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ISOW pathways and mixing revealed by Deep-Argo floats

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The North Atlantic Subpolar gyre (NASPG) is a privileged region for the formation of the water masses of the lower limb of the Meridional Overturning Circulation by winter heat loss. The formation of these dense water masses contributes to the uptake and transfer of anthropogenic carbon and dissolved oxygen (O_2) to the deep ocean. While knowledge in deep circulation is required for understanding long term changes in heat content, acidification and ventilation of deep ocean interior, the spatio-temporal variability of the deep circulation and its driving mechanisms are still poorly documented. To address such issues, the Laboratoire d'Océanographie Physique et Spatiale (LOPS, Plouzané) deployed five Deep-Arvor below 2000m depth in the Iceland-Scotland Overflow Water (ISOW) between 2015 and 2016. The Deep-Arvor is an Argo profiling float able to sample temperature, salinity and O_2 down to 4000m. While the trajectory of floats deployed in the Irminger Sea in 2016 was predictable, results from the three deep-arvor floats launched at Charly Gibbs fracture zone during summer 2015 are unforeseen. None of these floats circulated northward in the Irminger basin as initially expected considering recent general deep circulation schemes [e.g. Daniault et al., Prog. Oceanogr. 2016], and one of them revealed a new pathway westward till the western boundary current (WBC). Based on all float trajectories combined to satellite observations, we show that surface circulation strongly influenced float displacements and that the North Atlantic Current shaped the deep circulation between the eastern and western parts of the NASPG, as well as with the subtropical gyre. Finally, analysis of the water masses characteristics from the Deep-Arvor data set are also used to estimated westward mixing of ISOW toward the western boundary current. These results will be compared to those obtained from the 4 additional Deep-Arvor floats deployed in ISOW during summer 2017.