



A mechanism for fluctuations between Atlantic inflow branches to the Arctic

V.S. Lien, F.V. Vikebø, and Ø. Skagseth

Institute of Marine Research, Bergen, Norway (vidar.lien@imr.no)

Atlantic Water inflow to the Barents Sea ensures a steady flow of heat, nutrients and plankton to one of the most productive shelf seas of the world. We utilize direct current measurements and a numerical ocean model to quantify the mean and variability of the flow pattern on the northern slope of the Barents Sea Opening, and discusses the results in climatologically and ecologically perspectives. We find that a dominating westward flow is interrupted by transient flow reversals following a reduction of the downstream sea surface height through Ekman transport off the northern Barents Sea shelf, caused by a northward shift of the storm tracks. The subsequent cross-slope sea surface height gradient induces a compensating barotropic current, which advects more heat into the Barents Sea, where it is lost to the atmosphere, leaving less heat to enter the Arctic Ocean through the Fram Strait, where it effectively gets insulated by the cold halocline. Furthermore, the heat is made readily available to melt sea-ice, a key process in the marginal ice zone ecosystem dynamics.