

## ***Interactive comment on “Spatially-distributed influence of agro-environmental factors governing nitrate fate and transport in an irrigated stream-aquifer system” by R. T. Bailey et al.***

**Anonymous Referee #1**

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Nitrate contamination in irrigated stream-aquifer systems is a serious problem in agricultural watershed. Numerical modelling and relevant sensitivity analysis are important methods for understanding of nitrogen fate and transport, as well as making remediation strategies. This study used a nitrogen fate and transport groundwater model and the revised Morris sensitivity analysis method to identify the spatially-varying influence of system factors on nitrate fate and transport in a regional-scale irrigated hydro-agricultural system. Some results were valuable for future data collection and remediation strategies in the study area. On the whole, the paper was well written. Some minor improvements and corrections are needed. 1. According to the title, the

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spatially-distributed influences should be the emphasis in this paper. But in the abstract there are no such descriptions or conclusions. some important conclusions should be added in the abstract. 2. In your model, there are 7 vertical layers. Each layer has the same depth for each grid cell, which means you don't consider the topography? Is the groundwater table keeping constant or can be changed in different seasons? 3. There should be many input parameters in the UZF-RT3D model, why you chose such 9 factors as the target to analyze? Please give the explanation. 4. E is an environmental reduction factor that accounts for  $\theta$  and T and acts to temper the reaction rates based on microbial activity, ———do  $\theta$  and T have the same effects on microbial activities in different processes (i.e. nitrification, volatilization and denitrification)? 5. in page 14, formula (5) , the left should be  $r_{vol}$  6. in line 5 of page 24, it seems to have some words lost after 'and.'. 7. In line 10, line 17 of page 24, 'CO<sub>2</sub>' and 'NO<sub>3</sub>' should be 'CO<sub>2</sub>' and 'NO<sub>3</sub>'? 8. In line 18 of page 24, 'andshould' should be 'should'? or some words after 'and' are lost? 9. In line 19 of page 24, 'withmonitored' should be 'with monitored'?

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