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Weakening of the equatorial Atlantic SST variability under global warming

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The eastern equatorial Atlantic is the region with the largest seasonal and interannual sea surface temperature (SST) variability in the entire tropical Atlantic Ocean. It is characterized by a rapid cooling during the boreal summer season, between June and September, that has large impacts in the regional climate. In this study we explore climate changes related to global warming in the cold tongue region using the CMIP5 and CMIP6 datasets as benchmarks. The historical simulations of both CMIP generations reproduce fairly well the spatial pattern of the observed warming – although weaker – in the Angola-Benguela region and most of the equatorial Atlantic band. The largest disagreements between model and observations are localized in the eastern equatorial Atlantic. The future business-as-usual scenario shows an intense and zonally homogeneous warming along the equatorial Atlantic band in CMIP5 and CMIP6. We also find a significant reduction of the June-July-August SST variability of 12% (17%) in the ensemble mean of the CMIP5 (CMIP6), in the future scenario (2050-2099) with respect to the historical period (1950-1999). The thermocline feedback, i.e., the local response of the SST anomalies to the thermocline depth anomalies, is weaker in the future scenario and appears to be the main driver of the change in interannual SST variability. The strong warming of the upper equatorial Atlantic Ocean in the future leads to a higher stratification which could explain the weaker thermocline feedback.