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Verification of seasonal forecast for facilitating agricultural applications

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Seasonal forecasting has the potential to support agricultural activities by offering crop-yield forecasts and facilitating measures to mitigate weather-related damages. This study aims to enhance the application of subseasonal to seasonal (S2S) forecasts in agriculture by evaluating them through tailored verification methods that consider crop calendars and areas.

The verification employs the so-called 1-norm continuous ranked probability score (CRPS), which utilizes the absolute norm instead of a square to quantify forecast errors. While the 1-norm CRPS is not a *proper* score and does not suit for ensemble forecast verification, it offers an advantage in terms of user-friendliness. Specifically, the score is proportional to the expectation of the absolute error, and thus, it is easier to relate the outcomes of crop models under the assumption of linearity compared to other scores like the ordinal CRPS.

Crop regions and seasons for major commodity crops such as wheat, rice, and maize were identified using global datasets of crop yields and crop calendars. Using the crop calendar information, we can assess the within-season forecast performance in relation to crop growth stages globally. Reforecast data from seasonal forecasts archived by the EU-funded Copernicus Climate Change Service (C3S) were evaluated, allowing for a multi-model comparison of forecast skill. The presentation illustrates a set of example verification products targeted to the common commodity crops. A comprehensive overview of forecast skill for the target crops is anticipated to facilitate a dialogue between meteorological and agricultural experts, thereby enhancing the usability of the seasonal forecast.