Biogeosciences Discuss., 10, C7872–C7874, 2014
www.biogeosciences-discuss.net/10/C7872/2014/

Biogeosciences
Discussions
Open Access

Interactive comment on "Effects of mowing on N_2O emission from a temperate grassland in Inner Mongolia, Northern China" *by* L. Zhang et al.

C. Hoffmann

hoffmann@zalf.de

Received and published: 13 January 2014

Abstract

Line 10: "control of non-mowing" –> Not clear if this is ungrazed or used as grazing land in any manner. Please shortly give a hint.

General: Highest N2O fluxes were recognized during freezing-thawing periods, especially after snow melt (March/April). In your experiment these fluxes were ignored: The paper, cited also in this manuscript, Wolf et al 2010: "In temperate ecosystems with long frost periods, distinct freeze–thaw periods can occur. These periods can contribute significantly to annual N2O budgets . . ." and Figure 1 in Wolf et al. 2010. Check also Essery, R. & Pomeroy, J. Vegetation and topographic control of wind-blown snow

distributions in distributed and aggregated simulations for an Arctic tundra basin. J. Hydrom.5,735–744 (2004) as cited in Wolf et al. 2010: "Vegetation height is the determining factor in snow-holding capacity, such that snow is more quickly eroded at grazed sites with sparse or low vegetation than at sites with denser and taller vegetation"

Line 23-24: To define grassland as a sink, year round measurements are necessary! Introduction: The variation of grain size distribution seems to be too small. Taking units of two decimal numbers (.00), also for pH, is pseudo precise. How many samples were choosen? Methology of grain size distribution? Are these data published somewhere else?

Methods

Soil moisture and temperature measurements: It is not clear if both values were measured weekly/biweekly or permanently. If weekly/biweekly: Both values are highly variable in space and time, especially after rain events and snow melt (moisture), during day/night, cloudy sunny weather (temp). It is not clear which daytimes measurements were made. Taking average values and "ranges between" and reporting "highest values in July" (moisture) in the result section are not correct as rain event shortly before measurements (moisture) or varying time of date measurements (temperature) would influence the results.

3.1 Was there really no snow fall between Nov and Feb in both years? Usually you have a permanent snow cover in this region between November and March.

3.3/3.4. In my eyes it is not entirely correct to call single measurements "means over the growing period". Again, values are highly related to precipitation, time of the day, day-night cycles, cloud-shadowing. . .. I recommend using measurements as single values/trends and moving interpolated data from hour measurements to season-averages into the discussion section.

3.3. Line 23 "Figure 3 indicates that grasslands. . ." is not right. Better: "Measurements

showed that grassland could be a sink/source (Figure 3)"

3.3. "surprisingly" is does not look so good in the result section – Better write and explain why it surprised you in the discussion section.

Figure 4a: Soil moisture 9-15% seems to be much too high in the semi-arid region. I guess it is permille (?) If so the measurements have been made under more or less comparable conditions (not directly after snow melt or after rain fall). What is to be expected after such moist conditions (e.g. short time water saturation)?

Figure 4f: I cannot see the "open circles" in the figure. If there is a temperature effect it would be better to show this effect instead of separating some measurements. However there seem to be a multiple effects on the N2O fluxes

4.1. First sentence: . . .decrease in N2O >emission< . . . (the word emission is missing) Line 21/22 twice "this was in a line with . . ." The Discussion section is convincing and compliant but it also agrees with my critical points above "Because moisture is the key determinant of the microbial processes that consume or produce N2O, soil moisture shifts in arid and semiarid regions will likely affect N2O fluxes". I strongly recommend the authors to show, that measured were performed only under dry conditions and that short wet conditions have great effects on N2O fluxes but were not included to this study. This is the reason why no analyses of a entire seasonal balance is possible. Some ideas in this direction I miss in the discussion. . .: Reducing plant height could increase solar radiation on the soil surface (+evaporation) and dryer conditions. Long grass also catches snow, rain and morning dew → increase of local soil moisture.

Figure 5: the y-axis is not clear to understand. What is meant by minus X% moisture? Relative reduction? Over which period or is this the seasonal average?

Interactive comment on Biogeosciences Discuss., 10, 19219, 2013.