

FORMATION OF THE MEDITERRANEAN CORE WATER AND IMPLICATIONS
FOR THE SALINITY BALANCE OF THE NORTH ATLANTIC OCEAN

by

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Extended Abstract

Mediterranean water of a salinity $S \approx 38.45\%$ flows out over the Strait of Gibraltar sill and entrains Atlantic water of lower salinity during its passage through the Gulf of Cadiz. In approach of Cape St. Vincent, where the mixture reaches its final depth (roughly 600 - 1400 m), its salinity is near 36.4%. A mean salinity of 35.6% for the Atlantic water component, which is the salinity found near 800 m depth, has been assumed in previous assessments of the mixing process.

From hydrographic-, tritium- and in part silica data from stations taken in the Gulf of Cadiz during cruises in 1974 to 1978 we conclude that the entrained North Atlantic water successively originates from depths ranging from 200 m to 800 m, and in the vicinity of the Strait of Gibraltar the entrained Atlantic water comes from depths less than about 300 m.

The consequence is that the average salinity of the Atlantic water component is higher than 35.6%, so that a larger amount of entrained North Atlantic water is required to form the 36.4% salinity of the final mixture.

Using a simple entrainment model fitted to our data we calculate a mixing ratio of admixed Atlantic water to Mediterranean water of about 3.75. This value leads to a minimum feed rate of $4 \cdot 10^6 \text{ m}^3/\text{sec}$ of Mediterranean Core Water in the Northeast Atlantic, which rate exceeds the value accepted in the literature by about 30%. (2)

References

- (1) Zenk, W., On the Mediterranean outflow west of Gibraltar, "Meteor" Forsch. Ergebnisse, Reihe A, No. 16, 1-14, 1975.
- (2) Worthington, L.W., On the North Atlantic circulation, The John Hopkins Oceanographic Studies, No. 6, The John Hopkins University Press, Baltimore and London, 1976.

