

¿DONDE VA? : MESOSCALE FLOW DYNAMICS  
EXPERIMENT IN THE STRAITS OF GIBRALTAR AND ALBORAN SEA

Paul E. La Violette  
Thomas H. Kinder  
Ruth Preller  
Harley E. Hurlburt

Naval Ocean Research and Development Activity, Bay St. Louis, Miss. 39525  
-----

The purpose of ¿DONDE VA? is to use the numerical modelling and remote sensing and in situ data collection to elucidate the dynamics of the mesoscale circulation in the Alboran Sea. Historical data has shown that this circulation is primarily driven by the density imbalance between the Atlantic Ocean and Mediterranean Sea such that mean flows of  $1$  to  $2 \times 10^6$   $m^3/sec$  move through the Straits of Gibraltar. The surface inflow of comparatively fresher (36%) water enters the Alboran Sea as a narrow jet 30 km wide and 200 m deep. Within the sea, the jet turns southward toward the African coast at or west of Cape Tres Forcas where, it splits into two branches--one returning westward toward the Straits of Gibraltar to form an anticyclonic gyre that dominates the western Alboran Sea; and the other flowing eastward to form less intensive circulation features in the eastern portion of the Sea. The areal extent and variations of these features are well displayed in satellite thermal imagery and, with the aid of computer enhancement and registration techniques, can be monitored for seasonal and short-term periods. This is being done for the period November 1981 through October 1982, with particular (twice daily) emphasis on the period of the ¿DONDE VA? survey of 1 to 20 October.

Preliminary modeling results using a reduced gravity (lower layer quiescent) non-linear, numerical model on a 5 by 10 km grid have simulated the major features of the upper layer circulation in the satellite imagery and previous hydrographic surveys. For simplicity, the model is rectangular. Thus, the formation of the gyre in the model is independent of coastal geometry and bathymetry and any interaction with the lower layer (e. g.,

baroclinic instability). From this modeling, it appears that the important parameters for the formation, size, and intensity of the gyre are the inflow angle, speed and horizontal shear.

The field portion of the experiment in June and October 1982 was conducted with the purpose of measuring inflow conditions while monitoring the strength and structure of the gyre. This was done using techniques from ships strategically positioned in the western Alboran Sea (i.e., west of Alboran Island) in the Straits of Gibraltar and in the Gulf of Cadiz. In June 1982, five current moorings were positioned along a line stretching from south of Marbella, Spain, to  $35^{\circ} 50' N$ . Three current meters were attached to each mooring--two in the Atlantic incoming water and one in the deep out flowing Mediterranean water. These were retrieved during the more intensive field surveys of October 1982.

During the October field surveys, remote sensing was done using a high frequency radar (CODAR-NOAA), four oceanographic-instrumented aircraft, and visible and infrared data from NOAA and Nimbus satellites. In addition, four ships conducted standard ocean stations in the Gulf of Cadiz, the Straits of Gibraltar, and the Alboran Sea. The collection of these field data are providing a comprehensive realization of the synoptic and near-synoptic oceanographic events taking place prior to and during the intensive study period of October.

Because of the large amount of data collected, only the most obvious results were presented at the CIESM meeting. Plans for analysis and possible numerical experiments were discussed.