



Agulhas leakage contribution to the recent warming trend in the tropical Atlantic

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Tropical Atlantic sea surface temperatures (SSTs) have increased in recent decades (Tokinaga & Xie, 2011; Servain et al., 2014). This warming was not directly forced by local heat exchange with the atmosphere, and also wind stress in the tropical Atlantic that drives oceanic upwelling rather increased than decreased (Servain et al., 2014). Remote forcing from outside the tropical Atlantic might thus have played a role.

Utilizing a series of hindcast and Southern Hemisphere westerlies sensitivity experiments within a high-resolution ocean model (Durgadoo et al. 2013), we isolate the remote contribution of an increased inflow of Indian Ocean water into the South Atlantic via Agulhas leakage. The hindcast experiment reproduces the tropical Atlantic warming and shows an upward trend in Agulhas leakage with an increase of about 30% from the 1970s to the early 2000s. The role of that increase is investigated with a climatological experiment in which the Southern Hemisphere Westerlies over the Agulhas region have been artificially strengthened, resulting in an about 20% higher Agulhas leakage compared to an experiment with climatological winds. A large fraction of this additional inflow reaches the equatorial region within two to three decades.

In response to the strengthened westerly winds and subsequently increased Agulhas leakage we find a general warming in the tropical Atlantic that is most pronounced in the subsurface at about 200m depth. We will further discuss pathways and the impact onto surface temperatures in the tropical Atlantic.