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Biogeosciences Discussions

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.

Anonymous Referee #1

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General comments Traditionally, the only known biological mechanism of CH4 was a limited group of obligately anaerobic prokaryotes called methanogens. Recently, some studies have found aerobic CH4 emissions by plants in lab conditions. However, plant methane emissions are highly uncertain with intense debates. This is the first study that was specifically designed to investigate plant methane emissions from terrestrial plants in the field. Authors investigated vertical profiles of methane and carbon dioxide in forest air, using micrometeorological techniques. Using new approaches of 'gradients' and 'daytime excess' within-, and below-canopy, authors did not find substantial emissions of CH4 from the foliar vegetation even under high UV irradiance. The paper addresses relevant scientific questions within the scope of BG. This study presents

some important information on whether methane can be emitted by terrestrial plants in the field. The paper is of high interest because it provides new information about plant methane emissions in nature. I rate this study as 'good' for scientific significance and quality. I recommend that the paper is accepted subject to minor revisions.

Specific comments 1. This study mentioned the other contributions such as wind transports from nearly 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? 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. 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.

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