Response to reviewers:

In general, all technical and editorial suggestions were accepted.

Briefly explain to the reader why you have used two different solutions (101)

The various references to using two solutions in this paragraph were removed, and a separate paragraph was added below (now on lines 112-117):

> "Conventionally, the soil emission potential is calculated as a function of the soil pH (H^+_{DIW}) and salt solution-extracted NH_4^+ ($NH_4^+_{SALT}$). In addition to investigating whether adsorption isotherm equations could be applied to estimate $NH_4^+_{(aq)}$ from the total soil NH_4^+, we investigated the impact of calculating the emission potential using a 'like-with-like' ratio of H^+_{DIW} with NH_4^+ extracted using DIW as the solvent, as well as the ratio of $NH_4^+_{SALT}$ to H^+ determined from a salt-solution:soil slurry. Consequently, the pH was also determined as described above, but using a 0.01 M $CaCl_2$ solution in place of DIW, while soil NH_4^+ was also determined as described above, but using DIW as the solvent."

I don't understand why not all 16 soil samples were used as a test set. (122)

The 16 environmental soil samples were collected to measure the impact of the different approaches on the soil emission potential, a subset were used to validate the parameters calculated using the 8 fully characterized soil samples. Fully characterizing soil samples (which was done for the 8 + 3 soil samples) is labor-intensive, and characterizing the additional 13 samples was not considered a good use of resources.

Why is there no +/- se for Smax? (Table 2, Table 3)

These tables show the calculated fitting parameters and errors for the investigated adsorption equations, Smax was directly measured and does not have an associated fitting error.

Define emission potential and add unit (233)

An explanation of the emission potential was added to the introduction, where it was missing (in addition to the definition that was already given in the method section)

> The propensity for ammonia to volatilize from liquid reservoirs is parameterized by the emission potential (Γ), which is calculated as the ratio of aqueous NH_4^+ to H^+.