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Biogeosciences Discussions

Interactive comment on "Non-microbial methane formation in oxic soils" *by* A. Jugold et al.

Anonymous Referee #2

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Laboratory experiments with sterilised soil samples from four temperate forests and one peat bog are presented. They show that temperature, wetting and drying, H2O2 treatment, and UV radiation can cause the release of small amounts of CH4 from organic material. Experimental methods are sound, well described and results are clearly presented.

Aiming to discover new sources of greenhouse gases is intrinsically interesting, and a worthwhile effort. Pressure to produce results that are "relevant" in, for example, the context of climate change, is large. This often misleads to over-interpreting results and renders an otherwise great study unnecessarily difficult to accept in its entirety. I think this study could gain, if the authors would dispense with forcing "relevance" on its results. To give an example, the Abstract says: "We suggest that chemical formation of methane during degradation of soil organic matter may represent the missing soil source that is needed to fully understand the complete methane cycle within the

pedosphere." Or, from Conclusions and outlook (page 11975): "However, given the large global soil areas and the frequency at which dried and rewetted soils release CH4, this source can nevertheless be an important factor in aerobic soil organic matter degradation." In light of the very small CH4 emissions found, I find such statements inappropriate. Further, the studied soil samples are from locations (mid-latitude, 4 of 5 samples below forest canopies), which are neither subject to frequent drying-rewetting cycles nor high temperatures or UV radiation. So there are two large leaps of extrapolation. One is from the mild conditions under which the organic matter in the studied samples has developed in the field to the harsh environment of pre-treatment and finally incubation under the various stressors in the laboratory incubation. The second leap is from the laboratory to savannahs and tropical regions. Instead of trying to force the results into a global natural context, it would be better to provide in the outlook some indication of how a more mechanistic understanding of the processes underlying abiotic CH4 emission could be studied.

Minor issue: Page 11963, line 21: ". . .emitted up to 6 ug CH4 per core. . ." Please be more precise and let the reader know the mass or volume of a "core".

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