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Interactive comment on “Nitrogen compounds emission and deposition in West African ecosystems: comparison between wet and dry savanna” by C. Delon et al.

Anonymous Referee #1

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General comments: The paper represents a first estimate of the Nr input-output balance for a remote and under-studied region in Sub-Saharan Africa. The work is strongly relying on various modeling approaches, but nevertheless it provides valuable insights in potential drivers of N-exchange at the five sites being evaluated. However, I am struggling with the organization of the paper, with only minimal information provided in the introduction (e.g. what are driving hypotheses for studying these sites and multi-years) as well as the material and method part (some tables summarizing site characteristics, used models, approaches to assess uncertainty and assumptions taken to finally derive flux estimates) are needed. Due to unclear separation of M&M and results the result/ discussion part is wordy and somewhat unorganized, with in-

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formation which should go to earlier parts. What I missed to see is time series of the measurements of wet deposition and air concentrations of Nr/ O₃ etc. on which all the modeling was based. Provided are calculated modeled fluxes, but not measurement data. Furthermore, I like to see uncertainties, but knowing how they were estimated would be helpful too (→e.g. Table). That Nr cycles are mostly closed is not a surprise. However, N must be lost from the system in form of N₂ or N₂O (marginal most likely as N₂O₅) but a rough estimate of biological N₂ fixation as driver of N cycling in these systems would be useful.

Page 7224, line 1 foll. A rough estimate of the contribution of tropical regions to Nr production would be helpful. I think that Galloway et al. 2008 provides some ideas to get to such numbers Page 7224, line 11 following It is clear that the work of Delon et al was expanded to to more sites and a longer time period. But at this point it would be interesting to know what are you hypothesizing: due to the limited interannual variability of rainfall Nr fluxes are rather constant across years? Are dry or wet savanna systems exhibit larger Nr fluxes? Some reasoning on current understanding underpinning hypotheses would be helpful too. Page 7224, line 17 "is" actually..

As said before some guiding hypotheses and what has been expected while considering more sites and years would be helpful to guide readers. Only to say it is an understudied region is from my point not sufficient. Page 7225 Though it may be repetitive more site information is needed. Specifically climate information, dominating vegetation, land use at the site and the region, possibly information about management (livestock raising, fertilizer use, crop management, frequency and intensity of biomass burning events) to get a bit of an idea how comparable sites are, or how they differ. To say this has been reported is not fair for any reader, at least some rough information is needed (e.g. in form of a Table) Page 7226, line 14 How was the 54% uncertainty determined? Also in the following just say shortly how uncertainty values were derived. Page 7226, line 24 should not be excluded? Does this means that it was considered? And how was it considered? Page 7229, line 25 are "based on".. Page 7232, line 22

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The following paragraph is very well suited for the introduction section but not for the results Page 7234, line 1 follow. Also this paragraph I would rather see in the Material and Methods section (site description) as to be found in the result section Page 7234, line 27 FAPAR curves: let us assume that not all readers are insiders Chapter 3.1.2 Since estimates of soil NO emissions are modeled and not measured I find this section extremely speculative. From my perspective the discussion of the modeling results should focus on the likeliness of magnitudes, seasonal patterns and site differences (e.g. due to differences in soil, vegetation or management) and not so much if nitrification or denitrification or both are contributing to simulated emissions.

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