

Greenhouse Gas Point Source Monitoring from Space using Imaging Micro Fourier Transform Spectrometer (FTS)

Greenhouse gas (GHG) emissions from localized sources such as power plants, pipeline leaks or oil refineries are major contributors to the global anthropogenic GHG emissions and the global carbon and methane budgets. Currently, estimates of emissions are inferred from statistical data according to agreed methodologies and for most countries no top-down verification exists. As a consequence, many of the specific (localized) emissions are highly uncertain. These gaps in our knowledge add substantial uncertainty to the global budgets and limit our ability to develop strategies for managing and reducing GHG emissions and it is now widely recognized that systematic observations are needed to monitor more accurately and verify GHG emissions

We have investigated if and how instrument technology on a static optical MicroFTS™ which has been developed at RAL Space can be used for observing CO₂ and CH₄ columns in plumes from localized emission sources. The MicroFTS™ or Micro Fourier Transform Spectrometer is a compact, passive Fourier transform spectrometer with a stable and static approach making it a versatile instrument for various applications such as: remote sensing, agricultural, process monitoring, laboratory work, process monitoring, and emissions monitoring.

We show that the MicroFTS™ technology is suitable for the purpose of plume monitoring of greenhouse gases. This can allow interesting, new instrument concepts that are well suited for deployment on a small satellite such as Cubesat thanks to the compact and lightweight nature of the MicroFTS™ and that fact that it can be operated autonomously.