

Determination of CH₄ in mangrove area using LIDAR Raman and Cavity Ringdown Laser Spectroscopy

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Natural wetlands are considered important sources of atmospheric methane, and several researchers have attempted to quantify global emissions from wetland environments. Therefore, this project was conducted an experimental data sample in Itanhaém region, which explored the spatial variability of methane flow within a system with no anthropogenic wetland impact known as mangrove. The study area is located in the coastal region of São Paulo state, region of Atlantic Forest preservation, with large mangrove area. Since remote sensing is a method non-invasive, we were able to detect the emission of methane in areas that do not undergo human intervention, estimating the release of natural gas. The Lidar Raman method reduce the complexity system and cost of mobile and real-time analytics. The system used includes a commercial laser pulsed Nd:YAG Quantel S.A., model CFR 200, with wavelengths of 355 nm, 353 nm and 396 nm, 120 mJ pulse power, with laser repetition rate of 20 Hz and pulse width of 20 s, with a spatial resolution of 7.5 m. The system includes an ethernet interface, used together with LabView software to control the measurement and readout of the acquired data. For an exchange and precision data the Cavity Ringdown Laser Spectroscopy (CRDS) was used functioned with light absorbing at specific wavelengths and its ability to detect mole fractions in ppt (part per trillion) detecting small amounts of gases. Advances in CRDS in cavity-enhanced absorption spectroscopy techniques provide dramatic increases in optical path length and, as a result, allow ultra-sensitive trace gas measurements using robust, reliable and near-infrared temperature room-temperature diode lasers. The results indicated that the spatial variability of the flow within a wetland ecosystem can introduce significant results when compared to areas with impacts with fugitive gases, as well as in extrapolations to larger areas, even if the extension of the ecosystem is well known.