



Water mass properties on their way over the Mid-Atlantic-Ridge through the Faraday Fracture Zone

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Over the last decades there have been major changes in the water mass properties and production of Labrador Sea Water (LSW) in the subpolar North Atlantic. A dedicated work package in the framework of the German research project “North Atlantic” examines therefore the variability of deep water formation in the Labrador Sea and connections to transport variations of the North Atlantic Current (NAC), the strength of the subpolar gyre and the propagation of water masses into the East Atlantic. In the focus of this study are the pathways of the NAC over the Mid-Atlantic-Ridge (MAR) and the LSW T/S- properties that are carried over the MAR in the LSW range below the NAC.

Since November 2009 three moorings have been collecting data at the western entrance of the Faraday Fracture Zone (FFZ) to monitor water mass variability. FFZ is situated south of the Charlie-Gibbs-Fracture Zone (CGFZ) and is one of the major passages for deep water masses across the MAR into the East Atlantic basin. Moorings have been serviced annually and data from the first two deployments are presented here. The analysis presented here combines in-situ time series from the moorings with satellite and Argo data to identify the pathways of the NAC over the MAR in local velocity and temperature and salinity data.

First results show a persistent occurrence of the NAC over the FFZ from mid 2009 until early 2010 based on sea surface height fields, which is reflected in strong convergent velocity signals at the mooring sites. From 2010 onward, a northern NAC branch over the CGFZ is prominent in the altimeter record but the core seem to split again in mid 2010 into a northern and a southern branch. The branching of the NAC is also reflected in the trajectories of Argo floats over the MAR which are locked to the various fracture zones. The T/S – time series from the moored instruments show extreme saline as well as fresh variations of the LSW, which are related to the variability of the current system. Argo measurements in the vicinity of the moorings from 2000 onward could be used to show that the 2 year time series of LSW properties at the mooring sites are part of a long-term temperature and salinity increase in this water mass.