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***Interactive comment on* “Quantifying methane emissions from rice fields in Tai-Lake region, China by coupling detailed soil database with biogeochemical model” by L. Zhang et al.**

Anonymous Referee #3

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The paper titled ‘Quantifying methane emissions from rice fields in Tai-Lake region, China by coupling detailed soil database with biogeochemical model’ identifies the current need to accurately quantify the greenhouse gas emissions that contribute toward global warming. Methane (CH₄) is of particular importance when quantifying GHG emissions from rice paddies but it is impossible to use measurements alone to estimate the regional emissions. As suggested by the authors the use of verifiable process-based models is one approach that can be used given that the model is calibrated and tested sufficiently against local measurement data and that the database used for input accurately represent the region. The paper in its present form has many serious issues before it can be accepted for publication. The scientific concept of comparing

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two databases for quantifying CH₄ emissions using the same process-based model is interesting however the sentence structure and formatting of the paper is so poor that it becomes exceedingly difficult to give a proper review. This paper requires a thorough editing by someone who has a good grasp of the English language. A comprehensive review at this time is not possible until this is done. There is however a few general scientific comments that need to be addressed before resubmission of the paper. The authors state the county-based database is built from the polygonal database using the constraints in the DNDC model that require the maximum and minimum values for specific soil characteristics be inputted. Unfortunately, as evidenced by the results that show a -42.10% deviation between the total emissions between the two datasets, this technique might not be the most appropriate when scaling up a database to a larger land unit. Soil properties need to be scaled up by weighting their overall contribution to the larger soil unit, in this case the county level. Otherwise all soil types are given an equal contribution to the larger soil unit and inevitably skew the result for the larger soil unit. The authors demonstrate this issue when discussing the impacts that paddy soil subgroups have on CH₄ emissions. For example the submergenic soil group had a high emission rate of 105.41 kg C ha⁻¹ y⁻¹ and according to the methodology described it would have contributed equally to the country based emission rate regardless of the soil area it occupied. Considering the sample size used in the modeling exercise the result of the two databases should be on average very similar if the dominant soil is used to describe the county based soil unit. A better justification for using the smaller soil unit would be for implementing government policy that suggests management changes to reduce CH₄ emissions. A smaller soil unit would ensure that this policy could be implemented at the farm level successfully. This issue will need serious attention before the paper can be considered for publication. There are also a number of other less serious scientific comments that need to be addressed. It would be beneficial if the authors could provide some measurement studies that are from the initial 1982-1986 period that support the output from the model simulations (Fig 4). Undoubtedly the emission rates would be much lower if fertilizer inputs were reduced, however,

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comparisons to measurements would still indicate if the magnitude is correct. Also, it is important that the number of significant digits for reporting results is uniform throughout the results. One loses some credibility by stating results to several decimal places. The equivalent FAO soil classification should be used when describing any soil group in the paper. Parts of the introduction need to be written in a more concise manner and the authors should add discussion on how CH₄ emissions could be reduced from these soils. We suggest major rewriting before being asked to review this paper.

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