" The tempestuous deep waters of the North-Western Mediterranean Sea "

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Numerous (~50) and long (1 to 6 months) time series have been collected with Anderaa current meters immersed at several depths on the continental slope off the Gulf of Lions. At the present time, this data set is not entirely analyzed and the phenomena observed are not completely understood. Nevertheless, the observations are so unexpected that, even if hypothetical and incomplete, the results obtained till now can be considered with interest. The main ideas presented in this paper have been deduced from the analysis of 2 records obtained at 10 m above the bottom, roughly on the 1800 m isobath and 6 km apart.

Firstly, we have observed a seasonal variability of the deep layer's dynamics during the period August 80 to March 81. From August (at least) to the end of December, the current measured in the bottom layer is small but significant : the speed (mean of the order of 5 cm/sec) oscillates from 0 to 15 cm/sec, and the mean direction is roughly along the isobaths to the south-west. On the beginning of January, the regime markedly changes, and till mid-March (at least) the mean and the variance of the speed are relatively large: 1/2 hour mean values up to 48 cm/sec have been measured, and two-day means larger than 30 cm/sec observed during oceanic storms which last for several days are a common feature during winter season. These very large velocities probably have a rather short space scale.

Secondly, the oscillations observed during the first period present at both points, very peculiar features. The current successively flows during several days towards directions which make an angle of ~90° roughly centered on the mean isobaths. The anticlockwise rotation generally occurs within one or two days with rather low speeds while the clockwise rotation generally occurs within a few hours with rather large speeds. The periodicity of the

phenomenon, deduced from both spectral analysis computations and a detailed study of the records is $\sim$8 days, when the time lag between the two time series is $\sim$2 days.

These features are interpreted as the effects of cyclonic and anticyclonic eddies advected in the studied area. Indeed, when summing a pure rotating current and an advective current (of about the same speed) along a rectilinear track located on one side of an eddy, the resultant current is rotating either clockwise or anticlockwise with either low or high speeds. The progressive vector diagram clearly defines the eddy as cyclonic or anticyclonic and we also know if its center has been advected on the right or left hand side of the current meter. During the experiment, the center's path was on deeper isobaths, i.e. eddies were advected to the south-west on the left of the moorings.

Other features deduced from the whole data are the very strong barotropic structure (over the whole depth) of such phenomena and the non occurence of large geostrophic currents within 40 km of the studied area. Then, the generation of such eddies is linked either to some topographic effect (very steep slopes have been detected in the vicinity from a Sea Beam survey) or, more probably, to some baroclinic instability of the Ligurian Current along the Provence coast. In that case, the eddies generated in the deep layer (in a region without any continental slope) are then bottom-trapped along the deeper isobaths when they reach the continental slope region off the Gulf of Lions (while the surface current follows the shelf break). The infra-red satellite imagery shows that the outer edge of the Ligurian Current frequently undulates : the displayed wavelengths are of the order of 60 km and in good agreement with our hypothesis of baroclinic instability of the Ligurian Current as a possible source for eddies in the deep layer.

The writing of a paper entitled "Deep Current Measurement in the North-Western Mediterranean Sea" on the relationships between the large speeds measured near the bottom in the whole area and some sedimentological features is on hand with other colleagues; it will probably be submitted as a note to Deep Sea Research. Another paper dealing with the 8-day phenomenon is to be written as soon as possible.