Session: C43 Poster: Th220A

Development of predictive SWAT to assess global change impacts on U.S. water quality

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To assess global change impacts on U.S. water quality, the PSWAT, the Predictive Soil and Water Assessment Tool (SWAT), has been developed by coupling the improved basin-structure SWAT with the state-of-the-art mesoscale grid CWRF, the Climate extension of the Weather and Research Forecasting model (WRF). The PSWAT integrates the dynamic climate, water cycle, crop growth, and air quality variations with the most comprehensive pollutant sources, surface and subsurface watershed processes, agricultural practices, and other human managements to predict water yield and supply, streamflow, surface runoff, groundwater recharge, nutrients, pathogens, bacteria, and sediments. This poster will first describe the software engineering, physics improvement, and dynamic coupling that enable effective information transfer between SWAT and CWRF from individual subbasins, across major watersheds, to the entire U.S. It will then demonstrate the PSWAT ability in reproducing the observed streamflow and crop production, the runoff dependence on snow melting and evapotranspiration, as well as the result sensitivity to adjustable parameters for different watersheds. Water quality variables will also be compared with USGS observations. The analyses will facilitate further system improvements and applications for a credible national assessment of future U.S. water quantity and quality responses to global changes.