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May spring seasonal forecasts improve a climate service providing cereal yield predictions?

Maria Nieves Garrido¹, J. Ignacio Villarino², Eroteida Sánchez³, Inmaculada Abia⁴, Marta Dominguez⁵, Pedro García⁶, **Ernesto Rodriguez-Camino**⁷, Beatriz Navascues⁸, David Nafría⁹, and Alberto Gutierrez¹⁰

¹AEMET, Valladolid, Spain (mgarridod@aemet.es), Madrid, Spain (erodriguezc@aemet.es)

²AEMET, Valladolid, Spain (jvillarino@aemet.es), Valladolid, Spain (mgarridod@aemet.es)

³AEMET, Santander, Spain (esanchezg@aemet.es)

⁴AEMET, Valladolid, Spain (iabial@aemet.es)

⁵AEMET, Madrid, Spain (mdomingueza@aemet.es)

⁶AEMET, Valladolid, Spain (pgarciac@aemet.es) (bnavascuesf@aemet.es)

⁷AEMET, Madrid, Spain (erodriguezc@aemet.es)

⁸AEMET, Madrid, Spain (bnavascuesf@aemet.es)

⁹ITACyL, Valladolid, Spain (nafgarda@itacyl.es)

¹⁰ITACyL, Valladolid, Spain (ita-gutgaral@itacyl.es)

Following the need of winter cereal farmers from the main producing region (Castilla y León) in Spain to estimate crop yield with at least one season of anticipation, we have developed a climate service based essentially on current and historical meteorological observations, on spring seasonal forecasts from ECMWF System 5 and on the crop growth model AquaCrop. Different experiments have been designed to produce both a synthetic yield database serving as observed truth and three different seasonal forecasting strategies. Calculation of objective verification scores for deterministic and probabilistic crop yield forecasts -including an assessment of their potential economic value- in hindcast mode determines the quality of this service and the differences among forecasting strategies. We demonstrate that the three compared strategies show good skill of wheat yield forecasts at the beginning of July, although the meteorological forcing for Aquacrop simulations between 1st April and 30th June is very different for the three compared strategies. The important role of the memory from previous (autumn and winter) climate conditions carried by the crop growth model is analysed and discussed. A yearly assessment also allows some preliminary estimation of the value and possible benefits of the service for final users. Finally, we conclude that the simulation synthetically producing the observed truth compares rather well -especially the interannual variability- with other yield data based on surveys and experts estimations although it overestimates yield. Users have played a decisive role in co-design and co-development phases of this climate service. They have also actively intervened in the analysis and evaluation of results.