**A Compact Cavity Ring-down Spectroscopy Analyzer for *In Situ* Measurements of Carbon Dioxide, Methane, and Water Vapor**

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High-quality measurements of greenhouse gases in remote locations require instruments that are precise, versatile, robust, and most importantly have power requirements that are not as limited by location, i.e. low enough power consumption to run off of batteries or even solar array. Here we present a battery-operated, full greenhouse gas analyzer that utilizes a novel method of Cavity Ring-Down Spectroscopy (CRDS) to measure carbon dioxide ($CO_2$), methane ($CH_4$) and water vapor ($H_2O$). The instrument consumes only 25 W and still maintains long-term stability to allow for averaging time of over 3 hours. Measurements have a 1-σ precision of 30 ppb for $CO_2$ and 300 ppt of $CH_4$ with 5 minutes of averaging; and with measurements of 3-hour averages reaching precisions down to 40 ppt of methane. Additionally, this new flavor of CRDS has allowed for an overall increase in measurement dynamic range from traditional Continuous-Wave Cavity Ring-Down Spectroscopy (CW-CRDS) measuring methane up to 1000 ppm and carbon dioxide up to several percent. We will present supplemental data acquired using this <11 kg analyzer, including soil respirations using closed static chambers and 10m tower measurements from Santa Clara, CA.

**Figure 1.** Picarro G4301 Compact $CO_2/CH_4$ Analyzer