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**Biogeosciences Discussions**

# *Interactive comment on* "Winter greenhouse gas emissions ($CO_2$, $CH_4$ and $N_2O$) from a sub-alpine grassland" *by* L. Merbold et al.

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I provide comments in the attached pdf document.

Interactive comment on Biogeosciences Discuss., 10, 401, 2013.



Review of BG-2013-401, Winter greenhouse gas emissions ($CO_2$, $CH_4$ and $N_2O$) from a sub-alpine grassland; Merbold et al.
By Benjamin R. K. Runkle, University of Hamburg

General comments
The authors present a good dataset on greenhouse gas fluxes from a snow-covered grassland during the under-measured winter season. This work was carefully performed and is of strong interest to the scientific community. I think more studies should analyze these three major greenhouse gases, use a variety of methods to cross-validate methods and investigate spatial heterogeneity, and take a year-round approach that includes the winter season presented here. The data and its presentation are generally of the quality expected by Biogeosciences, and I think the work should be published there. However, before its publication there are considerable revisions necessary to work out how to be present the data collect, how to contextualize it with respect to other studies at this and other sites, and in improving the quality of the written English.

I do not wish to re-examine the points raised in the other reviews, so present my key suggestions in the comments below. I strongly recommend going over the writing with a fine-toothed comb to work through the structural, textual, and conceptual issues raised in this and the other reviews, and suggest letting a native English speaker assist in the final editing.

Specific comments
p. 402, line 13 – I suggest putting the study time period (November – April) before you present anything about the results (ideally in the first or second sentence of the abstract); additionally I wonder why in the abstract the time period is Nov-Apr but in the text the measurements began in December and went only to mid-April, the snow cover started 19 Nov, and the upscaling starts 16 Nov.

p. 403, lines 8-11 – I rarely find one-sentence paragraphs warranted and suggest either expanding the thoughts presented in this paragraph or folding it into one of the paragraphs above or below it.

p. 404, lines 5-1 – This paragraph requires a topic sentence giving us some context and thesis for what the paragraph will present. Also please be more specific when saying "the most important N2O sources" – is there some quantitative proportion or magnitude available?

p. 404, line 28-page 405, line 2 – this long line of citations deserves a bit more explanation. Are these papers which include other GHGs, or do not? Are they relevant comparisons (e.g., of the ecosystems and time periods studied here)?

p. 407, More information should be provided about the EC set-up, particularly as the valley sounds quite small and possibly steep. Is there flat enough terrain to suit the EC method? What is the average footprint size? Do any wind directions require screening out? At the maximum snow depth the measurement system is less than 1 m above the surface – are there any additional considerations during this period? Does any of the spatial heterogeneity uncovered during the transect measurements make an appearance in a footprint model (or even by wind direction)?

p. 410, line 2? I would have suggested starting a new paragraph somewhere in this region, but seeing the (non)results from the 222Rn work, I suggest shortening this section considerably – it is not so important to get into the details of how this would measure. I do appreciate that you left this work in the text even though it failed as I think it can provide useful lessons for others in the community – both about an interesting tracer for use in measurement and about the potential

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**Fig. 1.**