



Origin of Southeast Tropical Atlantic Biases in Climate Models

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Most coupled general circulation models (CGCMs) suffer from a prominent warm sea surface temperature (SST) bias in the southeast tropical Atlantic Ocean off the coast of Africa. The origin of the bias is not understood and remains highly controversial. Previous studies suggest that the origin of the bias stems from systematic errors of atmospheric models in simulating surface heat flux and coastal wind, or poorly simulated coastal upwelling. In this study, we show, using different reanalysis and observational data sets, IPCC model simulations, as well as a set of high-resolution regional climate model simulations, that systematic errors in ocean models make a significant contribution to the bias problem. In particular, (1) the strong warm bias at the Angola-Benguela front that is maintained by the local wind and the convergence of Angola and Benguela Current is caused by an overshooting of the Angola Current in ocean models and (2) the alongshore warm bias to the south of the front is caused by ocean model deficiencies in simulating the sharp thermocline in the equatorial Atlantic and along the Angola coast and the complex circulation system within the Benguela upwelling zone. We will further examine how regional air-sea feedbacks in the region can amplify systematic errors in the ocean and atmosphere model using a high resolution coupled regional climate model.