A model for the stable isotope characterisation of water masses in the Eastern Mediterranean Sea

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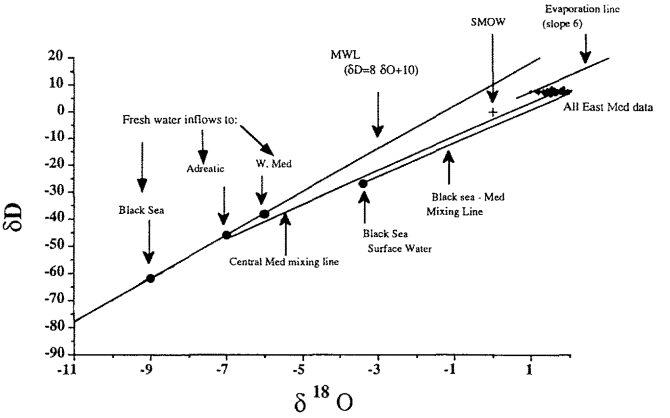
Water samples from thirteen hydrographic stations of the POEM program in the Eastern Mediterranean Sea were sampled July 1988 - March 1989 and analysed for their stable isotope content ($\delta^{18}O$ and $\delta^{2}H$) and their tritium levels (TU). Characteristic and distinguishable values are obtained for different water masses, with greater uniformity at depth and seasonal and spatial scatter in the surface waters. Averaged values were as follows:

depth (m)	mean salinity (‰)	$\delta^{18}O$ (‰)	$\delta^{2}H$ (‰)
below 1000	38.68	+1.505 ± 0.15	+7.64 ± 0.41
500 - 1000	38.80	+1.545 ± 0.19	+7.83 ± 0.46
50 - 400	38.94	+1.690 ± 0.15	+7.94 ± 0.35

The $\delta^{18}O$ values reported by PIERRE *et al.* (1986) for their hydrographic stations #10, 11, 14, 16 fall in line with these data, but the relationships between the enrichment of the oxygen and hydrogen isotopic species and of salinity differ from those found in other evaporative basins, i.e. the Red Sea (CRAIG, 1966) as well as in the western part of the Mediterranean (PIERRE *et al.*, 1986). In particular the relatively small enrichment of the deuterium is noted, with $\Delta\delta^{2}H/\Delta\delta^{18}O \sim 1.57$ compared to a value of 6 in the Red Sea. The value of $\Delta\delta^{18}O/\Delta S$ is found to be larger by a factor of two or three compared to a usual evaporative system, but the enrichment of the deuterated species is much reduced, i.e., $\Delta\delta^{2}H/\Delta S \rightarrow 0$.
This apparently anomalous pattern can be explained by the admixture of fresh waters through the Adriatic and Aegean (Black Sea) system. These continental fresh waters are depleted in the heavy isotopic species relative to the ocean waters.

A multi-stage model of evaporative enrichment followed by dilution with freshwater runoff seems to reproduce data rather well. Based on this model, the degree of admixture of freshwater runoff to the "evaporated" waters of the Mediterranean Sea can be specified.



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