

Relationships Among Inter-model Spread and Biases in Tropical Atlantic Sea Surface Temperatures

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State-of-the-art general circulation models show important systematic errors in their simulation of sea surface temperatures (SST), especially in the Tropical Atlantic. In this work the spread in the simulation of climatological SST in the Tropical Atlantic by 24 CMIP5 models is examined, and its relationship with the mean systematic biases in the region is explored. The modes of inter-model variability are estimated by applying Principal Component (PC) analysis to the SSTs in the region 70°W-20°E, 20°S-20°N. The inter-model variability is approximately explained by the first three modes. The first mode is related to warmer SSTs in the basin, shows worldwide connections with same-signed loads over most of the tropics and is connected with lower low cloud cover over the eastern parts of the subtropical oceans. The second mode is restricted to the Atlantic, where it shows negative and positive loads to the north and south of the equator, respectively, and is connected to a too weak Atlantic Meridional Overturning Circulation (AMOC). The third mode is related to the double Intertropical Convergence Zone bias in the Pacific and to an interhemispheric asymmetry in the net radiation at the top of the atmosphere. According to the results, the most important of these contributors for SST biases spread in the Tropical Atlantic is the second mode, with models having stronger biases simulating weaker AMOCs.

Keywords: GCM bias, CMIP5, tropical Atlantic, intermodel spread