Impacts of the Atlantic Multidecadal Variability (AMV) on the tropical Pacific: a multi-model study

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Abstract

The Atlantic Multidecadal Variability (AMV) has been linked to the observed slowdown of global warming over 1998-2012 through its impact on the tropical Pacific. Given the global importance of tropical Pacific variability, better understanding this Atlantic-Pacific teleconnection is key for improving climate predictions. Yet, the robustness and strength of this link is uncertain. Analysing a multi-model set of sensitivity experiments that largely comply with the CMIP6/DCPP-C protocol, we find that models differ by a factor 10 in simulating the amplitude of the Equatorial Pacific cooling response to observed AMV warming. We explore the origins of this spread using energy constraint approach. We find that the large inter-model spread is mainly driven by different amounts of moist static energy injection from the tropical Atlantic surface into the upper troposphere, which is mostly due to different models ITCZ positions and strengths. Analytically correcting models for their mean precipitation biases, we reduce this inter-model uncertainty and we quantify that, following an observed 0.26^{o}C AMV warming, the equatorial Pacific cools by 0.11^{o}C with an inter-model standard deviation of 0.03^{o}C.

Keywords: Atlantic Multidecal Variability, tropical Pacific, multi, model uncertainty, global warming slowdown, model biases

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