

# **Role of the Atlantic Ocean in modulating North-American and European weather extremes on decadal timescales**

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The relationship between the frequency of weather extremes and the slowly-varying ocean state is still elusive. In this study, statistical modes of covariability between sea surface temperature (SST) and subseasonal temperature variability in the lower troposphere midlatitudes over decadal timescales are identified by applying singular value decomposition analysis to observational data. The dominant mode of covariability identified by this analysis highlights an important connection between wintertime SSTs over the subtropical Atlantic Ocean and subseasonal surface temperature variability over Northeastern America and Europe. The connection between the subtropical Atlantic and the midlatitudes is established through the propagation of a Rossby wave train forced by anomalous oceanic heat sources in the subtropics. The modification of the wintertime circulation by this wave train modulates transfers of energy between the time-mean flow and the quasi stationary eddies that are responsible for the occurrence of surface temperature extremes.

Key words: subseasonal variability, weather extremes, oceanic variability, Atlantic multidecadal variability, atmospheric energetics