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Bistability of the Atlantic subpolar gyre in a coarse-resolution climate model

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High resolution models indicate that the dynamics of the Nordic Seas and the subpolar gyre is crucial for deep water formation and overturning circulation in the Atlantic. During the last decades significant changes in ocean properties have been observed in this region. We show that large-scale dynamics, as captured by coarse resolution climate models, allows for a bistability of the Atlantic subpolar gyre. We suggest three positive feedbacks which yield the necessary nonlinearity for this behavior. Transitions between the two states can be triggered by small fluctuations in surface freshwater flux to the Nordic Seas, only slightly larger than natural variability presently observed in the region.