



Evaluation of dense water cascading and cross-shelf exchange in the Arctic Ocean: inter-comparison project.

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Dense water cascading (DWS) is a specific type of bottom-trapped gravity current, which is particularly important in the Arctic Ocean as the main mechanism of ventilation of interior waters, under conditions when open ocean convection is blocked by strong density stratification. Being a localized and sporadic process, and occurring mostly under sea ice in winter time, DWC is hard to observe. Only 24 locations have been identified around the AO, where DWC events were confirmed for the entire period of instrumental observations.

This study is the first output of the model inter-comparison project, initiated by the Forum for Arctic Ocean Modeling and Observational Synthesis (FAMOS), “cascading team”. In this multi-model inter-comparison study we explore (DWC) on the multi-decadal time scale using an ensemble of 10 different regional and global model set ups. These include models with different vertical discretization schemes: z-coordinates, hybrid and isopycnal, eddy-resolving and eddy-admitting models, different physics and vertical mixing schemes.

We identify the locations with the most favourable and intensive DWCs and evaluate associated cross-shelf mass heat and salt fluxes. Alongside the cascading flux, we examine other components of cross-shelf exchange, as Ekman surface and bottom fluxes, eddy fluxes and their effects on the DWC and water mass transformation. We compared results with available observations and theoretical estimates, known in the literature. We found, that cascading flux is dominant process in the cross shelf exchange.