

List of corrections:

L 29-35: the flow of this newly added section is suboptimal. Please rewrite

Response: Section was streamlined to read:

The most common removal of nitrogen from soil environments is mineralization (for organic nitrogen), followed by nitrification and then denitrification (Canfield *et al.*, 2010). In water-saturated and organic carbon rich sediments or soils, such as wetland sediments, there is little oxygen for significant nitrification by aerobic ammonium (NH_4^+) oxidation bacteria/archaea (AOB/AOA). (L 29-33)

L. 31: sediments, such as those found in wetlands and other aquatic systems, there is.... (benthic sediments make no sense).

Response: We feel that “benthic sediments” is an accurate description, but removed it since it is not essential.

L. 33: the link with groundwater discharging is unclear

Response: This sentence was not essential and was removed.

L. 41, equation 1. The stoichiometry of your reactions is not right: you produce 7.5 water molecules not 8.5. (just check the number of O and H atoms on both sides). This is not just a typo it comes back a couple of times and most importantly your Gibbs Free energy calculations are based on this wrong stoichiometry.

Response: The stoichiometry is actually correct. The 3 multiplies the whole empirical formula of ferrihydrite: $3\text{x}(\text{Fe}_2\text{O}_3 \cdot 0.5\text{H}_2\text{O})$, although the conventional way of writing the reaction is:



$$\text{H: } 3 \times 0.5 \times 2 + 10 + 4 = \mathbf{17} = 8.5 \times 2 = \mathbf{17}$$

$$\text{O: } 3(3 + 0.5) = \mathbf{10.5} = 8.5 + 2 = \mathbf{10.5}$$

$$\text{Fe: } 3 \times 2 = \mathbf{6} = \mathbf{6}$$

$$\text{Charges: } 10(+) + 1(+) = \mathbf{11(+)} = 6 \times 2(+) - 1(-) = \mathbf{11(+)}$$

No changes were made to the stoichiometry, relevant discussions, or the Gibbs Free energy calculation. Writing it as $3[\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}]$ might avoid confusion, but it is just not the convention. Dividing the equation by 3 could help but one ends up with numbers like 8.5/3, which is odd. We prefer to leave the equation as is.

L. 74: no manganese oxides

Response: Done. (L71)

L. 118: final

Response: The Fe(III) concentration given was for the beginning of the incubation ($t=0$). We called it initial and are afraid that final can be misinterpreted as the concentration at the end of the incubation. Hence we changed the sentence to:

‘The Fe(III) concentration at the beginning of the incubations was 25 mmol L⁻¹.’ (L113)

L. 127: through

Response: Done. (L125)

L. 134: fed

Response: Done. (L132)

L. 135: dissolved

Response: Done. (L133)

L. 140: introduce DI abbreviation upon first use

Response: Done. (L138)

L. 185: Table 1, not Table1 (all through)

Response: Done.

L. 217: Rotthauwe et al. 1997. Where does it refer to. This is not clear at the end of the sentence.

Response: Deleted

L. 219: 2008).

Response: Done. (L217)

L. 244: found in the sterilized

Response: Done. (L242)

L. 255: Fig. S6 (is correct, but is S5 in appendix).

Response: Corrected

L. 326-331: the number of nirS gene and nirK gene. This does not make sense. Rewrite this section to the number of copies of nirS gene...

Similarly, Growth of nirS and nirK gene copies showed....

Response: The section was rewritten accordingly:

‘The abundance of Acidobacteriaceae bacteria (DGGE band A8), and that of denitrifiers (represented by the number of copies of nirS gene and of nirK gene), increased over the 180-day incubation (Fig. S4a, b, c), although their growth was less than that of Acidimicrobiaceae bacteria (DGGE band A6). Increase in copies of the nirS and nirK genes showed similar trends, although the number of nirK gene copies was two orders of magnitude lower than that for nirS (Fig. S4b, c). Increase in the denitrifier activity was most likely stimulated by the NO_2^- generated via Feammox.’ (L322-329)

L. 368: in samples

Response: Done. (L362)

L. 386: Fe (III) was added

Response; Done. (L385)

L. 387: do not require, no...

Response: Done. (L386)

L. 423 a strong link with an Feammox...

Response: Done. (L421)

L. 445: delete might

Response: Done. (L444)

L. 454-455: unclear. Do you mean no production?

Response: What we are saying is NO_2^- production was found in all incubations where NH_4^+ was removed, but the NO_2^- produced was consumed quickly by denitrifiers. The

sentence was changed to read:

‘In all incubations where NH_4^+ was removed, the production of NO_2^- was observed, although NO_2^- did not accumulate. Most of the NO_2^- produced from the NH_4^+ oxidation was reduced rapidly by denitrifiers, which were present in the incubations.’ (L454-456)

Check reference list for completeness.

Response: The references were checked.

Supplementary information

Section 1.1. Equation 1 was wrong and the ΔG calculation as well.

L 25-28: should all be 7.5 instead of 8.5

Response: The stoichiometry is correct. The 3 multiplies the whole empirical formula for ferrihydrite. See more detailed discussion above.

L. 121: After 270 days of operation in Feammox enrichment slurries were collected from the

Response: The sentence was corrected. (L121)

L. 127: was added

Response: Done. (L127)

L. 134: Ding et al. is not in reference list.

Response: The reference was added. (L228)

Line 202: Fig. 6S not 5S, also Stoichiometry...

Response: Figure number was corrected. (L208). Since the equation was right, no change was done for the stoichiometry.

Line 227: supplementary references: check.

Response: The references were checked.