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Changes of the NAO in projections of future climate under increasing GHG-concentrations and stabilization thereafter

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It is well known that climate change in terms of global rise of near surface temperature or sea level will continue even after stabilization of GHG-concentrations. We present one of the first studies focusing on changes of the NAO under both an increase and the stabilization of the GHG-concentrations. The coupled AO-GCM EGMAM (ECHO-G with Middle Atmosphere Model) is used. Investigations are based on a set of scenario simulations under the A1B, A2 and B1 scenario. For each scenario 3 realizations with different starting conditions are available. Selected simulations were continued with stabilization of the GHG-concentrations in 2100 for another 100 to 200 years. For comparison simulations with 1% increase of CO2-concentrations with stabilization after doubling and quadrupling of the concentrations are also available. Results are compared to a pre-industrial control simulation.

Whereas no significant change of the NAO is found in simulations under the weakest scenario (B1), individual simulations under the A1B and A2 scenario show a significant shift towards a more positive phase. During the scenario period (2000-2100), the centennial trends of individual simulations exceed the low frequency variability of the control simulation. In some simulations, however, the NAO remains within internal variability of the control simulation, indicating a relevance of the starting conditions for the trends. Under stabilization of the GHG-concentrations no further increase is found. However, due to the high low-frequency internal variability of the NAO the simulations should be continued to address the question whether there is a shift towards the current state of the NAO on longer timescales.