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Confluence, mixing, and circulation scheme of Atlantic, Pacific, and Siberian shelf water masses around the Mendeleyev ridge into the central Arctic Ocean

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The importance of the Arctic Ocean circulation to the global thermohaline circulation has been recognized, but the circulation scheme of the Arctic Ocean is still highly uncertain. One of the key areas to understand the Arctic Ocean circulation is around the Mendeleyev Ridge because Atlantic, Pacific, and Siberian Shelf water masses meet around the area and may flow into the central Arctic Ocean together. Using hydrographic observational data around the Mendeleyev Ridge, in the Makarov Basin and the Canada Basin during IPY period and later, we examined the distribution, characteristics, and mixing processes of these water masses to understand the circulation scheme of the Arctic Ocean. In 2008, the front between Atlantic and Pacific water masses was clearly located at the western edge of Chukchi Rise. The boundary current of the Atlantic Water coming from the Eurasian side partly flows into the central Arctic Ocean along the Mendeleyev Ridge and remainder goes along the Siberian shelf slope into the Canada Basin side. Siberian shelf water masses also flow into the central Arctic Ocean with modification due to mixing with Atlantic water and cold halocline water. It is interesting that no signal from Pacific-origin water masses can be found over the main stream of the Atlantic Water inflow to the central Arctic Ocean over the Mendeleyev Ridge, although the signals of summer/winter Pacific water masses were very clear over the Chukchi Plateau. In summer 2009 and 2010, we could find the similar signals of Atlantic and Siberian shelf water masses but no Pacific water signal in the northern Canada Basin. This suggests a flow from the Mendeleyev Ridge into the central Arctic Ocean during these periods. Interannual variability in the distributions and characteristics of these water masses is discussed, related to a change in the atmospheric circulation pattern and recent sea ice reduction.