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Maize yield forecast using earth observation data and machine learning for Sub-Saharan Africa

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In Sub-Saharan Africa, forecasting of agricultural production is becoming increasingly important for the management of the agricultural supply chain, market prediction, and food aid. More importantly, agricultural forecasts can enhance the ability of governments and humanitarian organizations to respond better to food production shocks and price spikes caused by extreme droughts. Here, we use earth observation (EO) and machine learning (ML) techniques to develop 1-6 months ahead end-of-season maize yield forecast models for several regions in Sub-Saharan Africa. We find that ML models present different aspects of forecast accuracy compared to baseline regression models. Specifically, we investigate 1) skillful EO predictors and their predictability in a given region and lead-time and 2) the benefits of using finer time resolution of EO data that can potentially capture temporal dynamics in early reproductive stages. Overall, this study provides the groundwork for an operational crop yield forecast and famine warning system. Actionable famine risk predictions can radically improve existing disaster management practices of aid organizations by providing advanced preparedness and response strategies.