



Towards CO₂ and CH₄ measurements by ground based observations of surface scattered sunlight

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Our development starts out from the EM27/SUN Fourier transform spectrometer, which is a reliable, mobile and commercially available spectrometer for the measurement of carbon dioxide (CO₂) and methane (CH₄) column densities using direct sunlight spectra. We increased the radiometric sensitivity of the instrument by enhancing optical throughput and replacing the detector module by a thermoelectrically cooled detector. This enables the measurement of surface scattered sunlight spectra in the range of 4000 - 14000 cm⁻¹ under various viewing directions. Our setup is independent of sun position and exhibits a high sensitivity to the concentrations in the lower boundary layer, due to the near ground horizontal path component. Here we present the instrument modifications, first test measurements and ongoing developments. The latter focus on characterizing the performance of the spectrometer with respect to signal to noise ratio and on devising a strategy to reliably determining the viewing geometry.