

Interactive comment on “The stable carbon isotope signature of methane produced by saprotrophic fungi” by Moritz Schroll et al.

Anonymous Referee #2

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General comments: Methane is the second important anthropogenic greenhouse gas after carbon dioxide. Recent studies have shown that this gas can be produced under aerobic conditions by plants, algae, fungi and animals. In this manuscript, Schroll et al. cultivated two saprotrophic fungi on three different substrates and measured the stable carbon isotope values of methane. This study is the first to report the analysis of stable carbon isotope values of methane emitted from saprotrophic fungi. The authors found that the source values of $\delta^{13}\text{C}_{\text{CH}_4}$, emitted by the fungi, were dependent on the fungal species and the metabolized substrate. Although this paper has some limitations in terms fungal species and substrates, it certainly opens the door for new and exciting work in the area of aerobic methane emissions. Overall, this is a well-written manuscript and deserves to be published in Biogeosciences after minor revisions.

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Specific comments: Abstract L16. eukaryotes, L17-18. ecosystems via decomposition of plant litter L18. Although the methane L19. In this study, L20. The common names of fungi must be mentioned here L21. , cultivated... (pine...), reflecting L21. Which grass? It is better to provide the Latin names of pine, grass (species name) and corn L22. Keeling; K must be uppercase here and in other places L26. 'Whilst' should be replaced; it is mentioned in the previous sentence L28. We found that the values of $\delta^{13}\text{CH}_4$ emitted L29. What is 'They' in 'They cover'?

Introduction L32. Fossil fuel burning indicates a process but not source; source is fossil fuel, biomass, and... L35. microorganisms, L38. discovered, L43. It is better to delete 'therefore' L43-L44. White rot fungi (e.g., Latin name)... brown rot fungi (e.g., Latin name) L46. in the synthesis of CH_4 L48. archaea with essential substrate... in fungus-infected wood stem L52. might be an underestimated L53. It is better to delete 'Applications of'; It is better to start the sentence with Stable isotope procedures L54. 'they' is referred to what? L61. have been identified L64. plant-derived CH_4 ..., and UV-induced CH_4 ... L66. In this study, we...

Material and Methods L73. Pleurotaceae and Polyporaceae are the family names and should not be italicized. L77. Both common and Latin names should be provided for pine, grass (specific plant species) and corn L92. It is better to provide the temperature for autoclave L109. What are those five different gases? L135. Is 'the working reference gas' the standard reference gas? L143. substrate was put... the resulting gases were separated... L144. 27.5 m ... then reached L148. Keeling L153. Keeling L155. Keeling...Keeling L157. It is better to delete the first 'grown on pine' L163. Keeling L169. Was there a reason for using Fisher test instead of a robust test, such as Tukey's test?

Results and Discussion L177. Keeling L178. The second 'source' can be deleted. L185. 'the' should be deleted. L188. The second 'grown' should not be italicized. L194. Most of the controls? It is better to be specific. L195. ... , respectively were observed L206. was present L220. thereby, both...; the 'both' after substrate should

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be deleted. L221. Is it $P < 0.001$? ; a comma should be added after *sapidus* L227. 'in a good accordance' is not clear, it needs to be rewritten. L227. It should be noted that CH₄ L262. It is better to rewrite this sentence, like: ...Keeling plot analysis that range ... are presented. L265 and L269. $P < 0.001$ (number should not be italicized) L278. Keeling; one of the 'values' should be deleted. L283. 'as so far' is not clear L285. The values of... that range from... are presented in Table 2 L287. 'more' should be deleted. L292. 'Although... substrate' is not a sentence and should be rewritten. L295. 'usually' should be deleted from here and added after 'are' L299. 'slightly more' should be reworded. L306. CH₄ and CO₂ are derived L318. a wide range

Conclusion L336. sources, such as methanogenic archaea and eukaryotes. L337. 'and from abiotic processes' should be deleted or modified in such a way to show sources L339. processes, resulting L340. The sentence that starts with 'Thus, studying' is not clear and should be rewritten. L343. research, stable L359. Grant Numbers L384. In CO₂, 2 should be subscript. L391. The title of this paper should be written in correct format. L441. The Latin name should be italicized. L447. In CH₄, 4 should be subscript. L448. In CH₄, 4 should be subscript; In 13C/12C, 13 and 12 should be superscript. L451-L452. CH₄ and 13C/12C should be written in correct format. L512. The Latin name should be italicized. L533. Plant Cell Environ.

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