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Dynamical Characterization of a Low Oxygen Submesoscale Coherent Vortex in the Eastern North Atlantic Ocean

A submesoscale coherent vortex (SCV) with a low oxygen core is characterized from underwater glider and mooring observations from the eastern tropical North Atlantic, north of the Cape Verde Islands. The eddy crossed the mooring with its center and a 1 month time series of the SCV's hydrographic and upper 100 m currents structure was obtained. About 45 days after, and 100 km west, the SCV frontal zone was surveyed in high temporal and spatial resolution using an underwater glider. Satellite altimetry showed the SCV was formed about 7 months before at the Mauritanian coast. The SCV was located at 80–100 m depth, its diameter was 100 km and its maximum swirl velocity 0.4 m/s. A Burger number of 0.2 and a vortex Rossby number of 0.15 indicate a flat lens in geostrophic balance. Mooring and glider data show in general comparable dynamical and thermohaline structures, the glider in high spatial resolution, the mooring in high temporal resolution. Surface maps of chlorophyll concentration suggest high productivity inside and around the SCV. The low potential vorticity (PV) core of the SCV is surrounded by filamentary structures, sloping down at different angles from the mixed layer base and with typical widths of 10–20 km and a vertical extent of 50–100 m.

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