



Description of the Lofoten Basin Eddy using three years of Seaglider observations

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The Lofoten Basin of the Norwegian Sea is an area where the warm Atlantic Water is subject to the greatest heat losses anywhere in the Nordic Seas. The region is recognized as an area of intense mesoscale activity, including eddies shed from the Norwegian slope current and a long-lived, deep, anticyclonic eddy residing in the central part of the basin (the Lofoten Basin Eddy, LBE). Here we use observations from Seagliders, collected in five missions between July 2012 and April 2015, to describe the LBE in unprecedented detail. The missions were concentrated to sample the LBE repeatedly, allowing for multiple realizations of radial sections across the eddy. The LBE has a mean radius of 18 ± 4 km, and propagates cyclonically with a mean speed of approximately $3\text{--}4$ cm s⁻¹. The anticyclonic azimuthal peak velocity varies between 0.5 and 0.7 m s⁻¹, located between 680 and 860 m depth, and 16 and 25 km radial distance to the eddy center. The contribution of geostrophy in the cyclogeostrophic balance is approximately 50%, which indicates the importance of the non-linear effects. The relative vorticity representative of the core exhibits large values between $-0.7f$ to $-0.9f$, where f is the local Coriolis parameter. The eddy core is long-lived (at least two years from May 2013 to March 2015), has characteristic values of Conservative Temperature of 4.8°C and Absolute Salinity of 35.34 g kg⁻¹, and deepens to approximately 730 m in wintertime. A comparison of the eddy properties to those inferred from automated tracking of satellite altimeter observations shows that while the location of eddy center is detected accurately to within 5 km, the altimeter inferred vorticity is underestimated and the radius overestimated, each approximately by a factor of 2, because of excessive smoothing relative to the small eddy radius.