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Changes in Atlantic Water circulation patterns and volume transports North of Svalbard over the last 12 years (2008-2020)

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Atlantic Water (AW) enters the Arctic through Fram Strait as the West Spitsbergen Current (WSC). When reaching the south of Yermak Plateau, the WSC splits into the Svalbard, Yermak Pass and Yermak Branches. Downstream of Yermak Plateau, AW pathways remain unclear and uncertainties persist on how AW branches eventually merge and contribute to the boundary current along the continental slope. We took advantage of the good performance of the 1/12° Mercator Ocean model in the Western Nansen Basin (WNB) to examine the AW circulation and volume transports in the area. The model showed that the circulation changed in 2008-2020. The Yermak Branch strengthened over the northern Yermak Plateau, feeding the Return Yermak Branch along the eastern flank of the Plateau. West of Yermak Plateau, the Transpolar Drift likely shifted westward while AW recirculations progressed further north. Downstream of the Yermak Plateau, an offshore current developed above the 3800 m isobath, fed by waters from the Yermak Plateau tip. East of 18°E, enhanced mesoscale activity from the boundary current injected additional AW basin-ward, further contributing to the offshore circulation. A recurrent anticyclonic circulation in Sofia Deep developed, which also occasionally fed the western part of the offshore flow. The intensification of the circulation coincided with an overall warming in the upper WNB (0-1000 m), consistent with the progression of AW. This regional description of the changing circulation provides a background for the interpretation of upcoming observations.