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Interactive comment on "Determining the optimal nitrogen rate for summer maize in China by integrating agronomic, economic, and environmental aspects" *by* G. L. Wang et al.

Anonymous Referee #1

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This study estimates and compares the agronomical, economical and ecological optimum N application rates in maize cropping in the North China Plain. It concludes that the ecological optimum in N application rate yields also the highest financial net benefit. This finding is an argument for discouraging excessive N fertilisation and one may wonder why anyone is still using more fertiliser than is needed to achieve this ecologically and economically desirable goal. Does it have to do with putting a high value on food security? Is it, because the price of maize is volatile and in years when it is high, the economically optimum fertiliser application rate is also higher? Is too much of N during years with a low price for maize economically over-compensated during years when maize is expensive?

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I find the study is comprehensive and potentially useful in re-evaluating N fertiliser rates not only in China, but also elsewhere, where similar data allows this kind of analyses. Still, I would recommend to go a little bit further in explaining why there is such a discrepancy between economically (ecologically) and actual rates in fertiliser application. In this context, a small sensitivity analysis for the estimated optima would be desirable. For example, the market price of a CO_2 allowance (Pg) in Eq. 7 is set to 23.8 S/t. In the meanwhile, it has dropped considerably. How does this affect the estimated ecological optimum of N application? Estimate of the economical optimum for N application is based on a regional average maize price for 2008 and 2009 of 360 \$/t. Over the years, the maize price can be very volatile, sometimes doubling or halving between years (e.g.: http://www.indexmundi.com/commodities/?commodity=corn&months=120). How do such changes affect the conclusions? In principle, continued excess fertiliser application will not pay off, neither economically, nor ecologically, but the optimum rate will certainly shift with price development. A back-of-the-envelope sensitivity study would be very useful to assess the impact of price developments on the proposed optimum rates.

Discussion: page 2650, lines 14 to 21 are difficult to understand. I can guess what you mean, but try to rewrite these lines in a way that is less ambiguous.

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