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Variability of transport and pathways of the North Atlantic Current: a comparison of satellite altimetry data and observational data from pressure inverted echo sounders

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The North Atlantic with its major currents being part of the Atlantic Meridional Overturning Circulation (AMOC) is one of the major climate relevant regions and of special interest in the context of climate change. The North Atlantic Current (NAC), extending the Gulfstream in northward direction and forming the upper branch of the AMOC, transports warm and saline water from the subtropics into the subpolar North Atlantic. This provides not only the energy for basal melt of the Greenland Ice Sheets but also leads, for instance through the exchange of heat between the sea surface and the atmosphere, to relatively mild winter temperatures in northern Europe.
On its way north, the NAC splits up into different branches. For this work of special interest is the pathway of the NAC in the Newfoundland Basin. Here, the NAC splits up into a recirculation and different pathways that cross the Mid-Atlantic Ridge and subsequently either flow eastward into the Nordic Seas or westward contributing to the subpolar gyre. In the subpolar gyre, deep water formation takes place connecting thus the upper branch of the AMOC with its lower branch. By this, the strength of the NAC and its pathways are closely linked to the global climate.
To study the circulation in the subpolar North Atlantic with a focus on the NAC, satellite altimetry data is combined with NAC transports measured with pressure inverted echo sounders at 47°N and at the Mid-Atlantic Ridge. In order to evaluate the link between the NAC circulation and atmospheric fluctuations, the spatial and temporal correlation between the altimetry data, NAC transports and the North Atlantic Oscillation is studied additionally.