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Sensitivity of Equatorial Atlantic Variability to Mean State Biases

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Analysis of observed sea surface height, sea surface temperature, and heat flux and reanalysis wind stress and upper ocean temperature show that the Equatorial Atlantic Zonal Mode (ZM) obeys similar physics to the El Nino Southern Oscillation (ENSO): positive Bjerknes and delayed negative feedbacks. This implies the ZM may be predictable on seasonal timescales, but models demonstrate no prediction skill in this region. In this study using different configurations of Kiel Climate Model (KCM), we show that a reasonable simulation of the ZM depends on realistic representation of the mean-state, i.e. surface easterlies along the equator, upward sloping thermocline to the east, with an SST cold tongue in the east. We further attribute the differences among the simulations to the individual components of the positive Bjerknes and delayed negative feedbacks. Our findings indicate that seasonal predictions will have no skill in the Equatorial Atlantic while the coupled models exhibit large mean state errors.