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The optimization of WRF-Crop in South Korea and evaluation with agricultural productivity indicators

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This study optimizes the performance of the Weather Research and Forecasting Model (WRF) with the Noah land surface model featuring Multi-Parameterization options (Noah-MP) and the dynamic crop module, known as WRF-Crop, to enhance the agricultural application of climate data in South Korea. Although extensive evaluations of WRF performance have been conducted in South Korea using typical meteorological variables, the optimization of the WRF-Crop model and its potential for enhancing agricultural applications remains underexplored. The study set up the default version of WRF-Crop over the East Asia centered in South Korea, and identifies the optimal combination of cumulus, microphysics, and planetary boundary layer parameterization schemes that demonstrate the best performance with Noah-MP. The performance of these configurations is evaluated by focusing on agricultural productivity indicators, such as Gross Primary Productivity (GPP) and Net Primary Productivity (NPP), alongside temperature and precipitation, using flux observational data. The results could have important implications for assessing the applicability of the WRF-Crop system in South Korea and offer valuable insights into the future development directions for further improvements.

Keywords: WRF-Crop, agricultural productivity, performance optimization

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