Short Communication Global Journal of Life Sciences and Biological Research 2020
Vol.7 No.2

Plant Science Biology 2019: The measurement of soil derived greenhouse gases in localised ecosystems - Aleksandra Buja - Gasmet Technologies Ltd

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Soil-derived greenhouse gas (GHG), both biological and abiological processes, represents a major source of Greenhouse Gases, such as Carbon Dioxide, Methane, Nitrous Oxide, Ammonia and Carbon Monoxide. These gases, released from soils into the atmosphere, are primarily biogenic in origin and as such the contributions of the individual soil fluxes vary considerably with varying temperatures in the localised ecosystems.

The measurement challenge is to provide an accurate methodology that can be used to simply and quickly measure soil fluxes derived from localised ecosystems, both in the field and in the laboratory (by sample transfer) which exhibit consistent results between the laboratory and the field thereby enabling a broader research program utilising a wider data topography.

Our research was centred on obtaining temperature dependent data-sets for soil fluxes by field sampling and laboratory analysis in tandem with real-time field sample analysis. The use of Fourier-transform infrared spectroscopy is particularly suited to measuring soil flux gases in real time, primarily due to the technique's ability to both accurately measure and speciate gases at low concentrations enabling precise and reliable data-sets to be acquired over very short timescales.

Fast analysis times at low concentration levels in a static apparatus reduces many of the secondary effects such as the build of water vapour and other fugitive gases, short term changes in temperature as well as eliminating any errors associated with bag or syringe sampling.

Only in recent times have fully field portable FTIRs been readily available for such research. The data presented in this poster involved taking localised soil samples from a fallow agricultural field characterised by clay-enriched subsoil.

The soil was transported to a laboratory environment and measurements were taken across a range of temperatures from 3°C to 45°C using a static head vessel technique. A close temperature dependent correlation was observed between the flux emitted from the sample and the localised temperature.

This work is partly presented at 5th Annual Congress on Plant & Soil Science February on 28-March 01, 2019 held at London, UK