Non-linear internal waves generated at Nazaré canyon: observations over the W Portuguese inner shelf

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INTRODUCTION

This work is a contribution to the European project EUROSTRATAFORM, whose objectives include the study of some of the most important canyon systems indenting the European margin and the evaluation of their impacts on the sedimentary dynamics of those regions.

Previous studies based on synthetic aperture radar (SAR) images and some in-situ measurements show strong non-linear internal waves (NIW) activity over the Western Portuguese shelf, especially during the summer. These waves are probably the result of the unstable wave generation that takes place in the region, and they can be observed in the radar images, as well as being detected by the current meters. The presence of NIW over the continental shelf is quite obvious. Similarly to the surface gravity waves, NIW orbital velocities also can be depth-controlled. In the inner shelf, shoaling depths will affect C-NIW propagation speeds and degree of nonlinearity. In this area, the NIW front shows a very small curvature radius, suggesting a close generation spot. The variation of the wavefronts is also observed in the SAR images. In this region, the NIW front can be observed as a complex pattern, showing the result of 3 successive periodic events of NIW generation. Refraction processes along the propagation path lead to a non-uniform wavefront pattern, as we can see in figure 1.

For the C-NIW's (the central interest in this study), it is essential to isolate each individual poleward front. NIW (with upper layer velocity anomaly direction in the NE quadrant) from the measured timeseries. Following the results of the SAR observations, we can expect that there is a high density of NIW packets generated at the canyon and to select the in situ measurement spots for the 2004 summer program of the project.

FINAL CONSIDERATIONS

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