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Comment

Interactive comment on “Soil and plant contributions to the methane flux balance of a subalpine forest under high ultraviolet irradiance” by D. R. Bowling et al.

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Received and published: 7 July 2009

We thank the reviewer for thoughtful comments and ideas. Here we respond to those comments which led to suggestions for changes in the manuscript.

Specific comments 1. This study mentioned the other contributions such as wind transports from nearby wetlands and an urban area, besides soils and plants. Authors concluded that variability in the CH₄ mole fraction of forest air was related to a mountain-plain wind system and influenced by air mass transport from the Denver, Colorado, urban area. Also, another greenhouse gas, carbon dioxide, was in detail measured. So, is the title appropriate?

C1045

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Reply: We have changed the title to reflect the atmospheric transport influence.

2. This paper was presented in omissions to some extent, particularly in Methods section. Some figures can be eliminated, e.g. Fig. 1. Instead, relative descriptions may be concisely put in the text. Some figures can be combined, e.g. Fig.2 and Fig.4; Fig.8 and Fig. 9. Fig. 8 and Fig. 9 should be combined via two columns to still compare CO₂ and CH₄ gradients between near ground and canopy. These are easily improved through further revision.

Reply: We have removed Fig. 1 as suggested. Combining Fig 3 and Fig 4 doesn't make sense since the x-axes are not the same. We tried combining Fig 8 and 9, but were unable to find an acceptable combination because the scales are quite different, even after normalizing the y-axes.

3. This study provided evidence that aerobic foliar methane emission from the dominant conifer species at Niwot Ridge is minimal. Meanwhile, authors cannot rule out the possibility of a canopy source of CH₄. The results present us a possibility: if plants only exist 'pulse' methane emission under sudden environmental stress such as physical injury, not 'continuous' emission, it is very difficult to find their substantial emissions of methane in the field. This requires more in situ measurements to test.

Reply: We agree. The last sentence of our discussion stresses the need for more in-situ measurements: "Given the growing body of literature documenting aerobic methane emission from plants, more work is clearly needed to assess the general phenomenon of methane emission across plant taxa, and to determine the general ecological significance of plant emission of methane in intact ecosystems."

Interactive comment on Biogeosciences Discuss., 6, 4765, 2009.

BGD

6, C1045–C1046, 2009

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