Cite abstracts as **Author(s) (2010), Title, Abstract xxxxx-xxxx presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.**

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HR: 1340h
AN: **B23A-0390** ***Poster***

TI: Methodological considerations for measuring $\delta^{13}C$ of CO_2 by CRDS

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AB: Recent advances in optical spectroscopy techniques have provided an alternative to stable isotope ratio mass spectrometry (SIRMS) techniques as a means of measuring $\delta^{13}C$ in CO_2. Low cost, ease of use, portability, and easier maintenance have made cavity ringdown spectroscopy (CRDS) an increasingly popular alternative to traditional SIRMS methods. Our recent experiences with two Picarro CRDS analyzers (G1101-*i*) for CO_2 show instrument accuracy and precision to be influenced by gas composition and humidity levels. In some instances, these effects are large and limit the utility of the instrument unless appropriate calibration procedures are performed. We will discuss the results of experiments with sample gases other than air, including those containing different nitrogen-oxygen ratios and helium. The effect of different humidity levels and CO_2 concentrations will also be addressed. These issues raise important concerns in using the CRDS in a range of environments in which there are varying concentrations of oxygen and for applications in which the CRDS is used as a detector interfaced to preparative instrumentation such as elemental analyzers.

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