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The Atlantic Niño is assumed to be largely governed by coupled atmosphere-ocean dynamics described by the Bjerknes-feedback, a positive feedback loop between adjustments in atmospheric and oceanic circulations. The postulation is that initial sea surface temperature (SST) anomalies in the eastern equatorial Atlantic can modify the zonal SST gradient and alter the vertical profile of atmospheric diabatic heating through changes in convection, water vapour, cloud cover and precipitation? across the basin. The increased diabatic heating gradient slows down the Walker Circulation and activates the oceanic component of the Bjerknes feedback. However, the physics underlying the Atlantic Niño remain under debate. In particular, the role of diabatic heating which represents the atmospheric component of the Bjerknes feedback loop is often overlooked. In this study, we use multiple observations to show that diabatic heating variability that is linked to the seasonal migration of the inter-tropical convergence zone controls the seasonality of the Atlantic Niño. The strongest diabatic heating variability in spring leads that in the SST in summer, whereas the atmospheric response to the SST variability is relatively weak. This can be linked to net surface heat flux tendencies which drive the mixed-layer temperature anomalies in spring, but is the major damping term in June-July when the SST variability peak, although observational uncertainty is quite large. Entrainment is the dominant heating term associated with the peak SST variability in June. Our findings point to the existence of a strong meridional variability in the atmosphere, which by terminating the Bjerknes feedback, controls the seasonality of the Atlantic Niño.
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