Responses of microbial communities to varying terminal electron acceptors in peatlands and the production of CH4 and CO2

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Peatlands play a crucial role in the natural carbon cycling by effecting methane and CO2 emission.  Despite this, we know little about the specific interactions between external terminal electron acceptors and the microbial communities that produce greenhouse gases. Additionally, a relatively limited amount of research has been conducted on terminal electron acceptors within peatland soils along vertical stratification gradients. In the present study, the impact of various external factors such as SO42-; SO42- + HA; HA and Goethite, on methane and CO2 emission as well as microbial community structure along depth was evaluated in pilot scale mesocosm study. Briefly, CO2 production has increased twice after SO42-, but there has been a small increase after SO42- + HA. Goethite also followed same pattern; however, all of these treatments were also able to increase the production of CO2, but not methane. In contrast, both gases were inhibited by HA treatment. Moreover, we demonstrate by community composition and network analysis that the composition of microbiota communities is primarily determined by external environmental factors, and microbial communities of each type differ in their taxa networks. The present study, using a subtropical peatland, provides a better understanding on impact of terminal electron acceptors on both the above-ground and below-ground bacterial microbiome as well greenhouse gas production.