

TRITIUM IN THE EASTERN MEDITERRANEAN SEA

J.R. GAT, A. SHEMESH and I. CARMİ

Department of Environmental Sciences and Energy Research
Weizmann Institute of Science, Rehovot, Israel

A hydrographic survey conducted in the eastern Mediterranean within the framework of the POEM program during 1988/89 included the measurement of tritium in the water samples. Surface concentrations of tritium have decreased considerably relative to 1968, when values ranged up to 30 TU (ASSAF, 1968). Surface tritium values during the present survey were close to 5 TU near the Turkish coast and were even lower in the southern part of the eastern basin, ranging from 2.7-3.7 TU (Fig. 1). In the north-eastern part of the basin values of 3-5 TU persisted to a depth of 300-500 meters. In the central part of the basin, around Crete, such high tritium levels were encountered at much greater depths, down to 1000-1500 meters. A well defined step structure of the vertical profile was noted at the more southerly stations, with intermediate values of around 2 TU at a depth of 300-600 meters. Furthermore, we observed a deepening of this step-layer from east to west (from 300-400 meters at Station 9 to 400-600 meters at Stations 14 and 10).

There is little correlation between tritium values and parameters such as $\delta 18O$, temperature and salinity (GAT *et al.*, 1994), indicating that it is not simply local vertical mixing which results in penetration of tritium to deeper layers. The intermediate "step" in the tritium profiles is probably related to the Levantine Intermediate Waters (LIW) which originate in the eastern part of the basin. The relatively high tritium levels found down to the deeper waters in the area near Crete, may be indicative of the process of deep water formation at this site (ROETHER and SCHLITZER, 1991).

The tritium data in this period of declining atmospheric tritium levels have been found useful in delineating water masses and suggesting genetic relationships among them. The simultaneous measurement of helium-3 (3He) and of tritium (3H), which provides a time of closure (age) for the waters, is planned for the upcoming phase of the POEM program in December 1994. This can be expected to clarify the relationships between the different water bodies which were delineated in the eastern Mediterranean water column.

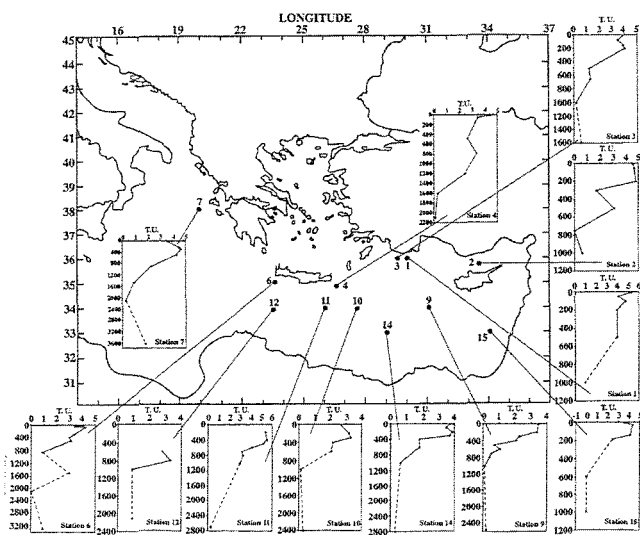


Fig. 1. Sampling stations in the Eastern Mediterranean and their vertical tritium profiles. Tritium concentrations are in tritium units (TU). Stations 1, 2 were sampled in July '88, stations 3,4,6 and 7 in September '88 and stations 9, 10,11,12, 14 and 15 in March '89.

REFERENCES

- ASSAF, G., 1968. reported in Anati, D.A. and J.R. Gat, "Restricted Marine Basins and Marginal Sea Environments" In: *Handbook of Environmental Isotope Geochemistry* (Fritz, & Fontes, Editors) Elsevier, Vol. 3: 29-73, 1989.
- GAT, J.R., A. SHEMESH, E. TZIPERMAN, A. HECHT, G. GEORGOPOLULIS and O. BASTURK, 1994. The stable isotope composition of waters of the Eastern Mediterranean Sea, *Tellus*, in press.
- ROETHER, W. and R. SCHLITZER, 1991. Eastern Mediterranean deep water renewal on the basis of chlorofluoromethane and tritium data. *Dynamics of Atmospheres and Oceans*, 15: 333-354.