

Forest cockchafer larvae as methane production hotspots in soils and their importance for net soil methane fluxes

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Certain groups of soil invertebrates, namely scarab beetles and millipedes, are capable of emitting considerable amounts of methane due to methanogens inhabiting their gut system. It was already pointed out in the early 1990's, that these groups of invertebrates may represent a globally important source of methane. However, apart from termites, the importance of invertebrates for the soil methane budget is still unknown. Here, we present preliminary results of a laboratory soil incubation experiment elucidating the influence of forest cockchafer larvae (*Melolontha hippocastani* FABRICIUS) on soil methane cycling. In January/February 2016, two soils from two different management systems – one from a pine forest (extensive use) and one from a vegetable field (intensive use) – were incubated for 56 days either with or without beetle larvae. Net soil methane fluxes and larvae methane emissions together with their stable carbon isotope signatures were quantified at regular intervals to estimate gross methane production and gross methane oxidation in the soils. The results of this experiment will contribute to testing the hypothesis of whether methane production hotspots can significantly enhance the methane oxidation capacity of soils. Forest cockchafer larvae are only found in well-aerated sandy soils where one would usually not suspect relevant gross methane production. Thus, besides quantifying their contribution to net soil methane fluxes, they are also ideal organisms to study the effect of methane production hotspots on overall soil methane cycling.

Funding support: Reintegration grant of the German Academic Exchange Service (DAAD) (#57185798).