TITLE: RESPONSE OF THE METANOGENIC AND METHANOTROPHIC COMMUNITIES IN AMAZON SOILS TO TEMPERATURE AND MOISTURE VARIATIONS

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ABSTRACT:
The removal of primary forest and conversion to pasture affects the microbial community of the soil and its functions, including the microbial methane cycle, controlled by archaeal producers (methanogens) and bacterial consumers (methanotrophs). Currently, in addition to changes in land-use, the effects of global warming and its consequences on climate must also be addressed for both communities. In the Amazon region, such processes have resulted in the elevation of the mean temperature and changes in the water regime. In this sense, our work aimed to evaluate the methanogenic and methanotrophic communities in the face of the elevation of temperature and moisture in soils of the Eastern Amazon. For this purpose, soils from a primary forest in the Tapajós National Forest (Santarém, PA, Brazil) and a cattle pasture were incubated for 50 days at 25 °C, 27 °C, and 30 °C and under 60% and 100% of moisture at field capacity. Soil samples prior to the beginning of the experiment and after 1 and 49 days were collected, DNA extracted, and quantified for methanogens and methanotrophs by real-time quantitative PCR using the mcrA and pmoA genes, respectively. The land-use conversion resulted in an increase in pH and nutrients in the pasture. The effect of this process, already observed in the communities of the beginning of the experiment, was maintained and added to the effects of temperature and moisture after 49 days of incubation. Through a factorial analysis of variance, the influence of the three studied factors and their interaction was observed, with soil-use as the main factor of change. In general, methanogenic and methanotrophic communities showed a higher abundance in pasture soils. The results of the ratio of methanogens by methanotrophs (forest from 0,00073 to 0,025 and pasture from 0,813 to 3,96) presented a similar pattern, evidencing that pastures present greater methane production potential than forests.

Keywords: Global Clima Change, Microbial Methane Cycle, Forest, Pasture, qPCR.

Development Agency: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) - Finance Code 001, Fundação de Apoio à Pesquisa do Estado de São Paulo (FAPESP) (2014/50320-4; 2015/13546-7; 2017/09643-2; 2018/14974-0), Conselho Nacional de Desenvolvimento Cientifico e Tecnológico (CNPq) (311008/2016-3; 140032/2015-0).