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DESIGN AND FEASIBILITY STUDY OF A GLOBAL OPERATIONAL CROP YIELD FORECASTING SYSTEM: AN EXERCISE BASED ON THE EC GLOBCAST PROJECT

R. Lopez [a], B. Baruth [a, *], I. Cerrani [a], G. Duveiller [b], M. El Aydam [c], J. Gallego [a], G. Genovese [d], L. Seguini [a], E. Willems [c]

[a] European Commission, Joint Research Centre (JRC), Institute for Environment and Sustainability (IES), Monitoring Agricultural Resources Unit, , 21027 Ispra (VA), Italy– bettina.baruth@jrc.ec.europa.eu
[b] European Commission, Joint Research Centre (JRC), Institute for Environment and Sustainability (IES), Climate Risk Management Unit, 21027 Ispra (VA), Italy
[c] European Commission, Directorate-General for Agriculture and Rural Development (DG AGRI), Directorate Single CMO, economics and analysis of agricultural markets, Arable Crops Unit, B-1049 Brussels, Belgium
[d] European Commission, Directorate-General for Agriculture and Rural Development (DG AGRI), Agricultural Modelling and Outlook unit, B-1049 Brussels, Belgium

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ABSTRACT:

For more than 20 years, the MARS Crop Yield Forecasting System (MCYFS) is monitoring crop growth and forecasting crop yields of the European Union and its neighbouring countries. The MCYFS relies on the near real time acquisition and processing of three main data sources: biophysical parameters from remote sensing platforms to monitor crop status, weather data and crop model simulations. All these data are interpreted and analysed together to produce crop yield forecasts along the season following specific statistical procedures. In order to extend those forecasting capacities to other main producing regions of the world, we carried-out a feasibility study with the main purpose of defining a cost-efficient and region specific system, based on a comprehensive evaluation of different alternatives to build such a system.
The study investigated the a priori performance and costs of three different technical levels in the implementation of the system components against a set of specific objectives: qualitative crop growth assessment, quantitative yield forecasting, etc.
In the case of remote sensing, we considered non-calibrated kilometric data, calibrated products compatible with long-term archives with low interferences by sensors/platforms replacement and the synergistic use of low and high resolution data. An expected performance for each possible system is assessed through the evaluation of the individual solutions and accounting for possible risks of data unavailability. Considering this context special attention is paid to the main remote sensing data needs (spatial resolution, archive length...) and the interactions with other components in an operational activity. Finally, the roadmap reflects the strategy to successively implement the recommended system for different regions based on our evaluation. This paper presents the general design of the feasibility study, describing the methodology followed to evaluate the performance a priori of each individual component and to assess the impact of each component to the overall reliability of the crop yield forecasting system.

* Corresponding author. This is useful to know for communication with the appropriate person in cases with more than one author.