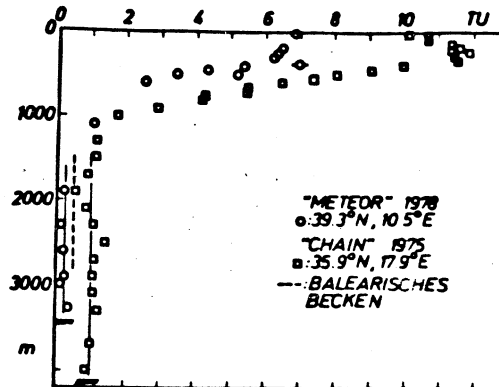
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ABSTRACT

We have available several hundred tritium observations in the Mediterranean Sea, 1974-1978 (resolution of our measurements  $\sim 0.1$  TU, i.e. 1 % of surface water concentration (1)). From these data, the water turnover of several of its deep basins (e.g. Ionian, Thyrrenian, and Balearic basin) is estimated to be of the order of 100 years (2), the estimate being based on known time-dependent tritium boundary conditions at the sea surface.

Combined measurements of tritium and its decay product helium-3 in the depth range of the Levantine intermediate water (eastern and western basin) are used to assign an age to this water mass (3) and thus to estimate the mean advection velocity of this water ; the result is 1 cm/sec. Similarly, the recirculation of the intermediate water within the western basin is found to be fast, e.g. recirculation time no longer than 1 year. Repeated tritium (and hydrographic) sections through the Strait of Gibraltar (4) show that the waters overflowing the sills largely originate from depths below the center of the Levantine intermediate water. They also quantify the nature of entrainment processes occurring during the overflow process. Similar information is available for the Straits of Sicily.

Tritium observations thus give information on the patterns and the time scales of the water transport and the mixing in the Mediterranean Sea. Based on these observations we plan to develop a circulation model of the Mediterranean which can directly be applied to predict the large scale dispersion of pollutants.



#### LITERATURE

- (1) WEISS (W.), ROETHER (W.) & BADER (G.), 1976. - Int. Jour. Appl. Rad. Isotopes 27, pp. 217-225.
- (2) ROETHER (W.) & WEISS (W.), 1980. - Deutsche Meteorologentagung Berlin, in press.
- (3) WEISS (W.) & JENKINS (W.J.), 1979. - Isotope in der Natur, Leipzig 1979, in press.
- (4) ROETHER (W.) & WEISS (W.), 1975. - Geophys. Res. Lett. 2, pp. 301-304.