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The oceanic variability of the Lofoten basin: first results from the glider activity of the ProVoLo project

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Located in the northern Norwegian Sea at high latitude between 68°N and 73°N, the Lofoten basin is one of the world's most energetic areas regarding the ocean dynamics. It hosts the largest and deepest pool of warm Atlantic Waters in the Nordic Seas, thus leading to very intense air-sea energy fluxes and deep convection in winter. Understanding the physical processes involved in the water mass transformations of this very productive area is thus of crucial interest in a climate perspective, as well as for the fishery economics. The ProVoLo project aims at quantifying the energy pathways from the large-scale circulation to the (sub-)mesoscale, and eventually to the dissipation scale. To this end, the project is largely devoted to in situ observations involving R/V cruises (CTD, LADCP, microstructure), mooring lines, gliders (CTD and microstructure) and RAFOS floats.

Collecting data with gliders in such a dynamical environment is a challenge. We present results from two completed Seaglider missions of 8-months duration each, started in May 2016, as well as from three ongoing missions. The observations enable the description of two key features of the Lofoten basin circulation:
1 - The Lofoten Basin eddy, which is permanent anticyclonic vortex that has been regularly detected in the center of the basin over the last decades. The vortex has very intense subsurface peak velocities exceeding 0.7 m/s and a small radius of about 15 km. The collected data also enable a description of the seasonal variability associated with the vortex, and give insight into its interaction with higher frequency flows.
2 - The frontal region situated along the Mohn ridge. The front is characterized by a narrow ($\sim$15 km) and intense baroclinic jet separating the warm Atlantic waters from the cold waters coming from the Arctic. The observations from intensive sampling of this front, testify an important variability, at both seasonal time scale and from meso to submesoscale.