

Development of an Open-path, Laser Dispersion Spectroscopy (LDS) Analyzer for Methane Emissions Mapping and Quantification

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Laser Dispersion Spectroscopy (LDS) is a new gas sensing technique that applies a novel approach to tuneable diode laser spectroscopy. Established laser absorption techniques depend on measuring detected intensity to derive concentration. This significantly impacts measurements in “dirty” environments where detected intensity of the transmitted light is bound to fluctuate. MIRICO’s LDS-based instrument derives concentration using the phase of light. This makes it highly immune to intensity fluctuations received at the photodetector. The instrument enables precise, real-time measurements of trace gas molecules in demanding environments. Furthermore, compared to absorption techniques, the analyser can measure gas concentrations within a very wide dynamic range (typically about five to six orders of magnitude), meaning, for example, from parts per billion all the way to sub-percent concentrations without the requirement for dilution.

In a long open-path, multi-direction configuration, coupled with a retroreflector array, and anemometer, the LDS analyser is capable of measuring methane concentrations associated with large area sources, and locating and quantifying point source emissions within said area. Here we describe the principle of LDS, and the development of a field-deployable instrument. In addition, we introduce the basic configuration required for mapping applications.

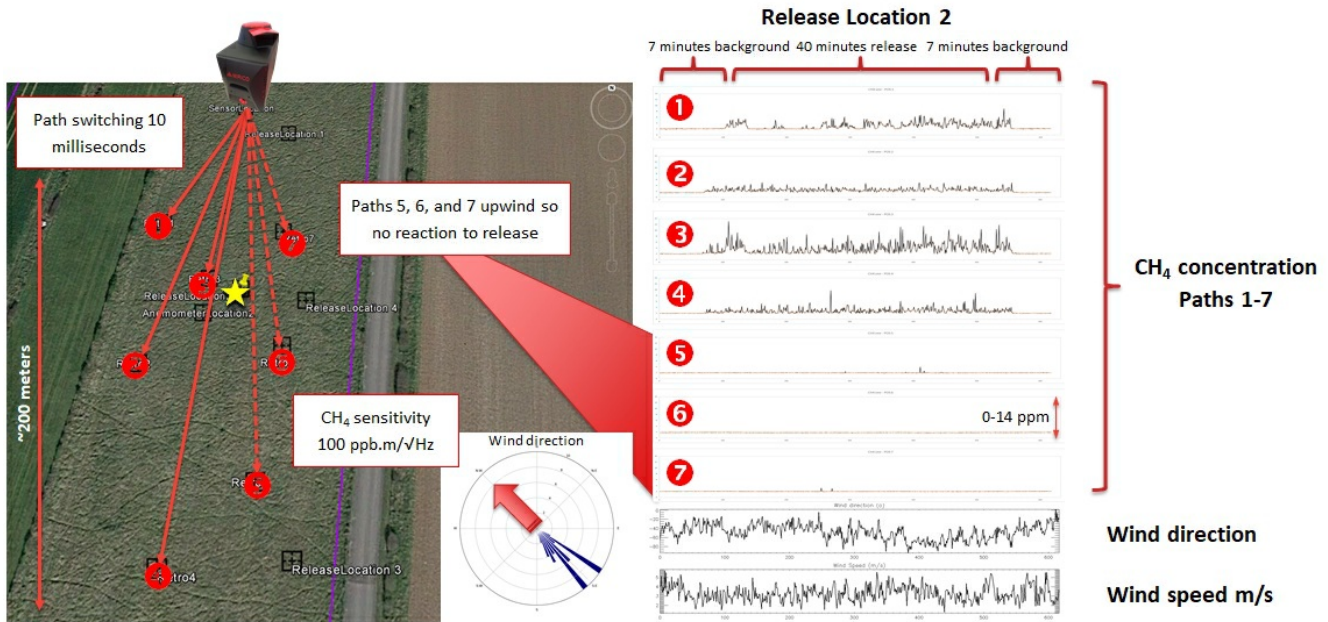


Figure 1. Mapping controlled methane release using MIRICO LDS spectrometer.