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Impact of Atlantic water inflow on winter cyclone activity in the Barents Sea: Insights from coupled regional climate model simulations

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The impact of the Atlantic water inflow (AW inflow) into the Barents Sea on the regional cyclone activity in winter is analyzed in 10 ensemble simulations with the coupled Arctic atmosphere-ocean-sea ice model HIRHAM-NAOSIM for the 1979–2016 period. The model shows a statistically robust connection between AW inflow and climate variability in the Barents Sea. The analysis reveals that anomalously high AW inflow leads to changed baroclinicity in the lower troposphere via changed static stability and wind shear, and thus favorable conditions for cyclogenesis in the Barents/Kara Seas. The frequency of occurrence of cyclones, but particularly of intense cyclones, is increased over the Barents Sea. Furthermore, the cyclones in the Barents Sea become larger (increased radius) and stronger (increased intensity) in response to an increased AW inflow into the Barents Sea, compared to years of anomalously low AW inflow.

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