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Biogeosciences Discussions

Interactive comment on "Effects of soil temperature and moisture on methane uptakes and nitrous oxide emissions across three different ecosystem types" *by* G. J. Luo et al.

Anonymous Referee #1

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Comparing soil nitrous oxide and methane fluxes from three very contrasting ecosystems is a nice idea; and as the authors suggested may help with the development of environmental response models. However, the data included in this comparison are: (i) data from their well studied Höglwald site, for which they have $\sim$ 10 years of flux data. For this paper's comparison they picked 1995 and 1997, as these years are 'typical with regard to flux magnitudes, seasonal flux patterns and environmental conditions'. For cross – site analysis they use the data for both years. However for some specific data analysis, the authors randomly select data from 1995 and 1997. (ii) a tropical forest in Australia, data for Nov 2001 – Oct 2002, (iii) a steppe in Mongolia, data for mid August 2007 to mid August 2008. I assume the authors don't have more than one year's

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worse of good quality data from the tropical forest and the steppe. I don't, however, understand why they did not make use of the ∼10 year record of nitrous oxide and methane flux measurements at Höglwald, and use the average/median of all years? Neither do I follow why 2 representative years for Höglwald were included, surely with all the generalisation done in this paper, one year would do?

Table 1: Why do you use 2004-2010 rainfall and temperature for the temperate forest, 1982 -2007 data for the steppe and data set of unknown (?) length for the tropical forest? A more consistent approach in deriving the temperature and rainfall data for your study would be more credible.

The comparison would be much stronger if you would have used same length data.

Below are some additional comments:

Section 3.1, p935 line 17 – 23 and Table 2: are the differences between sites significant? Section 3.1. p935, last paragraph, line 22: replace 'emission' with 'flux' in: ' A comparison of soil nitrous oxide and methane emission...' Section 3.1. p935, last paragraph, line 2 delete 'sites' in 'temperate forest sites ecosystems'

Section 4.1 p937 first paragraph: Nitrous oxide is a 'product', and not a 'byproduct' of denitrification. And 'nitrification is the oxidation of ammonium to nitrite and nitrate'. Please make these changes. Section 4.1 p937 line 3: delete 'approximately' and change to (0.22 kg ...) Section 4.1 p937 line 20: change to ($r2 \leq 0.33$) Section 4.2 p 941 line 19: change to: equals 44% and 43%, respectively. Section 4.2 p 941 line 20-25: The comparison of Sitaula's presumably in vivo measurements of CH4 uptake rates in a pine forest at relatively low WFPS with an agricultural soil (in vitro) study, where maximum CH4 uptake rates were observed at 50-70% WFPS is a little odd. The word 'SIMILAR' in line 23 is certainly not correct. I am sure you can find a more suitable in vivo study for this comparison? Table 1: what is Dfb, Af, DwB? Table 1: Should you not change 'Mean annual precipitation' to 'Cumulative annual precipitation'?. Table 1: Can you synchronise the display of pH (3.4 -4, 4.1 $\pm$0.03), and the other chemical,

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physical properties across the three sites. Fig 1-3: It is difficult to distinghuish between the 4 flux lines, when viewing in black and white. Fig 4: is the box plot of daily AVERAGE soil volumetric water content? Fig 6 ,7,8: delete Höglwald in legend Fig 9,10,11: it is difficult to distinguish the black, grey and white dots. Perhaps increase the graph size.

Interactive comment on Biogeosciences Discuss., 10, 927, 2013.