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Discussions

Interactive comment on "Real time drought forecasting system for irrigation management" by A. Ceppi et al.

Anonymous Referee #1

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The manuscript "Real time drought forecasting system for irrigation management" by Ceppi et al. presents an application of existing meteorological and hydrological models, coupled here to guide irrigation applications. The proposed framework is calibrated and validated over a specific case study site, a corn field in Northern Italy, for which three-year eddy covariance and soil moisture data are available.

My main concerns regard the impact of the paper. In its current form, the manuscript provides an application of existing coupled meteorological and hydrological models for real time drought forecasting in one location in Northern Italy, with two-year calibration and one year validation. The impact of the paper would be greatly enhances should the author choose i) to discuss the applicability of the tool beyond the specific case study; ii) to objectively present strengths and weaknesses of the proposed modeling

framework when applied for irrigation management; and iii) to quantify the advantage of employing such a tool.

The first two points are crucial in defining the applicability of the proposed framework in routine, 'real world' problems – which, as far as I understand, is the final goal of the project. This discussion should include also clearer information on data requirements for model running, as well as information of the ability to the model to provide reasonable results upon calibration with a more limited (but more common) data availability.

The last point, the quantification of benefits, aims at investigating whether such tool can really make a difference in water management. The first step in this direction is clarifying what role the model suggestions played in the investigated case: this point is currently not very clear, with an irrigation application the day before a major rainfall event, but also a hint to the farmer employing PREGI in his/her water management choices (also, if the forecast was used for water management, how could that be done before model calibration?) A more in-depth exploration of the advantages of such a toolbox – which I strongly suggest - would require run two season-long simulations, one assuming the farmer follows the PREGI platform suggestions for when to irrigate, the other assuming that the farmer follows the currently employed decision criteria (which could even be as simple as irrigation applications whenever possible). The comparison of total applied water between the two runs will make it possible to assess the benefits of such a system in terms of water savings, the difference in total transpiration (or occurrence of periods with low soil moisture) can be used as a (rough) proxy of yield. A similar analysis could be extended beyond the three-year timeframe, to fully assess the advantages of such a system under a variety of climatic conditions.

Additional comments:

- The model undergoes a calibration based on the data available at the case study site. Nevertheless, no mention is made of which parameters need calibration. This is an important information when considering the applicability of the model beyond the very

specific (and data rich) case study (see above).

- The manuscript would greatly benefit from an in depth editing of English – in its present form, it is understandable, but does not read smoothly, with some grammar mistakes, not appropriate informal language, and an awkward choice of wording. Also, the text requires streamlining, avoiding repetitions of the same information (e.g., page 15814 "MBL covers an area of 740 km2. Within the 74000 ha. . .")

- The word 'turn' for the timeframe in which the farmer has water availability seems confusing to me – I suggest changing it to 'irrigation time allotment' or 'time slot' or more in general 'irrigation scheduling'.

- The measures of model performance ought to be defined within section 2 (the scope of which should be broadened to 'Methods'), discussing what specific aspect(s) of model performance they allow assessing. In this way, the result section can be focused on just presenting the model performances.

- The description of data availability (now at the beginning of the result section) should be moved earlier, either by widening the scope of current section 2 or within a new sub-section in section 3, which then should be broadened to 'Methods', as also suggested above).

- Fig. 2, 3, and 4 and Fig. 5 and 6 could be easily combined in two multi-panel figures, to facilitate the comparison across years and indices of model performance.

- The presentation of the PRE.G.I. platform, including Fig. 8 and the description of the website, is unnecessary within the general economy of the paper and could be omitted/moved online as supplementary material.

- I suggest broadening the introduction and discussion with reference to other related works (also broadening the reference list – current references mostly refer to works focusing on the same region in Italy, which is relevant but not unique in the international arena).

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