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Physical processes in the Nazare Canyon area and related sedimentary impacts

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The Nazare Canyon (W Portugal) is one of the largest submarine canyons of the world, extending for about 230km and completely cutting the W Portuguese shelf at 39.5N. In the framework of the european project EUROSTRATAFORM, a program of observations of the Nazare Canyon area of influence is being conducted since November 2002. The program aimed to identify the dominant physical forcings acting on this canyon, to characterise the canyon dynamics and to evaluate its impacts on the shelf circulation and sedimentary dynamics. As part of the program, two current-meter moorings were deployed at two positions along the canyon axis, by bottom depths of 3300m and 1600m. The moorings were maintained from November 2002 to September 2004, and provide almost continuous measurements of currents, temperature, salinity and turbidity at several depths, covering the water column. Each mooring was also eqquiped with a sediment trap at near bottom depths. Multidisciplinary surveys were conducted in the canyon area, providing quasi-synoptic views of the physical and sedimentary conditions inside the canyon and in the nearby shelf/slope. Two surveys (May 2004 and November 2004), in particular, allowed a detailed characterisation of the canyon conditions under prevailing upwelling conditions. The surveys include CTD/nephelometer profiles from surface to bottom and water sampling for the evaluation of suspended particulate matter and nutrients. The set of observations collected during this program reveal the highly energetic processes that characterize the Nazare Canyon. These include strong and bottom intensified tidal currents, rapid responses to the wind forcing conditions over the shelf, important deep forcing associated with the Mediterranean Water flow and large sediment exportation in association with winter storms.