

Interactive comment on “Mapping groundwater abstractions from irrigated agriculture: big data, inverse modeling and a satellite-model fusion approach” by Oliver Lopez et al.

Anonymous Referee #2

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This manuscript presented an interesting framework to estimate groundwater abstractions for agricultural irrigation. The framework is novel as it integrates land surface modeling, satellite remote sensing, and inverse modeling. This work was built upon several other works from the same group of people. The manuscript is well written, though the organization part can be further improved. I have the following concerns for the authors to consider:

Firstly, more details about CABLE model simulation should be given. For example, is there a crop model in it? How was the simulation conducted for different crops (maize-C4 and wheat-C3, and others)? What if there are more than two crop types (if that is

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possible in this region) within a single field? How was the spin-up conducted? What's the model's performance in simulating ET when giving observed LAI compared with flux-tower or other ground-based measurements?

Secondly, the only validation reported in this manuscript is in Fig. 6 and 7 showing comparison between the annual/seasonal model estimation and farm reported groundwater abstraction. There is no validation on LAI and ET estimation from the satellite remote sensing. If there are uncertainties, how would they propagate to the final estimation of groundwater abstraction?

Thirdly, was the inverse modeling conducted at daily time scale? If it is, are we expecting irrigation every day, which is absolutely not true in the reality? The authors reported the accumulated amount of irrigation water use at monthly and annual time scale. How about irrigation timing and times?

Fourthly, where did the authors assess the model performance as described in section 3.5?

Finally, organization of this manuscript can be further improved. For example, Fig. 1 and Fig. 2 can be combined? Descriptions of TSEB and CABLE models can be simplified and details about them can be put into supplementary? Instead, the authors should focus more on simulation protocols there.

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