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Weather forecast downscaling for applications in smart agriculture

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In the framework of the *On Demand Services For Smart Agriculture* (OD4SA) project, funded by PO FESR 2014-2020 from Regione Basilicata, Italy, a weather forecast service has been developed, for applications in smart agriculture and precision farming. It is based on the *Weather Research and Forecasting* (WRF) model and provides a daily 96-hour forecast of temperature and water vapor at 2 m altitude, wind speed and direction at 10 m altitude, atmospheric pressure, solar irradiance, and 1-hour accumulated rainfall, for the Southern Italy. Although encouraging advances in microscale modeling have been achieved in the last decade, the computational costs imposed by the state of the art do not allow for continuous operational forecasting at the sub-kilometer scale, useful for precision farming, especially in southern Italy that is characterized by a complex orography. To overcome this limit, an algorithm based on some *Artificial Neural Networks* (ANNs) has been developed, by using the WRF *Large Eddy Simulation* (LES) to build the training database at 240 m spatial resolution. Particular attention was paid to the analysis of the true spatial resolution of the WRF-LES outputs, to the definition of the ANNs topology and to the input selection, from over 250 inputs more than half has been discarded. The preliminary results show RMSE equal on average to 70% of those obtained by using the most common spatial interpolation methods.