

Novel Analyzer for Real-Time N₂O and CO Measurements in Air

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Accurate and precise measurements of both nitrous oxide and carbon monoxide concentrations are important in understanding global atmospheric chemistry. Because atmospheric mixing ratios of these species are relatively small (generally < 0.5 ppmv), an analyzer designed to probe these species must have high sensitivity and high precision to make meaningful measurements. We report the development and performance characterization of a commercial analyzer (Los Gatos Research, Model 908-0014) based on a patented cavity enhanced laser absorption spectroscopy technique which measures both CO and N₂O simultaneously in air with a precision of better than 0.3 ppbv in a 1-second measurement time. Higher precision may be obtained with further averaging. Data rates of up to 20 Hz may be achieved to allow for eddy flux correlation measurements. The instrument requires low power (200 watts) and does not require liquid nitrogen, allowing for measurements in the field.

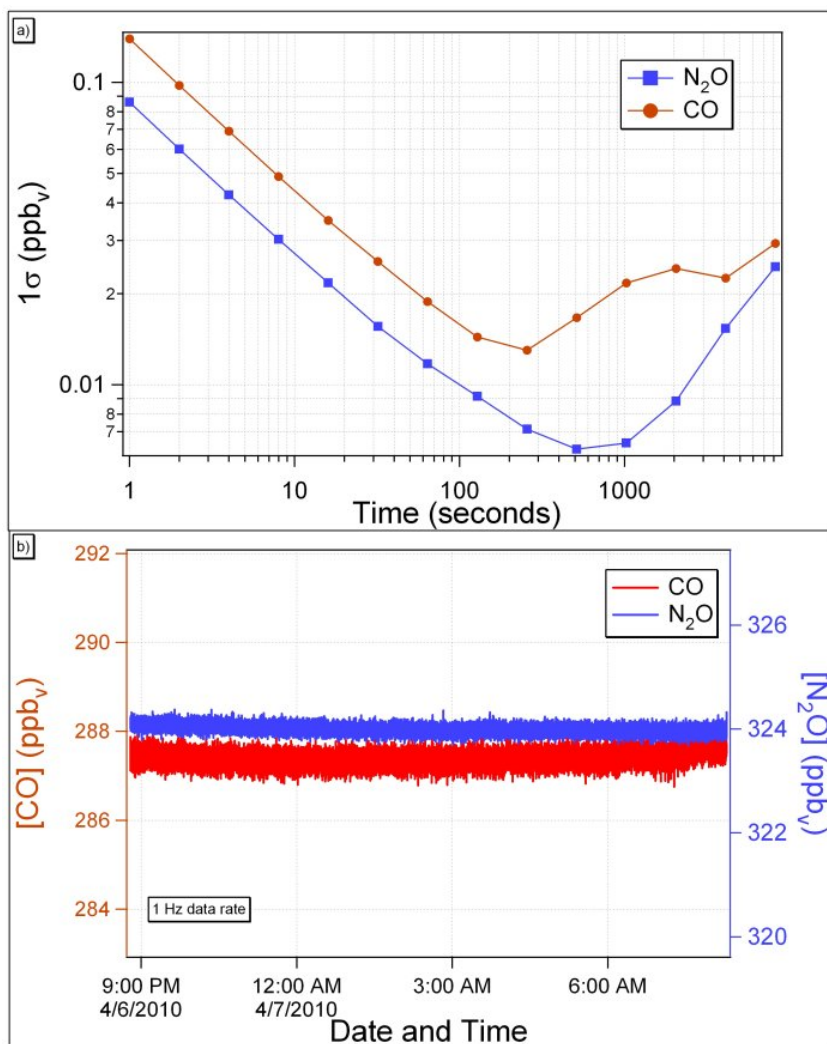


Figure 1. Long term performance of the Los Gatos Research (LGR) N₂O/CO Analyzer. (a) Allan deviation plot of the LGR analyzer measuring dry bottled air. A precision (1-sigma) of 0.09 ppbv for N₂O and 0.14 ppbv for CO was obtained in a 1-second measurement time. Long term precision of better than 0.040 ppbv is obtained for both N₂O and CO without any calibration. (b) Time trace of the data used to obtain the Allan variances in (a).