Inter-annual variability in CMIP5 models and the mean biases

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Analysis of model systematic errors in Sea Surface Temperature (SST) has generally focused on local processes and particular basins. Mean warm bias over the subtropical upwelling systems in coupled models are largely studied and local cloud cover, alongshore winds and ocean stratification are pointed out as the responsible processes. Mean errors may have impacts on the SST variability but this is less understood. In this study we investigate the relation between mean global bias and how models perform the variability at inter-anual time-scales. In order to understand the relation between bias and variability, we calculate the SST variability modes for the models and associated parameters are confronted with the mean bias among models, thus we conclude how realistic are the models in simulating the variability depending on the mean SST bias. Results suggest that models with cooler (warmer) that average SST mean bias over the southern hemisphere reproduce better (worse) the inter-annual El Nino Pacific variability. Unlike the Pacific, the skill for reproducing the inter-annual Atlantic Nino mode is related to SST over the southern ocean and this is more associated with the proper simulation of the Sta Helena high pressure system than the equatorial Atlantic oceanic thermocline. This work also emphasizes the importance of using the model bias for understanding processes operating in the SST variability.