



Greenhouse gas fluxes in different soil covers in the Caatinga in Pernambuco State, Brazil

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The study aims to assess the changes in the fluxes of the three main greenhouse gases (CO₂, CH₄ and N₂O) due to land use changes (LUC) in the Brazilian semi-arid region during dry season (October to December) and rainy season (April-July). This region is known as Caatinga and has unique features, and covers about 11 % of the Brazilian territory (about 850 km²). It is a densely populated region and the shifting of native vegetation to pasture stands out among the major environmental problems related to the changes in land use and land occupation. Pastures and agricultural areas cover about 27 % of the Caatinga (201,786 m²). Such drastic changes in land together with the conditions of low nutrient availability in soils and irregular rainfall events, usually leads to soil degradation with direct effects on the dynamics of CO₂, N₂O and CH₄. This experiment was conducted in the municipality of São João, in Pernambuco State (8°52'30" S, 36°22'00" W), in an Entisol with predominantly sandy texture. Samplings were performed in April 2012 (dry season) and August 2013 (rainy season). The fluxes were measured using static PVC chambers in periods of 30 minutes, and the design of this experiment consisted of two treatments: Native Vegetation - Caatinga (C) and grassland (P), distributed in 3 blocks (replicates). The CO₂ fluxes were higher during the dry season (One-way ANOVA, p=0.000), with the highest emissions found in grassland (4.6 g m⁻² d⁻¹) and the lowest in the Caatinga (3.2 g m⁻² d⁻¹). During rainy season, there was no difference between treatments, and CO₂ fluxes in Caatinga and grassland were, respectively, 3.4 g m⁻² d⁻¹ and 3.6 g m⁻² d⁻¹. High emissions of N₂O were found during the dry season (One-way ANOVA, p= 0.000), and the highest emissions were found in grassland (0.66 mg m⁻² d⁻¹) and the lowest in the Caatinga (0.33 mg m⁻² d⁻¹). During the rainy season there was no significant difference between treatments, and the fluxes were 0.03 mg m⁻² d⁻¹ in the grassland and 0.01 mg m⁻² d⁻¹ in the Caatinga. There was no significant difference between fluxes of CH₄ for treatments or seasons. During dry season, high soil temperatures (31.3 °C) were observed, which was 17 % higher than the temperature measured in the rainy season (24.5 °C), and air temperature (29.6 °C), which was 10% higher than the temperature found in the rainy season (25.5 °C). These preliminary results may suggest a possible trend of increasing CO₂ and N₂O by elevation of temperature, which is strongly influenced by changes in land cover in this biome. The results of this research will also be used for future comparisons with similar regions located in the Brazilian Northeast, as well as in other semi-arid regions of the planet.