

**TITLE:** Ground and Airborne Methane Measurements using Optical Parametric Amplifiers

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

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

**CURRENT SESSION:** A26. Greenhouse Gas Measurements Using Active Optical Remote Sensing

**AUTHORS (FIRST NAME, LAST NAME):** Kenji Numata<sup>2, 1</sup>, Haris Riris<sup>1</sup>, Steve Li<sup>1</sup>, Stewart Wu<sup>1</sup>, Stephan R Kawa<sup>1</sup>, James Brice Abshire<sup>1</sup>, Martha Dawsey<sup>1</sup>, Anand Ramanathan<sup>1</sup>

**INSTITUTIONS (ALL):** 1. NASA/GSFC, Greenbelt, MD, United States.

2. Astronomy, Univ. of Marland, College Park, MD, United States.

**SPONSOR NAME:** Haris Riris

**ABSTRACT BODY:** We report on ground and airborne methane measurements with an active sensing instrument using widely tunable, seeded optical parametric generation (OPG). The technique has been used to measure methane, CO<sub>2</sub>, water vapor, and other trace gases in the near and mid-infrared spectral regions.

Methane is a strong greenhouse gas on Earth and it is also a potential biogenic marker on Mars and other planetary bodies. Methane in the Earth's atmosphere survives for a shorter time than CO<sub>2</sub> but its impact on climate change can be larger than CO<sub>2</sub>. Carbon and methane emissions from land are expected to increase as permafrost melts exposing millennial-age carbon stocks to respiration (aerobic-CO<sub>2</sub> and anaerobic-CH<sub>4</sub>) and fires. Methane emissions from clathrates in the Arctic Ocean and on land are also likely to respond to climate warming. However, there is considerable uncertainty in present Arctic flux levels, as well as how fluxes will change with the changing environment.

For Mars, methane measurements are of great interest because of its potential as a strong biogenic marker. A remote sensing instrument that can measure day and night over all seasons and latitudes can localize sources of biogenic gas plumes produced by subsurface chemistry or biology, and aid in the search for extra-terrestrial life.

In this paper we report on remote sensing measurements of methane using a high peak power, widely tunable optical parametric generator (OPG) operating at 3.3  $\mu\text{m}$  and 1.65  $\mu\text{m}$ . We have demonstrated detection of methane at 3.3  $\mu\text{m}$  and 1650 nm in an open path and compared them to accepted standards. We also report on preliminary airborne demonstration of methane measurements at 1.65  $\mu\text{m}$ .

(No Image Selected)

(No Table Selected)

**INDEX TERMS:** [0394] ATMOSPHERIC COMPOSITION AND STRUCTURE / Instruments and techniques, [0343] ATMOSPHERIC COMPOSITION AND STRUCTURE / Planetary atmospheres.