Geophysical Research Abstracts, Vol. 7, 03695, 2005
SRef-ID: 1607-7962/gra/EGU05-A-03695

Influence of the North Atlantic horseshoe sea surface temperature pattern on the northern winter atmosphere circulation

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Projections of an idealised North Atlantic horseshoe (NAH) forcing SST pattern and its subcomponents onto the atmospheric circulation are assessed during the extended winter period, October through to April, using an atmosphere-only GCM, the HadAM3. Asymmetries are illustrated in the early and late winter responses about the sign change of the SST forcing patterns. Additionally it is shown that the significant response given by the whole NAH pattern is mainly induced by the subtropical component, with the atmospheric response to the extratropical SSTs not generally being globally significant. Mechanisms via which the SST anomalies significantly influence the atmosphere circulation are investigated, with particular case studies utilized to assess how the atmosphere responds to observed cases of warm/cold NAH events. Additionally, the feedback onto the ocean is identified by examining the impact on the wind stress and heat flux anomalies. In particular, the effect of seasonal changes in the mean wind strength influences the latent heat flux anomalies.