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Interactive comment on "A case study of field-scale maize irrigation patterns in Western Nebraska: Implications to water managers and recommendations for hyper-resolution land surface modelling" *by* Justin Gibson et al.

Anonymous Referee #2

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I find the study interesting and relevant. A better account of irrigation impact and dynamics in LSM is definitely an area that needs investigation.

I do miss more specific information on the actual linkage between the described irrigation routines and the so-called hyper-resolution LSM. An actual example on this would have been a particularly strong additional element. As a minimum, a more detailed description on the potential integration should be provided along with its feasibility (i.e., input requirements and sources, crop-specific calibrations, limitations etc) for large-scale application. In addition some clarifications to the methodology and findings are

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Discussion paper

needed as detailed below.

Specific comments:

1) Hyper-resolution needs to be properly defined. For me hyper-resolution intuitively refers to something that is very fine and very well resolved (i.e. at the meter scale) but that is obviously not the case here. 2) L136 – 66: I think that the points made in these sections are valid but I do think that framing would benefit from a slightly more streamlined and ordered structure, if possible. 3) L67-68: How was the critical field scale established? 4) L91: Not sure what is referred to here in terms of the critical LSM scale. 5) L94-95: I would hope you could be a little more specific when talking about the next generation of hyper-resolution LSM and operational weather forecast models; what those this statement imply? 6) L100-102: I would save the specifics of the irrigation routines to the method section. 7) L113: I find Fig. 1 pretty poor and not that informative. As a minimum, you will need a meaningful background image for the field boundary overlay. 8) L117: Why the reference to alfalfa here the entire area in under maize production? 9) L125-130: I think that you need to be more specific on the actual datasets used in this study. I see no description of the meteorological forcing data used. 10) L134: The full names of the irrigation schemes should be given here as well. 11) L135: Why is "(CM)" given here? Same issue with "(H)" in next sentence. The reference/link is not evident from the text. 12) Section 2.2.1: I'm a little confused about the differentiation between CM and HM. HM also seems to be linked to Hydrus but not CM? May need a separate description of HM if that is the case or use CM consistently throughout. 13) L150-151: The inputs (e.g., meteorological data, crop biophysical parameters) to the model are not well described here or in Section 2.1. 14) L195: "was triggered" 15) L208: How was daily ETr determined? 16) L222: HM or CM? See previous comment. 17) L243: So are you saying that you used a non-dynamic (i.e., the same) LAI time-series for all years? Why not consider inter-annual variations in phenology? Does these descriptions of HM also apply to CM? 18) L244 and L250: The sentence "In addition, HM. . .." is repeated here. 19) L307: There's an

issue with the figure numberings. Fig. 5 referred to here is Fig. 6. 20) L317: This is not Fig. 6 but Fig. 5. 21) L317-323: I'm confused about these numbers, which seem somewhat conflicting. It is stated that both CM and PD are near the historical average. But then it is mentioned that CM is 80 mm lower, the same as ET. In addition, the percentages differ. I also find it difficult to verify these numbers based on the figure. These issues will need to be clarified. 22) L323: Fig. 5? 23) Section 3.5: Why is ET and PD not mentioned here? 24) Section 3.6: In Fig. 7, the CM and ET colors can't be distinguished. 25) L353-354: The historically reported yield should also be plotted on the figure for comparison. 26) L371: Was the 30% reduced irrigation need described/mentioned in the results? 27) L401-413: This section is a little hard to follow and should be rewritten for better clarity. 28) Section 4.4: This section is very brief and would benefit from a much more substantial and elaborate description of the feasibility and limitations associated with the integration of the routines in the LSMs. 29) L447: Isn't the 1 km scale often too coarse to resolve field-specific irrigation dynamics?

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