

## THE FLOW OF ATLANTIC WATER INTO THE ALBORAN SEA DURING DONDE VA

Henry Perkins and Thomas H. Kinder  
 Naval Ocean Research and Development Activity  
 NSTL, Mississippi 39529, U.S.A.

Summary: A nearly synoptic hydrographic survey of the western Alboran basin made in October 1982 reveals a well developed anti-cyclonic gyre in the upper 200 m. Transport of the gyre was some  $1.5 \times 10^6$  m<sup>3</sup>/sec, comparable to the transport into and out of the basin. Mixing of the inflowing Atlantic water with that of the Mediterranean is evident in the T-S relationship.

Sommaire: Une inspection presque synoptique hydrographique de bassin Ouest de Mer Alboran faite en Octobre 1982 révèle un tourbillon anti-cyclonique bien développé au-dessus de 200 m. Le transport du tourbillon de  $1.5 \times 10^6$  m<sup>3</sup>/sec était similaire au transport vers l'intérieur et vers l'extérieur du bassin. Le mélange des eaux venant de l'Atlantique avec celles de la Méditerranée est évident dans la relation du T-S.

Extensive measurements were made in the western Alboran Sea during 5-13 October 1982 as part of the Donde Va? experiment. These provide a multi-disciplinary and nearly synoptic view of the area between the meridians of Gibraltar and Alboran Island. An overview of the experiment has been given by Parrilla (1984) and by The Donde Va Group (1984). Evident in the dynamic topography is a large anti-cyclonic gyre, similar to that reported by Lanoix (1974) but of lesser intensity (Kinder and Parrilla, 1984). The gyre circulation during Donde Va? was also clear in satellite infrared images and drifter trajectories (La Violette, 1984).

Calculation of geostrophic transport in the upper 200 m indicates a satisfactory balance between the inflow through the Strait of Gibraltar and the outflow to the east past Alboran Island, both amounting to some 1.3 Sv. (1 Sv. =  $10^6$  m<sup>3</sup>/sec). The transport in the northern portion of the gyre along the section south of Malaga (2.7 Sv.) split into two approximately equal parts, one continuing on towards the east, the other returning westward to form the southern half of the gyre. The transport at the eastern boundary of the study area passed in nearly equal amounts (0.6 Sv.) to the north and south of Alboran Island.

Characteristics of the region in the northwest where the gyre and Atlantic inflow join was determined by sections across the flow made

with an instrument combining the features of a lowered current meter and CTD (VCTD). Even at the westernmost of these sections, near Estepona, the geostrophic adjustment of the inflowing water appears nearly complete, the transport of the observed current agreeing well with that determined by geostrophy.

The inflowing water from the Atlantic consists of North Atlantic Central Water (NACW) modified by mixing during its travel through the Strait of Gibraltar (Lacomb and Richez, 1982). However, characteristics of the original NACW can be detected within the Alboran Basin. The T-S curves from stations along the Estepona section north of the inflow indicate normally deep water brought to the surface through geostrophic adjustment, while those south of the inflow are more representative of the gyre interior. Within the inflow itself, the T-S curves show the range of variability expected from incompletely mixed NACW.

In contrast, T-S curves on the southern side of the gyre, near Punta Jagerschmidt for example, represent a well defined water mass, while those from other sections show a progressive development of this water mass as it sweeps around the gyre.

#### References

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