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On the forced response and decadal predictability of the North Atlantic Oscillation

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We investigate the forced response of the North Atlantic Oscillation (NAO) in large ensembles of climate models including simulations with historical forcings and initialized decadal hindcasts. The forced NAO in the CMIP6 historical ensemble correlates significantly with observations after 1970. However, the forced NAO shows an apparent non-stationarity with significant correlations to observations only in the period after 1970 and in the period before 1890. We demonstrate that such apparent non-stationarity can be due to chance even when models and observations are independent. We find only weak evidence that initialization improves the skill of the NAO on decadal time-scales. Neither of the historical ensembles including only natural forcings, well-mixed greenhouse-gases, or anthropogenic aerosols show any skillful NAO. Our results question the possibility of useful decadal predictions of the NAO.