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Interactive comment on "Isotopically enriched ammonium shows high nitrogen turnover in the pile top zone of dairy manure compost" *by* K. Maeda et al.

Anonymous Referee #1

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Manure compost or application is a major source of atmospheric ammonia and nitrous oxide. It is undoubtedly necessary to investigate N cycling processes and their contribution to N losses during manure compost or application. Furthermore, knowledge of isotopic signature of the nitrogenous gases emitted from manure may be used to apportion the sources of atmospheric nitrogenous pollutants. In this manuscript, Maeda et al. found that ammonium in the top zone of dairy manure compost piles was enriched in 15N and they attributed this enrichment to high nitrogen transformation in this zone. The research topic is interesting and important as stated above, and is within the scope of Biogeosciences. However, due to a few major issues, I don't recommend the manuscript to be published, at lease in its current version.

1) Lack of scientific novelty. Quite a few studies have already reported that the manure nitrogen or ammonium becomes isotopically enriched during compost and this enrichment has been attributed to ammonia volatilization and nitrogen transformation. They only novel point is that the current study found that the enrichment was stronger in the top zone than in the side and core zones. Nevertheless, the manuscript is largely based on qualitative analyses while the underlying mechanisms was not presented, i.e., the mechanisms underlying the decrease in nitrous oxide emission (this should be a major objective of this study according to the abstract) following bulking agent use or the greater enrichment in 15N in the top zone of the manure piles (this should be another major objective of this study according to the abstract and the title). For the compost piles with bulking agent, the inside temperature reached more than 60 °C. Normally under such high temperature, nitrification and denitrification or the microbial activities are much low although these processes may take place in some geothermal ecosystems. The decreased emission of nitrous oxide after bulk agent integration may due to decreased nitrification and denitrification. But this needs experiment evidence.

2) Mistake in methodology. An isotopic mass balance equation is presented as equation (7). The prerequisite to use an isotopic mass balance model is that the isotopic masses in both sides of the equation are balanced. In terms of manure compost, large nitrogen loss (e.g., ammonia volatilization) is usually taking place. For equation (7), ammonia volatilization should at least be included.

3) Understandability, clarity and concise. Throughout the manuscript, there are lots of grammar issues which make the paper hard to understand. The experiment needs to be more clearly described. In addition, the terms need to be consistent. For example, according to line 19 in page 7580, samples were collected "just before each turning". However, in the following sections or the figures, it seems that samples were collected "just after the turning". For another, in line 1-2 of page 7581, "Total N was measured using raw samples by the Kjeldahl method. The C/N ratio was determined using a C/N analyzer (vario MAX CNS; Elementar, Germany)". So total N was measured using two

methods? In summary, the manuscript needs substantially improvement.

Interactive comment on Biogeosciences Discuss., 12, 7577, 2015.