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Predicting soil erosion under climate change: Using climate data to forecast future climate change scenarios and RUSLE2 modeling to estimate soil erosion on agricultural lands in the United States

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Soil erosion is one of the major processes of land degradation. Climate change, marked by alterations in the precipitation spatial and temporal patterns as well as rainfall amounts projected to increase, is expected to exacerbate soil erosion and loss of soil in the agricultural landscape. Understanding soil loss using physically-based water erosion prediction models and improving knowledge of soil erosion of agricultural lands under future climate change scenarios is critical to developing best management practices for the conservation of soil resources as well as to inform decision and policy makers. This study aims at investigating the impacts of future climate changes on soil erosion in the United States. By integrating up-to-date climate datasets this study characterized differences and current trends in precipitation with respect to climate change and applied a climate model ensemble based on the CMIP6 climate scenarios to predict the future climate. These data are downscaled with machine learning algorithms. It also estimates soil erosion in different soil-climate-agricultural management systems from predicted precipitation under future climate change scenarios using the Revised Universal Soil Loss Equation, Version 2 (RUSLE2). Research findings on the impacts of future climate change scenarios on soil erosion in agricultural landscapes will allow the development of climate-driven best management practices and conservation agriculture techniques as well as inform decision and policy makers to reduce soil loss, therefore protecting the limited soil and water resources, and contributing to a sustainable agricultural production and food security.