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High Resolution simulations of the halocline waters outflow from the Arctic Ocean

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Arctic fresh water plays a large role in both the global ocean circulation and the hydrological cycle. To identify sources and pathways of the Arctic outflow into the North Atlantic, results of a high resolution global model and observations have been examined. It has been shown that continental runoff and snow melt dominate the other Arctic fresh water sources. This analysis of the simulated circulation demonstrates that the oceanic outflow accounts for the majority of the fresh water transport from the Arctic into the North Atlantic. The oceanic outflow from the Arctic splits almost equally between the route through the Canadian Arctic Archipelago and the one through the Nordic. Pacific water and Arctic Atlantic Water are present on both the routes, with the route through the Canadian Arctic Archipelago being the principal pathway for Pacific water export and Arctic Atlantic Water dominating in the Nordic Seas. Most of the fresh water associated with sea ice melt and snow melt arrives into the North Atlantic via the Nordic Seas. Pacific water advances as far south as 42°N into the North Atlantic and is found at Grand Banks, whereas in the Nordic Seas it does not extend further south than 65°N. The simulation of the passive tracers demonstrated that the outflow of the Arctic upper halocline water into the North Atlantic contains about half the Pacific water, with the remainder of the upper halocine water formed locally in the Arctic Ocean.

Keywords
Arctic Ocean, Canadian Arctic Archipelago, Baffin Bay, Labrador Sea, Nordic Seas, Fram Strait, fresh water, Pacific water, Arctic Atlantic Water, sea ice, ocean modelling.