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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Sustaining the Ogallala Aquifer: From the Wells to People, A Holistic CNH Model" *by* Joseph A. Aistrup et al.

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1/19: "Irrigated crops will continue to be crucial for meeting the world's future demands for sustenance" - reword; this essentially says 'will continue to be important for the future' without ever getting around to the present.

2/4: The High Plains Aquifer and the Ogallala Aquifer are not quite the same thing; see bedrock maps available from the USGS, available at https://co.water.usgs.gov/nawqa/hpgw/html/GIS.html. Also, please cite the aquifer boundary: Qi 2010.

2/10: Should also cite publications from Virginia McGuire.

2/19: If you're only studying GMD3, please mention that in the abstract and title. "Sus-

taining the Ogallala Aquifer" strongly implies results that are applicable across the 450,000 sqkm of the High Plains, and GMD3 is not a perfect representation of the whole area (or if you think it is, explain why). The introduction should also give some information specifically about the study area, not just the whole region, and preferably a site map showing the boundaries of the management district (which are not quite the same as the county boundaries OR the aquifer boundaries). People who are familiar with the HPA might not be as familiar with the groundwater management agencies and programs in KS, or might not know the difference between, say, a GMD vs. an IGUCA vs. LEMA. You talk about this later, but it could be introduced early on so that the reader has it in mind.

3: Figure 1 is super fuzzy. Can you get the underlying data and make a new version? I have my own data for this and would be happy to help, but I don't have the KGS data. But I bet Brownie Wilson would send it to you.

4: Figure 2 is great! I'd suggest showing a cone of depression around the well, but it's a really slick conceptual diagram.

5: I recommend reading Hornbeck and Keskin (2014) for another take on the value of the aquifer. Your methods are entirely different, and it would be interesting to think about results of each (yours and theirs) in light of the other.

6/14: You might want to use only the saturated thickness for the area *with enough saturated thickness to support irrigation.* Saturated thickness is heterogeneous within a county, and if you're averaging in a bunch of depleted or non-High Plains area, you'll be underestimating saturated thickness in the areas where there's actual pumping. Also, for a great paper on well yield vs. saturated thickness, try Foster et al. 2015, "Why well yield matters for managing agricultural drought risk."

9/12: Should cite McGuire here.

9/17: "decreases over time"

9/26: "whiskers"

12/20: Again, the average county saturated thicknesses are not really relevant to an individual farmer; it would make more sense to report the average thickness for the area that starts off as irrigable (>9m saturated thickness or so; see Hecox et al. 2002, "Calculation of Yield for High Plains Wells: Relationship between saturated thickness and well yield."

13/9: Again, I recommend Hornbeck and Keskin (2014).

13/15: Whoa, I think you mean the HPA produces 20% of US meat products, but this implies that just GMD3 produces all that meat. For example, when you say "the region" in line 12/16, you're referring to GMD3.

13/20 and elsewhere: "holistic"

Overall, very interesting project and approach. Might want to add some additional language about study limitations, since you're going so far into the future.

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