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Hydrology and Earth System Sciences
Discussions

Interactive comment on "A Bayesian Approach to Infer Nitrogen Loading Rates from Crop and Landuse Types Surrounding Private Wells in the Central Valley, California" *by* Katherine M. Ransom et al.

Katherine M. Ransom et al.

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We thank the reviewer for his or her comments on our work. Please see the attached revised PDF for incorporation of the comments. See specific responses to comments below.

Review comments to hess-2017-39: A Bayesian approach to infer nitrogen loading rates from crop and landuse types surrounding private wells in the Central Valley, California by Katherine M. Ransom et al. This paper presents a Bayesian regression model

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that provides a statistical methodology to relate nitrate measurements in wells to the various types of surrounding landuses as a means to obtain a statistical distribution of nitrate loading rates. The study is focused in the Central Valley, California, USA, an intensively farmed region with high agricultural crop diversity. This method is especially useful absent specific information of individual farm agricultural management practices, specific groundwater quality, or local hydrogeology in the vicinity of a well. The tool can be used to define high nitrogen loading (high risk) zones. Authors have done interesting work. This paper has a good potential to be published in the journal. However, there are some significant issues, listed below, which need to be addressed before it is ready for publication.

1. Abstract section: Please rewrite this section, and focus more in what you have done including the study results in the manuscript. Response: We agree with both reviewers that the abstract did not focus enough on the results and findings of the study. We have rewritten the abstract to focus much more on the specific findings and results.

2. Introduction section: Introduce more on Bayesian statistical models and why authors developed such types of models. Response: We have included additional information on previous Bayesian studies in the introduction section. We are not currently aware of any study that has used Bayesian methods to estimate nitrate loading rates to groundwater. We have also included an additional section (new section 3.1) titles “Conceptual model” which explains in more detail nitrate transport modeling and the rational behind the Bayesian method.

3. Combining the Results section and Discussion section. When each picture is shown, we would like to see the description for the picture and why this phenomenon happens. So it is better to combine the Results and Discussion sections. Response: Due to the complicated nature of the discussion of our model results, we feel it is really best to leave them separate. We compare various parts of the model results with several previous studies and feel combining the results and discussions would lead to disorganization of the presentation as not all results are compared to all studies. This

way we can present all the results up front, and follow up with more detailed specific discussions of model results separately.

4. In page 3, line 17-18: Spring 2011 depth to groundwater ranged from 10 feet below ground surface (bgs) in the northern section of the CV to 670 feet (bgs) in the southern portion of the CV (DWR, 2011). Response: We have left the parentheses off bgs here, as it represents an abbreviation and is used later on in the manuscript.

5. In page 5, line 15-16: Insert “it” between “because” and “is”. Response: This typo has been corrected.

6. In page 6, line 29: Delete blank space before the “where”. Response: This has been corrected.

Please also note the supplement to this comment:
https://www.hydrol-earth-syst-sci-discuss.net/hess-2017-39/hess-2017-39-AC2-supplement.pdf

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