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Potential Predictability of Boreal Summer Monsoon Precipitation in a Dynamical Seasonal Prediction System with Systematic Error Correction

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Potential Predictability and its source of Boreal summer monsoon precipitation is investigated using the data obtained from the seasonal prediction experiments for 21 years of 1979-99 using the KMA/SNU seasonal prediction system. The dynamical prediction experiment is a part of CLIVAR/Seasonal Model Intercomparison Project (SMIP II). The observed SSTs are used for the external boundary condition of the model integration, thus the present study assesses the upper-limit of predictability of the seasonal prediction system. The analysis shows that the tropical precipitation is largely controlled by given SST condition and thus predictable, particularly in the ENSO region. But the extratropical precipitation is less predictable due to large contribution of internal atmospheric processes to the seasonal mean. The systematic error of the ensemble mean prediction is particularly large in the subtropical western Pacific, where the air-sea interaction is active and thus the two-tier approach of the present prediction experiment is not appropriate for a correct prediction in the region. The source of potential predictability of the simulated precipitation is different from that of the observed, suggesting that the model climate regime is quite different from the observed climate.

The statistical postprocessing method based on singular value decomposition corrects a large part of the systematic errors over the globe. In particularly, about two third of total errors in the western Pacific are corrected by the postprocessing method. As a result, the potential predictability of summer-mean precipitation is much enhanced over most of the globe by the statistical correction method; the 21 year averaged pattern-correction value between the predictions and the observed counterparts is changed from 0.31 before correction and to 0.48 after correction for the global domain and from 0.04 before correction and 0.26 after correction for the Asian monsoon and western Pacific region.

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