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Making methane visible

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Methane (CH4) is one of the most important greenhouse gases, and an important energy carrier in biogas and natural gas. Its large scale emission patterns have been unpredictable and the source and sink distributions are poorly constrained. Remote assessment of CH4 with high sensitivity at m2 spatial resolution would allow detailed mapping of near ground distribution and anthropogenic sources and sinks in landscapes but has hitherto not been possible. Here we show that CH4 gradients can be imaged on <m2 scale at ambient levels (∼1.8 ppmv) and filmed using optimized infrared (IR) hyperspectral imaging. Our approach allows both spectroscopic confirmation and quantification for all pixels in an imaged scene simultaneously. It also has the ability to map fluxes for dynamic scenes. This approach to map boundary layer CH4 offers a unique potential to improve knowledge about greenhouse gases in landscapes and towards resolving source-sink attribution and scaling issues.

Examples of methane imaging will include a lake, barn, sewage sludge deposit, waste incineration plant, and controlled gas releases. We will also present successful simultaneous imaging of another important greenhouse gas, nitrous oxide, with the same instrument.