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Comment

***Interactive comment on “Application of the
¹⁵N-Gas Flux method for measuring in situ N₂ and
N₂ fluxes
due to denitrification in natural and semi-natural
terrestrial ecosystems
and comparison with the acetylene inhibition
technique” by F. Sgouridis et al.***

Anonymous Referee #1

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This is a well written paper describing some interesting new advances in ¹⁵N-based methods for measuring denitrification, especially N₂ fluxes in the field. Denitrification is a very difficult process to measure and there is a clear need for improved measurements of this process, especially from natural and semi-natural ecosystems where it is not possible to use techniques based on additions of large amounts of ¹⁵N. The

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work here describes some improvements in mass spectrometry analysis that I am not qualified to review, and some nice comparisons of the new technique with the older acetylene inhibition technique (AIT).

The new method seems promising and the results here are certainly worthy of publication, but there needs to be a more thorough treatment of possible fertilization and water addition effects in the new method. The authors worked hard to minimize the amount of nitrate and water added to the field chambers but there needs to be a more clear statement of just how much the inorganic N pools and soil moisture content were increased by the additions. And once the extent of the increases is clarified, there should be some comparison with the literature to see if these increases have affected rates in previous studies. The authors correctly point out that “adding nitrate to the C₂H₂ amended cores would have been desirable for evaluating directly the priming effect of the added substrate on denitrification rates”, yet they did not do this. As a result, they cannot really conclude that the AIT rates were lower due to incomplete blockage of N₂O reduction from the data you have. The idea that “if the ¹⁵N tracer addition in the static chambers, even at such low rate (< 1 kg N/ha), were to stimulate the denitrification activity, this might have been reflected through high bulk N₂O flux from the chamber compared to the intact cores” is not really valid, as the vast majority of the denitrification flux went to N₂. So it would be hard to see a fertilization effect in the bulk N₂O flux.

Interactive comment on Biogeosciences Discuss., 12, 12653, 2015.

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