

NSF/NCAR Carbon Monoxide Measurement

- **CO**

VUV resonance fluorescence

Source wavelength: 151 nm

CO emission wavelength: 170–200nm

3 ppbv detection limit

.5 Hz freq response

5% accuracy at 100 ppbv



Calibrations: In-flight calibrations are conducted using a working standard and a catalytically scrubbed zero trap for background subtraction. A series of NOAA ESRL/GMD primary standard compressed gases are used in lab measurements to quantify the concentration of the working standard cylinder

Picarro G1301-f Methane/Carbon Dioxide Instrument

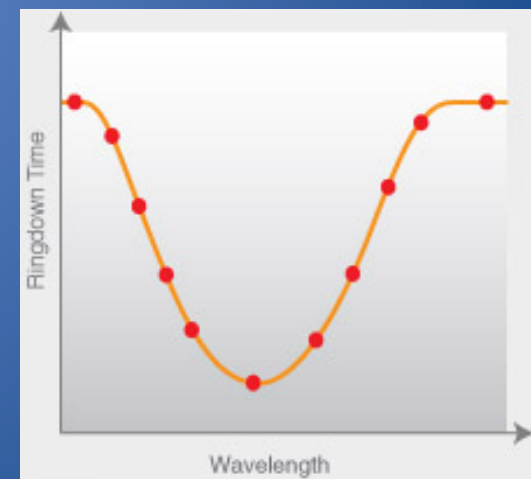
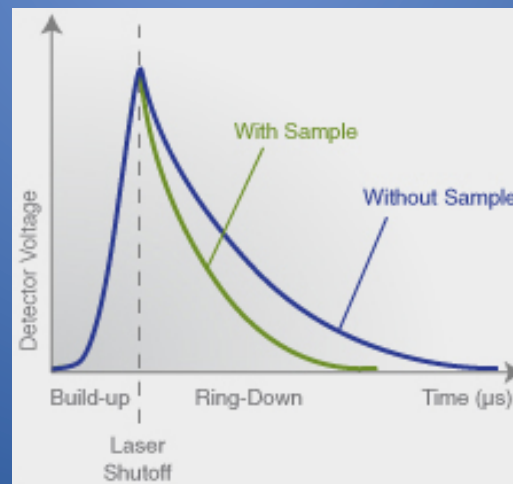
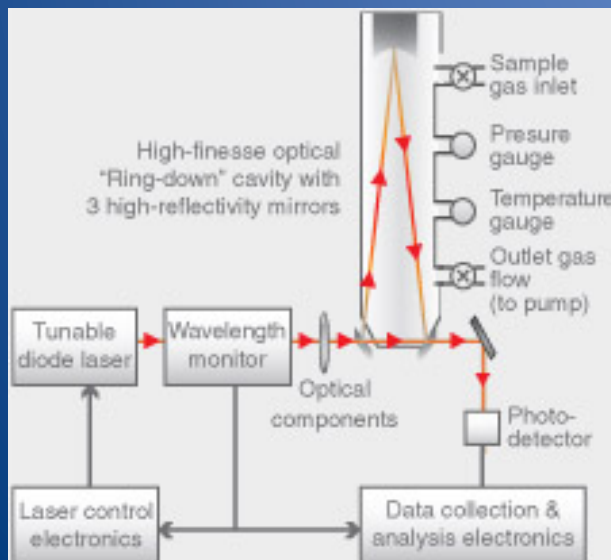
Measurement Technique: WS-CRDS

Concentration Range: CO₂: 0-1000ppmv, CH₄: 0-10ppmv

Measurement Interval: 5Hz (CO₂ & CH₄)

Precision: 250 ppbv CO₂ (.2-sec average)
3 ppbv CH₄ (.2-sec average)

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Reflections on Data Quality Thus Far

A compressor is part of the inlet manifold common to both instruments to allow instrument operation at the upper altitude range of the G-V.

A very small leak was identified during the test flights for sampling above 7-10km. Attempts to re-establish a leak tight inlet manifold have not yet been completely successful.

CO₂ data are most severely affected, due to high CO₂ levels within the cabin. In-flight leak testing confirms that the threshold altitude where CO₂ and CH₄ measurements are valid is approximately 10km.

During RF03, an additional problem with the CO₂/CH₄ instrument was encountered just prior to takeoff. Most of this research flight did not have useable data from the Picarro instrument.

The problem was diagnosed today, and a software problem was identified and repaired. Normal operation for one hour was observed during the end of maintenance operations.

Preliminary evaluation implies that the CO instrument is performing well, with near complete data coverage. A few brief dropouts in communication with the RAF data system provide small gaps in the data record. The cause of these problems seem to be internal to the VUV instrument and are not understood at this time.

