

Interactive comment on “First on-line isotopic characterization of N₂O emitted from intensively managed grassland” by B. Wolf et al.

Anonymous Referee #2

Received and published: 17 February 2015

The manuscript reports a technical feat: the on-line isotopic characterisation of N₂O emitted from an agricultural area. All descriptions, data and discussion relating to the isotopic characterisation are excellent science. A weak point is the relation of isotopic compositions to N₂O flux (and soil parameters) measured on the experimental grassland plot. There are probably something like four orders of magnitude in size difference between the concentration footprint (in the order of 10 x 10 km; from which isotopic compositions were derived) and the N₂O flux footprint (in the order of 0.1 x 0.1 km). By relating changes in isotopic composition to N₂O flux (and soil conditions) on the experimental grassland plot, the implicit assumption is made that N₂O emitted from the grassland plot is representative, in terms of isotopic composition, for a much larger area. Looking at aerial photographs of Chamau (e.g. Google Earth), it seems there is a large proportion of arable crops and also forest within the concentration footprint

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(I am not familiar with this site, but think to have located it at 47 degrees 12' and 24" N and 8 degrees, 24' and 32" E). This mix of different landuse constitutes the concentration footprint and is the source of observed changes in the isotopic composition observed during nocturnal inversions. In contrast, the N₂O flux measured by eddy covariance relates to the grassland site, where also the soil parameters (soil temperature and moisture, inorganic N) were measured. I would propose to drop the N₂O flux part of the manuscript and relate observed changes in isotopic composition during nocturnal inversions solely to meteorological parameters ("wet phase" and "dry phase", as in section 3.5), which are much more likely to have been homogenous within the concentration footprint, than N₂O flux or soil parameters (in particular NH₄⁺, NO₃⁻, DOC,) or management events.

Page 1575, lines 13-15 state: "Hence, the development of adequate mitigation strategies is pertinent and requires a better understanding of the processes driving N₂O fluxes."

Please return in your discussion to this statement and try to show how the study has contributed to this goal (maybe as a follow-up to sections 4.4 and 4.5).

Minor: Page 1576, line 22: insert space between "in" and "Toyoda". Page 1579, line18, and page 1594, line 22: maybe "comparability" instead of "compatability"? Page 1584, line 22: Results of DOC measurements are presented here, without the DOC measurements having been explained in the Methods section.

Interactive comment on Biogeosciences Discuss., 12, 1573, 2015.

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