



Rapid environmental assessment of the Balearic front combining glider and altimetry data

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An intensive observational programme of the Balearic front has been carried out using conventional (CTDs from ship) and new technologies (gliders). The strategy consisted in sampling a repeated section almost perpendicular to the Balearic current situated to the North of Mallorca island. This section is coincident with the track 773 of the ENVISAT satellite. In July, the sampling was designed to collect in situ data from CTDs (ship and glider) almost simultaneously to the passage of the altimetry sensor on board the ENVISAT satellite. The rest of the samplings performed every 35 days (repeat time period of ENVISAT satellite) along the satellite track have been done only by the glider platform. The front has been clearly detected in salinity (not in temperature) with lower values (37.4 PSU) near coast that are likely related to the input of recent Atlantic Water through the Mallorca channel. The observed width of the Balearic front is about 35-40 km and has a vertical extension of 200 m. This has been found to have a significantly different pattern between the July and September samplings which confirms the high mesoscale variability of this frontal area. Using a reference level of 180 m depth, we have obtained maximum geostrophic velocities of 40-45 cm/s flowing northeastwards along the North Mallorca coast. These velocity estimates are not sensitive to the test reference level (600m) indicating that the layer between 200 and 600 m does not play a key role in the dynamics of the upper layer (200 m). A dynamic height rise from July to September (in 70 days) of about 3-7 cm reflects the seasonal cycle of sea level mainly due to thermosteric expansion of the water column. This gives a rise rate in the range of 1.3-3 cm/month, which is

in agreement with previous estimates in the Mediterranean Sea. Absolute dynamic topography from altimetry data reveals good coherence with the dynamic height from glider data in the area where there are common observations. In September, ENVISAT perfectly captures the sharp gradient observed with in-situ data, with mean velocities of about 24 cm/s but with smaller variance than the glider due to the larger wavelength of the filter applied to the altimeter data.