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Structure and seasonal variability of the Arctic Boundary Current north of Severnaya Zemlya

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We assessed the spatial and temporal variability of the Arctic Boundary Current (ABC) using a high-resolution array of 7 oceanographic moorings, deployed across the Eurasian continental slope north of Severnaya Zemlya in 2015-2018. In particular, we quantified transports and individual water masses based on temperature and salinity recorders and current profilers. The highest velocities (>0.30 ms-1) of the ABC occurred at the upper continental slope and decreased offshore to below 0.03 ms-1 in the deep basin. The ABC shows strong seasonal variability with velocities two times higher in winter than in summer. Compared to the upstream conditions north of Svalbard, the water mass distribution changed significantly within 20 km from the shelf edge due to mixing with- and intrusion of shelf waters. Further offshore, Atlantic Waters remained largely unmodified. The ABC transported 4.2±0.1 Sv across the region with 63-71% of the volume transport constrained within 30-40 km of the shelf edge. Water mass transport was 0.52±0.13, 0.9±0.27, 0.9±0.33 and 0.9±0.35 Sv for Atlantic Waters (AW), Dense Atlantic Water (DAW), Barents Sea Branch Water (BSBW) and Transformed Atlantic Water (TAW), respectively. A seasonality in TAW and BSBW transport was linked with temperature changes, where maximum transports coincided with minimum temperatures. Our results highlight the importance of the Barents Sea for the ABC along the Siberian slopes, and indicate that a continuing Barents Sea warming would directly translate to reductions in the TAW and BSBW cooling effect and thus lead to warmer oceanic conditions in the ABC pathway.