

Measurement of greenhouses gases in the City of Sao Paulo: Assessing methane concentrations and sources

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Abstract: The gases that most contribute to the greenhouse effect are carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). When those gases have been in the atmosphere for a long time, its effects become almost irreversible with the radiative forcing of years, until natural processes manage to remove the quantities already emitted. Methane is a radiative agent and happens significantly in the southern hemisphere.

Methane is a major source of water vapor. When the concentration of water vapor in the stratosphere increases, it contributes to intensifying the greenhouse effect. The large part of carbon dioxide and methane absorbed by the ocean, atmosphere and biosphere, contributes to the global carbon cycle, bringing a stable carbon rate in the air. Forest fires are often responsible for releasing carbon dioxide and methane. It is important to consider the role of photosynthesis in the balance between anthropogenic process, climate change and air quality. Therefore, forest preservation and reforestation projects are fundamental against climate change.

The main purpose of Metroclima Project is to assess the sources of greenhouse gases and short-lived pollutants in Sao Paulo and neighboring cities, in the Southeast of Brazil. Currently, the GHG measurement network has four stations (IAG Station, Pico do Jaragua, UNICID and ICESP) extended across the City of Sao Paulo, measuring carbon dioxide and methane concentrations continuously using Cavity Ring Down Spectroscopy (CRDS) instruments.

In specific, the goal of this study is related to assessment of methane concentration variability and identification of potential sources near UNICID Station – an urban site; using the CRDS Picarro G2401 system. The data analysis acquired during 2020 and 2021 will be shown. Our results comprise a valuable contribution to the knowledge about methane concentrations in the city and guide public decision based on scientific evidence.

Keywords: Methane; Climate Change; Greenhouse Gases.

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