

## MEDITERRANEAN WATER STRUCTURE IN THE STRAIT OF GIBRALTAR

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From 1<sup>st</sup> to 18<sup>th</sup> November of 1985 about 320 CTD casts were made in the Strait of Gibraltar, within the Gibraltar Experiment. They were distributed over 5 cross-strait sections and one along strait. Each cross-strait section was occupied 4 times, once each on two successive semidiurnal tides during both spring and neap tides. Each cross-strait section was timed so that the central station was done near high water in Tarifa. The along-strait section was done twice. We also did repeated crossings of the Ciris section during 24 hours twice. All the stations were within 10 m. of the bottom.

Both mediterranean water masses, Levantine Intermediate water (LIW) and Western Mediterranean Deep Water (WMDW) were clearly distinguishable in the eastern part of the Strait till very near the sill. West of it they lost their individual characteristics, the Mediterranean water outflowing in the Atlantic became a single water mass.

LIW and WMDW in the eastern part of the Strait followed the same trend that has been found previously in the eastern entrance of the Strait (Parrilla et al, 1986). They are located almost side by side, the LIW -defined by a salinity maximum- on the Spanish slope and the WMDW -characterized by potential temperature lower than 12.9 °C- on the African slope. The LIW, in general was located between the 300 and 800 m and the WMDW extended from 300 m to the bottom, stretching out below LIW. Eastward to the eastern side of the sill the distribution it was the same but for the upper limit of the WMDW becoming shallower than that of the LIW. The former occupied always a larger cross area than LIW in all the cross sections.

The variations induced by the tidal components did not appear to affect substantially the distribution of both water masses, neither their clearly discriminable characteristics, but it seems that tides affected the spatial situation and cross areas that LIW and WMDW occupied. This last effect could be one of the mechanisms for selecting which of both water masses is preponderant in the outflow over the sill.

From the along strait sections and a 25 h. time series stations on the sill it could be seen that WMDW outflowed over the sill (Parrilla and Kinder, 1986) and it seems that the contribution of the WMDW to the outflow is larger than that of the LIW.

Just a few Km west of the sill both water masses had become a single water mass, fitting the classical description of the Mediterranean water mass in the Atlantic Ocean.

It is noticeable that the mixing processes that convert WMDW and LIW in Atlantic Mediterranean water took place in such a short distance and probably west of the sill.

## References.-

- Parrilla, G., T.H. Kinder and R.H. Preller 1986.  
Deep and Intermediate Mediterranean water in the western Alboran sea. Deep-Sea Research 33, 1: 55-88
- Kinder T.H. and G. Parrilla 1986.  
Yes, some of the Mediterranean outflow does come from great depth.  
In preparation.

## SEASONAL VARIABILITY OF THE SURFACE INFLOW THROUGH THE STRAIT OF GIBRALTAR

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We investigate the seasonal variability of the surface inflow through the Strait of Gibraltar, using historical data of sea level, wind stress, temperature and salinity, as well as idealised models and simple physical arguments.

The seasonal changes, deduced from monthly mean sea level differences across the Strait, do not reflect i) a purely barotropic flow as required by mass conservation, ii) an adjustment, month-by-month, of a two-layer salt-conserving flow, or iii) a baroclinic flow that is hydraulically controlled at the sill and driven by density changes of the inflowing Atlantic Water without changes in interface depth.

We suggest that the exchange through the Strait is submaximal, and that the interface depth changes over the course of the year. We attribute part of this change to the baroclinic set-up and set-down associated with seasonal variations in the wind stress, and the remainder to partial draining of the reservoir of dense outflowing Mediterranean Water during the summer when it is not being formed.