



## **Holistic quality assessment of ECMWF System-4 seasonal climate forecast to support crop production**

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Increasingly available data and recent advancements in seasonal climate predictions offer new possibilities to develop useful climate services to support decision making in a variety of sectors. One important prerequisite for such systems is to assess forecast quality, where a number of skill tests are commonly performed on hindcast data to check the capabilities of reproducing historic climate patterns. From the perspective of developing climate services, we argue that quality assessments need to go beyond conventional skill testing, and to include also the question of how well certain forecast parameters can provide the information required for decision making. For this purpose, we develop a novel, holistic quality assessment method to (1) identify skilful forecast parameters and (2) assess how these skilful parameters match the information needs of decision makers. We implement our method using ECMWF system-4 hindcast data in the context of supporting agriculture production in Ghana (tropical Savannah) and Bangladesh (tropical monsoon). We assessed skill of ECMWF system-4 hindcast using various skill tests. The identified skilful parameters for different lead-times and seasons are then compared with cropping calendars and key farming decisions acquired from farmer interviews to assess their usefulness for decision making. We conclude that:

- Forecast skills are generally more visible at regional scale and decrease at local (specific locations) scale.
- Temperature forecast is generally more skilful than rainfall forecast. Both parameters offers substantial potential to support agriculture decision making, especially in rain-fed systems.
- Despite important values, there are several mismatches between from ECMWF seasonal forecasts and users' information needs, highlighting the importance of second-order forecast, e.g. hydrological and crop yield forecasts.