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Integration of decadal climate predictions, ecological models and human decision-making models to support climate-resilient agriculture in the Argentine Pampas

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The prediction of regional climate conditions 10-30 years from present is an emerging field in climate science that is receiving increasing public attention. To derive societal benefits from decadal prediction, advances in climate science and models must be matched by a better understanding of how climate information can be integrated into societal structures and support resilient decisions. Well-informed adaptation to climate variability and change requires the capacity to "translate" decadal climate predictions into decision-relevant, sector-specific information and knowledge that is consistent with existing needs, procedures and decision protocols. The research presented here seeks to facilitate adaptation and inform decision-making in agricultural production - the human activity most vulnerable to climate. The geographic focus is the Pampas of central eastern Argentina, one of the main cereal and oilseed producing regions in the world. Decadal climate predictions are linked with state-of-the-art physical, ecological and social models (e.g., modern downscaling approaches, crop simulation models, realistic agent-based models of human decision-making under risk and uncertainty that include heterogeneity of, and interactions among, individuals). A major goal is to "translate" climate projections into likely outcomes (land use, crop yields and profits) of alternative climate scenarios and viable adaptation actions. The modeling framework is being developed in close collaboration with stakeholders from the agricultural sector (governmental institutions, farmer groups, technical experts). Given their newness, uncertainties remain about the actual skill of decadal climate predictions; the uncertainty, however, should not preclude societal adaptation. We will examine the performance of adaptation strategies over a wide range of plausible futures driven by uncertainty about the future state of climate and socio-economic drivers. Robust adaptation strategies that perform sufficiently well across a range of alternative futures can then be identified - even without accurate and precise predictions of future climate.