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Projections of seasonal climate forecast

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In recent years seasonal climate forecasts have made major progress and are provided operationally by many weather and climate centers around the world. Much of their underlying predictability is derived from ocean-atmosphere interactions in the Tropical Pacific that are responsible for ENSO Like many other regions the climate in the tropical Pacific is faced with changes due to the increase of greenhouse gas (GHG) concentrations. Current state-of-the-art coupled climate models from the IPCC AR4 suggest an El Nino-like change of the tropical mean climate, but show no unique change in ENSO variability. Some of the models, such as the coupled climate model ECHAM5/MPIOM, however show an increase in ENSO variability and consequently changes in the ENSO teleconnections with increasing GHG concentration.

Here we investigate how projected changes of the mean climate and ENSO variability affect the prediction skill of seasonal climate forecast. Statistical and dynamical methods are applied to the coupled climate models from the IPCC AR4. We compare the perfect model predictability for current and future climate (i.e. doubled) GHG concentrations. Perfect predictability provides an upper estimate of skill estimate for a model. For the dynamical approach the coupled climate model ECHAM5/MPIOM is setup in hindcast mode, and run with a total number of 9 ensemble members. Probabilistic verification methods are used to estimate the prediction skills.