

***Interactive comment on* “Temporal variability in bioassays of ammonia exchange potential in relation to plant and soil nitrogen parameters in intensively managed grassland” by M. Mattsson et al.**

Anonymous Referee #1

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General comments:

The paper presents the results of plant and soil analyses during the GRAMINAE integrated experiment in Braunschweig (Germany) in 2000. The aim of the paper was to estimate the NH₃ emission potential of grassland in relation to common management practice. In order to do this, temporal variation in the NH₃ compensation point and its underlying components of grass leaves and soil was followed at a field site before cutting to after cutting and lifting and subsequent N-fertilization of the field. The conclusion is that the management practice has a major influence on the potential

S1422

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plant-atmosphere exchange in grassland by influencing both plant and soil N parameters. The authors suggest that there is a link between the NH_4^+ and H^+ concentration in bulk extracts of plant material in grassland and the NH_3 compensation point. The paper contains valuable soil and plant measurements of NH_4^+ , NO_3^- , pH and several other variables from which the 'emission potentials' were calculated and therefore deserves publication in BGD. The term 'emission potential' is used for the ratio between apoplastic NH_4^+ and H^+ throughout the paper (and in the title!). This reviewer thinks that this is confusing, as the word 'potential' suggests that this is a driving parameter in the flux, while the actual driving parameter in the flux is the stomatal compensation point (which is also temperature dependent)). In resistance analogy, the current (or flux) is defined as the potential difference (or concentration difference) divided by the resistance. Therefore, I would suggest to reconsider the title of this MS.

Specific comments:

p 2751-22: 'NH₃ exchange potential'. See general comments.

p 2754-4: Why were guttation droplets collected?

p 2756-12/13: 'Plants on a plot receiving 200 kg N ha⁻¹ did not show higher apoplastic NH_4^+ concentrations'. This is not true, they do show a high peak in NH_4^+ concentrations.

p 2756-18: Why should σ be temperature independent. I think this is not necessarily true. The chemical equilibrium is determined by temperature, but the NH_4^+ concentration and pH are also determined by physiological processes, which might be temperature dependent. Therefore, I think that σ still might include a temperature dependency?

p 2757-4: define 'FW' (is 'fresh weight'?)

p 2757-20/21: Do they show a similar pattern?

p 2758-23/25: The explanation of the lower soil concentrations of NH_4^+ and NO_3^- for

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the 200 N treatment is not very convincing.

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S1424

