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Is the Atlantic subpolar gyre bistable in comprehensive coupled climate models?

A. Born (1,2), T.F. Stocker (1,2), C.C. Raible (1,2), A. Levermann (3,4)

(1) Climate and Environmental Physics, Physics Institute, University of Bern, Bern, Switzerland (andreas.born@climate.unibe.ch), (2) Oeschger Centre for Climate Change Research, Bern, Switzerland, (3) Potsdam Institute for Climate Impact Research, Potsdam, Germany, (4) Institute of Physics, University of Potsdam, Potsdam, Germany

The Atlantic subpolar gyre is one of the main drivers of decadal climate variability in the North Atlantic. The present study systematically analyzes its dynamics in pre-industrial control simulations of 19 different comprehensive coupled climate models. The analysis is based on a recently proposed description of the SPG dynamics that found the circulation to be potentially bistable due to a positive feedback mechanism including salt advection and enhanced deep convection in the SPG center. We employ a statistical method to identify multiple equilibria in time series that are subject to strong noise and analyze composite fields to assess whether the bistability results from the hypothesized feedback mechanism. Due to dominant noise in most models, only four models show two detectable metastable circulation modes, whereof three confirm the importance of the positive feedback mechanism.