



Impact of the Equatorial Atlantic Cold Tongue mode on the atmospheric circulation over the North Atlantic

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The variability in the equatorial Atlantic is dominated by two modes of variability: The interhemispheric gradient mode and the equatorial cold tongue mode. Both modes are simulated well by the coupled SPEEDO model. Here we study the response of the North Atlantic atmospheric circulation to the equatorial cold tongue mode. Similar as observed, SPEEDO simulates a significant association between a NAO-like signal during early winter and the cold tongue mode 1-2 months earlier. It appears that the lagged relationship is caused by the persistence of the cold tongue mode, which attains its maximum amplitude in the late summer, and the favorable conditions for Rossby wave propagation into the Northern Hemisphere in early winter. During that time of the year the ITCZ is situated over the cold tongue mode, enabling the generation of upper tropospheric divergence which induces the Rossby wave. Using a 200-member ensemble of the atmospheric component of SPEEDO forced by the cold tongue mode we have analyzed the dynamics of the extra-tropical response. This response is circumglobal and strongly modified by nonlinear interactions due to transient eddy feedbacks.