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Formation of dense water dome over the Central Bank under conditions of reduced ice cover in the Barents Sea

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On the basis of various data sets we traced formation of a 'dome'- shaped density structure over the Central Bank - an important morphological element of the Barents Sea bottom topography. The major conclusion, which follows from our analysis, based on direct winter measurements in 2019, is that under reduced ice cover, transformation of thermohaline structure during the cold season principally differs from that under the 'normal' climate conditions in the 20th century. Transition from the stratified vertical structure (in summer) to the homogeneous one (in winter) is governed by thermal convection. Additional input of warm and salty water with inflowing AW is crucial to allow reaching the seabed vertical mixing before the temperature drops to the freezing point. Cascading of dense water from the bank commences as soon as convection has spread to the seabed. The influence of cascading on the Barents Sea hydrographic structure extends far away from the bank. In the absence of advective influx of salt and warm water vertical convection can also reach the seabed. However, under this condition formation of sea ice and haline convection is required. In this case water temperature in the homogeneous water column over the bank is close to the freezing point. Obtained results suggest that in the warmer climate the role of sea ice in winter transformation of thermohaline conditions over the bank is opposite to what it was in the 'normal' climate: imported sea ice blocks convection, thus making the water in the dense 'dome' warmer than it typically was throughout the 20th century.