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Earth System Dynamics
Discussions

Interactive comment on "Identifying meteorological drivers of extreme impacts: an application to simulated crop yields" *by* Johannes Vogel et al.

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The paper is of a great interest and the authors applied an innovative approach to identify the drivers of extreme impact on crop yield. I found a few main issues that, on my opinion should be addressed before publication. The description of meteorological dataset is unclear and requires to be reframed under a more general scheme, e.g. which is the aim of developing such a dataset? Do you want to address the issue of uncertainties in climate simulations? Why using 1° as spatial resolution? May it be considered a good compromise between the scale you require for your assessment (global) and the scale required for crop growth simulations (local)? There is a reference

concerning the development of such dataset, but what is reported here is too much squeezed. The same applied for APSIM description. Given the topics of this journal, I strongly suspect that a general introduction about crop modelling is due. I would therefore expect a general overview on APSIM model with a particular reference to crop phenology, dry matter accumulation and limiting factors for growth. The effect of higher temperature on the length of growing season may therefore better understood as well as the effect of abiotic stresses on crop growth. As an example, this paper deals with the impact of extreme events on crop growth, but the reader actually does not understand which meteorological extremes can affect crop growth and if/how the model considers these impacts in relation the phenological stage. F Accordingly, I suggest firstly to outline the main features of APSIM. As a second step, I would state which are the main abiotic factors affecting crop yield with a special reference the phenological stage when they occur. E.g. a frost or heat events have a different impact if occurring during vegetative or reproductive stage. The authors report the issue on par 305, but the basis of this statement must be explained before by a description of impacts of extremes events in relation to crop growth Thirdly, I would explain how these effects are simulated in your model. E.g. how the impact of heat events at anthesis are simulated? Is there an additional effect during grain filling? This would help to better explain some trends observed in your results in relation the growing season period. This is of course a suggested scheme, but these issue should be in any case addressed Figure 1. Is there a general relationship between crop yield simulated and observed on the global scale? On par 320 there is a note on possible bias in crop growth calibration, but actually we do not know how crop model was calibrated The discussion tackles the effect of temporal resolution of the meteorological data and this an added value to the paper. In case, some discussion is due for some process not specifically considered in crop modelling approach

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