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Investigation of relations between inter-model similarities for present and projected future mean climate

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To reveal and better understand more statistical relations between climate change projection and climate model performance, we have investigated the inter-model similarities from the IPCC-AR4 database, which we call metrics here, for both the present-day climate and the future climate change, using three conventional similarity statistics. We calculated the correlation of the metrics for present and future change for surface temperature, precipitation and sea level pressure, for different seasons on global and zonal domains. The effective number of degrees of freedom cannot be directly calculated so we used a bootstrap method to test the statistical significance of the correlation coefficient. Most of the present-future correlation coefficients for precipitation were significant, but moderate or low in absolute value. In tropics, particularly, the current metrics on precipitation could be applied into the reliability of the future change performance on precipitation. However, many present-future correlation coefficients for surface temperature and sea level pressure were not significant, although those on surface temperature in northern high-latitude are moderate in R and M. For some outputs, the future metrics were very low across all model pairs. We are, therefore, doubtful whether future projections can be tightly constrained using only the simple model performance for the present-day climate. In addition, we will discuss several issues arisen from this method with inter-model similarities.