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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Dry deposition of nitrogen compounds (NO_2, HNO_3, NH_3), sulfur dioxide and ozone in West and Central African ecosystems using the inferential method" *by* M. Adon et al.

Anonymous Referee #1

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This study uses the inferential method to estimate dry deposition of a few acidifying species and ozone at several sites representing different ecosystems in Africa. Although not much new science in the paper, it is worth to be published considering the scarce of such data from this region. It is a very long paper due to the detailed description of too many not-so-important aspects. The method descriptions and most discussions on monthly variations can be significantly simplified. Instead, the paper should focus on annual and dry/wet seasonal results for each ecosystem. A few points are provided below when considering revising the paper.

P 11690, L17-18: The study only includes three gaseous N species; major aerosol N species (ammonium, nitrate) and other N species were not included in the N deposition budget. Thus, the conclusion regarding the percentage contribution from any individual N species provides no useful information at all. The paper should also point out why aerosols (N species as well as sulfate) are not included in the study. Without these species, N and S deposition budget is not complete.

Section 2.2.3: The whole section focuses on comparing concentrations between the heights of 3 and 10 meters. The authors also noted that the flux is supposed to be estimated as a product of concentration and deposition velocity at a height above the forest which should be at several ten meters for forest canopies. Because most uptake of pollutants happens near the top of the canopy where leaf area density is the largest, concentration gradient is also the largest between the first several meters at the canopy top. The materials presented in this section are thus not meaningful. They should try to discuss concentration differences between the canopy top and the 3 meter height. Also check a related reference by Hicks (2006), Agric. For. Meteorol., 136, 214-221, regarding this issue.

P11705, L11, Why use 6-year average Vd for all the years? I would use Vd from each year and only use multiple-year Vd for those years that do not have Vd data. Using the same Vd for every year reduces the standard variation in the calculated fluxes (Table 5) because only variations in concentration are considered.

The paper discusses in very detail the monthly variations of everything. The paper is thus very long, yet with limited useful information, especially considering the flux variations were arbitrarily reduced due to the use of the same Vd for each year. While the monthly variations can be simply discussed, the paper should focus on annual dry deposition budget, then compare dry and wet seasons. This way, the paper will be in reasonable size (measured by its useful results), and will include the most important materials.

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P11706, L5-10, this also suggest you should present fluxes for dry and wet seasons as a whole instead of on individual month because some monthly fluxes are not real (due to the approach used, e.g., neither bi-directional approach nor exclusion of emission estimate from dry deposition budget).

Even though wet deposition is not studied here, you could mention in just a few sentences (e.g., in the conclusion and discussion section) the relative importance of dry and wet deposition (based on your previous publications) to make the knowledge more complete.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 11689, 2013.