Droughts have heavily affected agricultural production in the Pannonian Basin. As most fields are only rain-fed, local agriculture is particularly vulnerable to droughts. The already challenging conditions for crop production are expected to worsen due to climate change, by increasing frequencies and intensities of drought events. A potential tool to support the adaption to these challenging circumstances is crop yield forecasting. This has proven being a vital tool to minimize socio-economic impacts of crop losses. However, such forecasts tend to underestimate the impact of severe droughts on yield losses and, therefore, require improvements [1].

Key drivers of the wheat forecast model are temperature and ESI; water availability (SPEI/ESI) for maize. In drought years, seasonal temperature forecast has a large impact on the early wheat yield forecasts, while soil moisture is a key predictor for maize. Impacts of predictors are largely dependent on the forecast month.

Crop yields of maize and wheat are highly dependent on the conditions in the last two months before harvest. This leads to highest performances of crop yield forecasts in these months. Seasonal weather forecasts enable longer lead times only to some degree.

Yearly yield anomalies of maize and winter wheat are forecasted for various districts in the Pannonian Basin from 2002-2016. Monthly forecasts are made for each growing season, starting around three months before harvest. The forecasts are cross-validated by using leave-one-year-out as testing set. Different model optimization techniques were used like feature elimination and hyperparameter tuning.

Understanding the model

Forecasted and observed maize yield anomalies per region

References