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# Spatial Analysis of Weather-induced Annual and Decadal Average Yield Variability as Modeled by EPIC for Rain-fed Wheat in Europe

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In our analysis we evaluate the accuracy of near-term (decadal) average crop yield assessments as supported by the biophysical crop growth model EPIC. A spatial assessment of averages and variability has clear practical implications for agricultural producers and investors concerned with an estimation of the basic stochastic characteristics of a crop yield distribution.
As a reliable weather projection for a time period of several years will apparently remain a challenge in the near future, we have employed the existing gridded datasets on historical weather as a best proxy for the current climate. Based on different weather inputs to EPIC, we analyzed the model runs for the rain-fed wheat for 1968-2007 employing AgGRID/GGCMI simulations using harmonized inputs and assumptions (weather datasets: GRASP and Princeton).
We have explored the variability of historical ten-year yield averages in the past forty years as modeled by the EPIC model, and found that generally the ten-year average yield variability is less than 20% ((max-min)/average), whereas there are mid/low yielding areas with a higher ten-years average variability of 20-50%. The location of these spots of high variability differs between distinctive model-weather setups.
Assuming that historical weather can be used as a proxy of the weather in the next ten years, a best possible EPIC-based assessment of a ten-year average yield is a range of 20% width ((max-min)/average). For some mid/low productive areas the range is up to 50% wide.