



Quantification of point-source emissions of CO₂ and CH₄ using airborne absorption spectroscopic remote sensing

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Many natural and anthropogenic emissions of CO₂ and CH₄ occur on small to point scales. Examples are the CO₂ release by volcanoes, power plants, steel and cement production, as well as CH₄ release by mud volcanoes, large seeps, landfills or open coal mines and coal mine venting. Quantifying and verifying these emissions by independent, non-intrusive (here remote sensing) techniques is required in the context of a better understanding and management of these sources. The data of an airborne absorption spectrometer covering the relevant spectral absorptions of CO₂ and CH₄ has the potential to contribute to this research and application area. Recent achievements using the Methane Airborne MAPper (MAMAP) sensor - developed by the University of Bremen in cooperation with the GFZ Potsdam - show that CO₂ as well as CH₄ point source emissions can be derived from column-averaged dry air mole fractions of CO₂ and CH₄ retrieved from airborne passive nadir remote sensing measurements. The developed techniques are also relevant in the context of future CO₂ and CH₄ satellite missions like OCO-2 and CarbonSat.

The paper will present first results of two campaigns performed in 2011 covering anthropogenic as well as geologic point sources of CO₂ and CH₄. The potential and limitations for future applications will be discussed.