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Climate forecasts are only one part of the whole story: combining seasonal forecasts with other types of climate information in agricultural decision-making

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Agricultural stakeholders consistently rank climate variability among the top sources of risk to production or profits. Crops in the Argentine Pampas are mostly rainfed, that is, they must rely on soil moisture coming almost exclusively from precipitation. Consequently, yields of crops in the Pampas are closely tied to rainfall before and during the cropping cycle. Given the large role of climate variability on production and economic risks, decision-makers can use climate information to mitigate unwanted impacts and take advantage of favorable conditions. El Niño Southern Oscillation (ENSO) is the major single source of seasonal-to-interannual climate variability in the Pampas. ENSO-related variability in rainfall has been shown to influence crop yields in the Pampas. Although many studies have demonstrated the value of ENSO forecasts to support agricultural decisions, other types of climate information that could be equally valuable have been relatively neglected. Soils in the Pampas can store considerable amounts of water that may help overcome temporary rainfall shortages. Unlike inherently uncertain seasonal forecasts, soil water content is a useful diagnostic that can be easily and cheaply measured at field level. In this abstract we analyze how soil water content – in combination with ENSO forecasts – may help enhance agricultural decisions. We simulated soybean and maize yields using historical climate records for several contrasting locations in the Pampas. For each crop we explored the outcomes of (a) a range of soil water contents at the beginning of the simulation, and (b) a set of realistic agronomic managements. As expected, ENSO phase influenced the simulated distributions of maize and soybean yields. However, we found that soil water content at sowing had an equally strong impact on yield distributions. Indeed, the ultimate impacts of ENSO phase depended on total water stored at the beginning of the cropping cycle. For instance, negative impacts of La Niña were considerably lower when soils were full of water at the beginning of a cropping cycle. The simulations showed not only marked interactions between ENSO phases and soil water content, but also with crop management. The agronomic managements that showed highest median yields varied depending on ENSO phase and soil water content. Th ese results show the need for adapting crop management not only in response to predicted ENSO phase but also in response to measured soil water content. This abstract highlights the benefits of combining different types of climate information in agricultural decision making. Soil water content – a measurable and uncertainty-free diagnostic – strongly conditions the yields that can be attained under different rainfall amounts during the cropping cycle. The combination of diagnostic and predictive information may contribute to assessing the potential impacts of predicted climate conditions, and ultimately may lead to better adaptive responses to climate variability.