

## A Miniaturized laser Heterodyne Radiometer for greenhouse gas measurements in the atmospheric column.

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Laser Heterodyne Radiometry is a technique adapted from radio receiver technology has been used to measure trace gases in the atmosphere since the 1960s. By leveraging advances in the telecommunications industry, it has been possible to miniaturize this technology.

The mini-LHR (Miniaturized Laser Heterodyne Radiometer) has been under development at NASA Goddard Space flight Center since 2009. This sun-viewing instrument measures carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) in the atmospheric column and operates in tandem with an AERONET sun photometer producing a simultaneous measure of aerosols. The mini-LHR has been extensively field tested in a range of locations ranging in the continental US as well as Alaska and Hawaii and now operates autonomously with sensitivities of ~0.2 ppmv and ~10 ppbv, for CO<sub>2</sub> and CH<sub>4</sub> respectively, for 10 averaged scans under clear sky conditions.