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Evaluating the ability of regional climate models to inform Central American agricultural decision support

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Agriculture is a vital component of Central America's economy. Poor crop yields and harvest reliability can produce food insecurity, malnutrition, and conflict. Regional climate models (RCMs) and agricultural models have the potential to greatly enhance the ability of SERVIR, the Sistema Regional de VisualizaciÛn y Monitoreo, in collaboration with local stakeholders, to promote efficiency in Central American agricultural and water resources management under a changing climate. A series of numerical experiments were conducted using Regional Climate Model Version 3 (RegCM3) and the Weather Research and Forecasting model (WRF) to evaluate the ability of RCMs to reproduce the current climate of Central America and assess changes in temperature and precipitation under multiple future climate scenarios. Control simulations were thoroughly compared to a variety of observational datasets, including local weather station data, gridded meteorological data, and high-resolution satellite-based precipitation products. Future climate simulations were analyzed for both mean shifts in climate and changes in climate variability. Special attention was paid to extreme events (droughts, heatwaves, floods) and quantifying the role that the El Niño-Southern Oscillation plays in modulating the weather of Central America. To explore the impacts of changing climate on maize, bean, and rice yields in Central America, RCM output was used to force the Decision Support System for Agrotechnology Transfer model (DSSAT). These results are being synthesized to create climate change impacts predictions for Central American agriculture that explicitly account for evolving distributions of precipitation and temperature extremes.