ABSTRACT

Assessment of the El Niño-Southern Oscillation variability in dynamically downscaled Climate Forecast System land surface temperature and precipitation in the Philippines

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The performance of dynamically downscaled land surface temperature (LST) and rainfall from Climate Forecast System (CFS) reanalysis, hindcasts, and forecasts are assessed in the Philippines for different phases of the El Niño-Southern Oscillation (ENSO). The reference dataset is the 0.25° monthly LST and precipitation derived from the Asian Precipitation - Highly-Resolved Observational Data Integration Towards Evaluation (APHRODITE) from 1979 to 2015. The Moderate Resolution Imaging Spectroradiometer (MODIS) and the Tropical Rainfall Measuring Mission (TRMM) will be used for land surface temperature and rainfall, respectively, for 2016 to 2019. To evaluate inherent model biases of CFS, the variability of the CFS Reanalysis (CFSR) LST and precipitation from 1979 to 2010 is first compared with the APHRODITE for different phases of ENSO. CFSR is then downscaled using the Regional Climate Model version 4 (RegCM4) at 25 km to determine the added value of dynamical downscaling. Optimization of RegCM4 through sensitivity tests are done for CFSR, considering the domain resolution, domain extent, cumulus convective scheme, and land surface model. The configurations are ranked according to their ability to capture ENSO teleconnections, monsoon seasonality of winds and rainfall, and the interannual variability of temperature and rainfall. The best configuration is used to downscale the six-month CFS hindcasts and CFSv2 forecasts initialized in November. The predictability performance of CFS hindcasts and CFSv2 forecasts is compared for El Niño, La Niña, and ENSO-neutral years.

Keywords: El Niño-Southern Oscillation, seasonal forecasting, CFSv2, RegCM4