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Title: Improved Seasonal Prediction of Land Temperature and Precipitation in a High-resolution GFDL Climate
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Abstract:
Seasonal climate predictions are of great value for decision-making, and consequently exert impacts on economy and societal benefit. Skillful predictions over land are in particular demand due to their influences on agriculture, hydrology, etc.. Here we demonstrate skillful seasonal prediction of land temperature and precipitation in a high-resolution GFDL model using a new statistical optimization technique. Specifically, we employ an optimization approach to identify the most predictable components of seasonal temperature and precipitation over land, and demonstrate skill of these predictable components. We then reconstruct predictions based on the most predictable components, thus removing components determined to be unpredictable with the expectation of improving prediction skill. We find the two most predictable components for 2m-temperature over land include a warming component for boreal winter and summer, and an ENSO-related pattern in boreal winter. The most predictable components of land precipitation in boreal winter and summer are also ENSO-related. These predictable components of temperature and precipitation show significant correlation skill for all leads from 1 to 10 months. In addition, the reconstructed forecasts based upon leading few predictable components show considerably better skill than raw predictions directly from dynamical model. These results indicate that improvements in models, including higher resolution, and refinements in analysis together lead to significant skill in seasonal predictions of global temperature and precipitation over land.
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