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Geostrophic and ageostrophic circulation of a shallow anticyclonic eddy off Cape Bojador

Simon Ruiz (1), Josep L. Pelegrí (2), Mikhail Emelianov (2), Ananda Pascual (1), and Evan Mason (1)
(1) IMEDEA (CSIC-UIB), Esporles, Spain, (2) Institut de Ciències del Mar, CSIC, Barcelona, Spain

A shallow mesoscale anticyclonic eddy, observed south of the Canary Islands with satellite altimetry, has been intensively studied with multi-parametric sampling. Hydrographic data from a CTD installed on an undulating Nu-shuttle platform reveal the presence of a mesoscale anticyclonic eddy of ~ 125 km diameter. The difference in sea level anomaly (SLA) between the interior and the edge of the eddy, as determined from altimetry, is ~ 15 cm, which compares well with the maximum dynamic height differences as inferred using a very shallow reference level (130 m). Further, the associated surface geostrophic velocities, of about 35 cm/s in the northeast and southwest edges of the eddy, are in good agreement with direct velocity measurements from the ship. Deep rosette-CTD casts (1500 m depth) confirm that the structure is a shallow eddy extending no deeper than 250 m before the fusion with another anticyclone. The SLA-tendency (temporal rate of change of sea surface height) indicates a clear northwestward migration during the two first weeks of November 2008. Applying an eddy SSH based tracker, the eddy's velocity propagation is estimated as 4 km/day. Use of the QG-Omega equation diagnoses maximum downward/upward velocities of about ± 2 m/day. The instability of the Canary coastal jet appears to be the mechanism responsible for the generation of the shallow anticyclonic eddy.