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Impacts of CGCM bias reduction on the equatorial Atlantic inter-annual variability

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Mean-state impact on simulated variability in the equatorial Atlantic by coupled model is revisited. We employ three different state-of-the-art coupled global models (CGCMs) to investigate how the climatological bias correction improves the representation of the equatorial Atlantic inter-annual variability (EAV). With respect to the observations, the three CGCMs exhibit the warm sea surface temperature (SST) bias in the equatorial Atlantic ocean and depict some failures to reproduce the EAV and associated dynamical and thermodynamical processes. By a bias correction with methodology based on the anomaly coupling technique, the climatological biases of the three models are largely alleviated and the simulated EAV and associated mechanism are improved. The Bjerknes Feedback, which is a fundamental mechanics to explain the EAV, works more realistically in the bias-corrected simulations than in the free simulations. In particular, the surface zonal wind is better correlated with the underlying SSTs in the central equatorial Atlantic in May to June, which is explainable for the summer peak in the EAV. In addition, the net surface heat flux is the stronger damping contributor to the EAV in the bias-corrected runs than in the free runs, which is also more realistic with respect to the observations. Our multi-model approach can provide more robustness to the fact that the systematic model biases in the climatology influences the representation of EAV.