

## ***Interactive comment on “Spatio-temporal variability in N<sub>2</sub>O emissions from a tea-planted soil in subtropical central China” by X. L. Liu et al.***

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Response to comment of gmd-2015-251-RC1 Comments of Edzer Pebesma: This is a fairly solid paper on a spatio-temporal kriging exercise on N<sub>2</sub>O fluxes in tea plantations. It applies well-known methods and uses software that has been developed and published by Ben Gräler, Gerard Heuvelink and me over the past few years (in particular, R packages gstat and spactime). The paper does not contain innovations in terms of parameterizations or model comparison. Its main contribution is the application of an established method to the use case at hand. Part of the conclusions (more variograms should be created, more efficient testing methods should be adopted, long term observations should be collected) seem not to be supported by arguments, and have little to do with this particular use case. A solid discussion of the results is lacking. The question is whether this manuscript fits the aims and scope of GMD. It has been submitted

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as a "development and technical paper", a category for "describing development such as new parameterizations or technical aspects of running models such as the reproducibility of results". None of these three aspects: new parameterizations, technical aspects of running models, or reproducibility, are present in a recognizable form in this paper, so I considered it to be out of scope for GMD. I can also not see it fit in one of the other paper categories that GMD accepts.

Authors' Response: We highly appreciate the comments made by Professor Dr Edzer Pebesma and his own and colleagues' contributions in the development of spatio-temporal modeling methods. After double-checking the aims and scopes of Geoscientific Model Development (GMD), we comfortably think that the content of our manuscript fits well within the one of aspects of the scope of GMD: technical aspects of running models. The primary reason is that this study contains not only the comparison of four spatio-temporal semivariogram models (e.g., the separable, product-sum, metric and sum-metric), but also the application of a new spatio-temporal regression kriging method, which is not included in the "gstat" package. In the implementation of these models, all individual parameters are finely tuned by us to best fit the observation data. In addition, we evaluate the spatio-temporal variability of N<sub>2</sub>O emissions from tea-planted soils and assess the accuracy of the traditional in-situ static chamber observation method by comparing to the spatio-temporal regression interpolation presented in this study. Furthermore, from our experience of applying the "gstat" package for the spatio-temporal variability analysis, we find there is an issue with the cross-validation operation in the software. We believe that our work could help the finer and further development of spatio-temporal variability modeling and attract readers with same research interests. In summary, this study is a very few attempt to reveal the joint spatio-temporal variability of N<sub>2</sub>O emissions in agricultural systems by applying spatio-temporal semivariogram models and interpolation methods, based on our literature review.

Author's Changes to the Manuscript: No change.

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