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# Sources of tropical Atlantic coupled model biases derived from initialised hindcasts and partially coupled sensitivity experiments

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State-of-the-art coupled general circulation models (CGCMs) still fail to simulate the mean state and variability of the tropical Atlantic (TA) climate correctly. We investigate the importance of air-sea interaction at different regions in the TA by means of performing partially coupled sensitivity experiments with the state-of-the-art CGCM EC-Earth3.1. All simulations are intialised from the observed climate state. By studying the initial drift in sensitivity experiments we obtain insight into the tropical dynamics and sources of model bias. We test the influence of realistic wind stress forcing over different regions of the TA on the development of SST as well as other oceanic biases. A series of hindcasts fully initialised in May and run until the end of August are performed with prescribed ERA-Interim zonal and meridional wind stresses over three different regions: firstly, we force the entire TA from 15N – 30S. Secondly, we force the equatorial band only between 5N – 5S, and finally we force the coastal area of the Angola Benguela upwelling region between 0W and the coast and between 5S – 30N. Our setup only affects the oceanic forcing and leaves the atmosphere free to adapt, such that we can identify the air-sea interaction processes in the different regions and their effect on the SST bias in the fully coupled system. The differences between forcing the entire TA and the equatorial region only are very small, which hints to the great importance of the relatively narrow equatorial region. The coastal upwelling area does not strongly affect the equatorial region in our model. We identify the equatorial band as most susceptible to errors in the wind stress forcing and, due to the strong atmosphere-ocean coupling, as source of the main biases in our model. The partially coupled experiments with initialised seasonal hindcasts appear to be a powerful tool to identify the sources of model biases and to identify relevant air-sea interaction processes in the TA.