

***Interactive comment on “Improved quantification of microbial CH<sub>4</sub> oxidation efficiency in Arctic wetland soils using carbon isotope fractionation” by I. Preuss et al.***

**Anonymous Referee #2**

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This manuscript examines the influence of methane oxidation and diffusion on the isotope ratio of CH<sub>4</sub> emitted from polygonal tundra. The authors make the scientific argument that fractionation due to diffusion is not often measured and they show that it can have a considerable effect on the <sup>13</sup>C-CH<sub>4</sub> of emitted CH<sub>4</sub>, thus improving our understanding of sources and sinks of CH<sub>4</sub> in these environments. The paper is thorough and well written, and although I cannot say I am an expert in the field of isotopic fractionation and CH<sub>4</sub> oxidation, the arguments and data seem well organized and justifiable. The conclusions seem to flow directly from the data and I do not think they are overstating their case. The only two comments I have are the following. First, on page 17019, the authors do not consider the importance of anaerobic methane oxidation in

either the change in concentration or  $^{13}\text{C}$  of  $\text{CH}_4$  with depth. What affect could anaerobic methane oxidation have on either of these patterns? Second, the discussion is repetitive (around pages 17019/20), and could be 'tightened up' a bit.

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Interactive comment on Biogeosciences Discuss., 9, 16999, 2012.

**BGD**

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