

MIXING PROCESSES INDUCED BY INERTIAL WAVES ON THE SETUBAL BAY, PORTUGAL

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In this work we focus on the analysis of oceanographic measures that were taken as a part of MREA04 experiment (Maritime Rapid Environmental Assessment 2004) by the Naval Research Laboratory (NRL) of the United States on the southwest coast of the Iberian Peninsula, from 27 March to 18 April 2004 (Ko et al, 2005). We observe that several vertical profiles of Temperature-Salinity at different stations on the Setubal Bay were influenced by the fluvial contribution of the Sado estuary. Also internal waves were found at several times during the experiment period using ADCP (Acoustic Doppler Current Profiler) measures at two locations on the Setubal Bay shelf.

A rotary spectral analysis (Emery and Thomson, 1997) was used to study the characteristics of these internal waves finding the dominant interval frequency was the diurnal band that corresponds to the inertial frequency at this latitude. Moreover, fluctuations in currents were polarized toward clockwise sense, characteristic behaviour for the inertial waves in the North hemisphere (Millot and Crepon, 1981).

Episodes with and without internal waves at the same station were compared in order to analyze the influence of these waves on the vertical profiles of potential density. Thus, it is observed that when the wave is present the associated vertical shear induces mixing processes that homogenize the first meters of the water column and mixes subsuperficial waters with superficial waters. And, on the other hand, when the signal of the wave disappears, the vertical shear decreases and the zone is strongly influenced by the estuarine plume in the first 10 meters and a steep pycnocline until the 30-40 meters of depth.

We conclude that the analyzed internal waves induce mixing processes in the water column producing a net vertical transport of different properties and changing the vertical structure of the water column influenced by the waters coming from the Sado estuary.

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