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Relation between mean bias and Atlantic Niño representation in the CMIP5 models

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Most of the tuning exercises of the coupled models are focusing on reducing the mean-state biases, assuming that an improved mean state should result in a more realistic variability. However, no clear general relation has been found between the model mean biases and the variability, except for some specific regions and variables, such as sea ice.
Most coupled models present a very large bias in the Tropical Atlantic. In spite of this, they are still able to reproduce relatively well the occurrence of the Atlantic Niño. The relationship between these first and second order moments of the temperature distribution in the equatorial Atlantic is investigated in the CMIP5 historical simulations. Results suggest that the ability of the coupled model to reproduce properly the Atlantic Niño is not directly linked with the representation of the SST mean state in the tropical Atlantic. However, we find a strong relation between ability of the coupled model to reproduced well the development of the cold tongue in the equatorial Atlantic between spring and summer and its representation of the Atlantic Niño.