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Export of convective water in the boundary current of the Labrador Sea

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A regional high-resolution numerical model of the subpolar North Atlantic is applied to study water mass transformation processes during a period of medium to deep convection in the Labrador Sea. The model realistically describes the hydrographic structure and the observed current system including boundary currents as well as recirculations. From backward Lagrangian drifter calculations it is found that about half of the Labrador Sea Water leaving the Labrador Sea within the deep Labrador Current was part of the mixed layer during the same year. Mixed layer water is predominantly subducted into the stratification within and near the southern boundary current in particular near 56°N, 56°W. Directly upstream of this location, near the boundary current, largest water mass transformations are found that are forced by the strongest surface buoyancy fluxes encountered in the Labrador Sea. The water mass transformations already start in early winter and are initiated by a doming of the isopycnals between southern boundary current and recirculation. While the export of convective water masses from the central Labrador Sea is a slow and continuous process, convective water masses generated near the boundary current are exported rapidly with maximum transport values during March at the 53°N section. The results obtained by the numerical model are discussed in comparison to observations.