

## ***Interactive comment on “Economic optimal nitrogen application rates for rice cropping in the Taihu Lake region of China: taking account of negative externalities” by Y. Xia and X. Yan***

**A. R. Mosier (Editor)**

amosier@ufl.edu

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This generally well written manuscript presents a potentially interesting analysis of the economic and environmental costs of N fertilizer use in rice cropping in an important agricultural area of China. Unfortunately, the analysis falls short of my expectations for several reasons, which are addressed by the two Reviewers. Along with other points raised by Reviewers, the authors need to be sure that the documentation of the calculations and procedures for the life cycle analysis are complete. The basis for the empirical equations used to describe environmental impacts of N fertilizer use are based, in large part, on an unpublished paper (Xia and Yan, 2011, in review) so the

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reader has no means of evaluating how the equations were derived or their reliability. The second major point is that the life cycle analysis only looks at the rice growing part of the year. As the cropping cycle for the Taihu Lake region is rice-wheat, I am not sure that it is valid to look only at one part of the cropping cycle at a time. Do we know the impact of decreasing the fertilizer N input in rice from 300 kg/ha to 200 kg/ha on the following wheat crop? Do we know the impact of changing wheat production management on the next rice crop? A third point is that when I try to use the equations given to calculate N<sub>2</sub>O emissions and N leaching I do not obtain reasonable numbers. Are all of the equations written correctly in the manuscript?

Following are questions concerning specific points within the paper:

p. 6282, first line of the abstract: The first few sentences need clarification. You start out by saying that N input is overestimated, but the following sentences suggest reasons that N input is underestimated.

p. 6286, line 25: should planning be planting?

p. 6289, line 7: Should “will be used” be are?

p. 6291, lines 10-11: Sentence needs to be revised: ...CO<sub>2</sub> is most frequently to emit...?

p. 6291, line 19: I think that you need a bit of explanation as to why ammonia is an acidifying agent. To an atmospheric chemist ammonia is a basic component of the atmosphere that neutralizes nitric and sulfuric acid. Ammonia becomes acidifying only during nitrification and protons are released in the process.

Table 2, what is the source of the data?

Table 3, how was cost established?

Figure 4, references are needed for the methods used.

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