

**CONTROL ID:** 947725

**TITLE:** Atmospheric Airborne Pressure Measurements using the Oxygen A Band for the ASCENDS Mission

**PRESENTATION TYPE:** Assigned by Committee (Oral or Poster)

**CURRENT SECTION/FOCUS GROUP:** Atmospheric Sciences (A)

**CURRENT SESSION:** A35. Greenhouse Gas Measurements Using Active Optical Remote Sensing

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**ABSTRACT BODY:** We report on airborne atmospheric pressure measurements using new fiber-based laser technology and the oxygen A-band at 765 nm. Remote measurements of atmospheric temperature and pressure are required for a number of NASA Earth science missions and specifically for the Active Sensing of CO<sub>2</sub> Emissions Over Nights, Days, and Seasons (ASCENDS) mission. Accurate measurements of tropospheric CO<sub>2</sub> on a global scale are very important in order to better understand its sources and sinks and to improve predictions on any future climate change.

The ultimate goal of a CO<sub>2</sub> remote sensing mission, such as ASCENDS, is to derive the CO<sub>2</sub> concentration in the atmosphere in terms of mole fraction in unit of parts-per-million (ppmv) with regard to dry air. Therefore, both CO<sub>2</sub> and the dry air number of molecules in the atmosphere are needed in deriving this quantity. O<sub>2</sub> is a stable molecule and uniformly mixed in the atmosphere. Measuring the O<sub>2</sub> absorption in the atmosphere can thus be used to infer the dry air number of molecules and then used to calculate CO<sub>2</sub> concentration. With the knowledge of atmospheric water vapor, we can then estimate the total surface pressure needed for CO<sub>2</sub> retrievals.

Our work, funded by the ESTO IIP program, uses fiber optic technology and non-linear optics to generate 765 nm laser radiation coincident with the Oxygen A-band. Our pulsed, time gated technique uses several on- and off-line wavelengths tuned to the O<sub>2</sub> absorption line. The choice of wavelengths allows us to measure the pressure by using two adjacent O<sub>2</sub> absorptions in the Oxygen A-band. Our retrieval algorithm fits the O<sub>2</sub> lineshapes and derives the pressure. Our measurements compare favorably with a local weather monitor mounted outside our laboratory and a local weather station.

**INDEX TERMS:** [0300] ATMOSPHERIC COMPOSITION AND STRUCTURE, [0350] ATMOSPHERIC COMPOSITION AND STRUCTURE / Pressure, density, and temperature, [0322] ATMOSPHERIC COMPOSITION AND STRUCTURE / Constituent sources and sinks.

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