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The importance of accurate evapotranspiration forecast for crop irrigation: A global sensitivity analysis of two model case studies

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A reliable forecast of potential evapotranspiration (ET_0) and precipitation can be used for precision crop irrigation. A multi-objective evolutionary algorithm (MOEA) optimization followed by a sensitivity analysis (SA) of a crop model (HYDRUS-1D) for two case studies was performed in order to assess the crop model sensitivity to weather forecast accuracy. A ± 5 % of ET_0 relative bias range was found to be a threshold for ET_0 forecast accuracy being a non-dominant parameter for both spring potatoes growing in loamy sand and summer peanuts growing in silty clay. For both case studies soil hydraulic parameters dominated model output and increased with increasing ET_0 forecast accuracy. With respect to model output of actual transpiration, maximum root depth was also dominant for the first case study and although precipitation for the test cases was scarce, the rainfall bias parameter dominated excess drainage of water and solutes. This MOEA—SA scheme for crop model analysis can help set priorities in irrigation management by ranking the data that is most important to be accurately determined in order to optimize crop production.

Time Block Preference

Time Block C (18:00-21:00 CET)

References

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