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iCOLT: Seasonal prediction of water irrigation need in Emilia-Romagna (Italy)

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Mediterranean regions are frequently exposed to water scarcity and an early assessment of the potential water requirements from summer crops is very important for water management at regional and Reclamation Consortia level. Since 2007, ARPA-SIMC has developed the operational climate service iColt (irrigazione e Classificazione delle cOLture in atto tramite Telerilevamento – irrigation and classification of crops by remote sensing), in order to monitor and predict potential water needs for crop irrigation at different geographical scales.
iColt has three components: a) a classification of crops through a set of satellite images acquired at different phenological stages; b) calibrated multi-model ensemble seasonal predictions of climate indices, using as input the EUROSIP products; c) a crop water balance prediction by the model CRITERIA.
The climate indices are predicted as input for a weather generator to produce an ensemble of daily meteorological time-series. The meteorological series together with the regional distribution of crops, classified by remote sensing, are used by the water balance and crop development model CRITERIA to assess the crop potential water requirement at geographical level during the following summer. CRITERIA includes an empirical model for computing the shallow water table through spring (observed) and summer (predicted) meteorological data. The water requirements predictions are verified at the end of summer by forcing the water balance model using the observed meteorological data.
The results obtained from 2011 to 2014 are described and show that the operational service has a better skill than the seasonal ensemble prediction products used as input. In all the years, the sign of the irrigation water requirements anomaly has been correctly forecasted.
Furthermore, the system has shown to be able to capture the spatial variability of the predicted field. These encouraging results are thought to be due partly to the correct initialization of the shallow water table level, both in time and space, and partly to a good evaluation of the geographical distribution of crop classes with different water needs.