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Non-annular, hemispheric signature of the winter North Atlantic Oscillation

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Sensitivity experiments with an atmospheric general circulation model (AGCM) without a proper stratosphere are performed to locally force a North Atlantic Oscillation (NAO)-like response in order to analyse the tropospheric dynamics involved in its hemispheric extent. Results show that the circulation anomalies are not confined to the North Atlantic basin not even within the first ten days of integration, where the transient response propagates downstream into the westerly jets. At the quasi-equilibrium stage, the response emphasizes a wavenumber-5 structure embedded in the westerly jets, associated with eddy feedback upon the Atlantic and Pacific storm-tracks. This AGCM waveguided structure rightly projects on the observational NAO-related circumglobal pattern, providing evidence of its non-annular character at tropospheric levels. These findings support the view on the importance of the circumglobal waveguide pattern (CWP) on the development of NAO-related anomalies at hemispheric level. It could help to settle a consensus view of the Arctic Oscillation, which has been elusive so far.