Updated Performance Evaluation of the LI-7825 Trace Carbon Dioxide Isotope Analyzer

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We report on the development and performance evaluation of a soon-to-be released trace gas analyzer for the measurement of atmospheric δ13C, δ18O, δ17O, ^{13}C, ^{12}C, ^{18}O and ^{17}O of CO_2. Based on Optical Feedback Cavity Enhanced Absorption Spectroscopy (OF-CEAS), the analyzer offers both the sensitivity and stability necessary for long-term atmospheric monitoring measurements.

Performance characterization of the LI-7825 analyzer, including results from long-term measurement stability tests for δ13C at near atmospheric background concentration, is given. Allan deviation plots for measurements of δ13C and other isotopic ratios ($\delta^{18}O$ and $\delta^{17}O$), at similar concentrations, are also presented. The introduction to the LI-7825 analyzer also demonstrates the sampling rate, response time, and dynamic range required for multiple applications including plant, climate, and soil gas flux research.

In conclusion, this portable and rugged instrument meets or exceeds requirements for both long-term atmospheric background measurements and offers a versatile platform for a range of mobile and agile measurements relevant to the better understanding of greenhouse gas emissions from anthropogenic and natural sources.

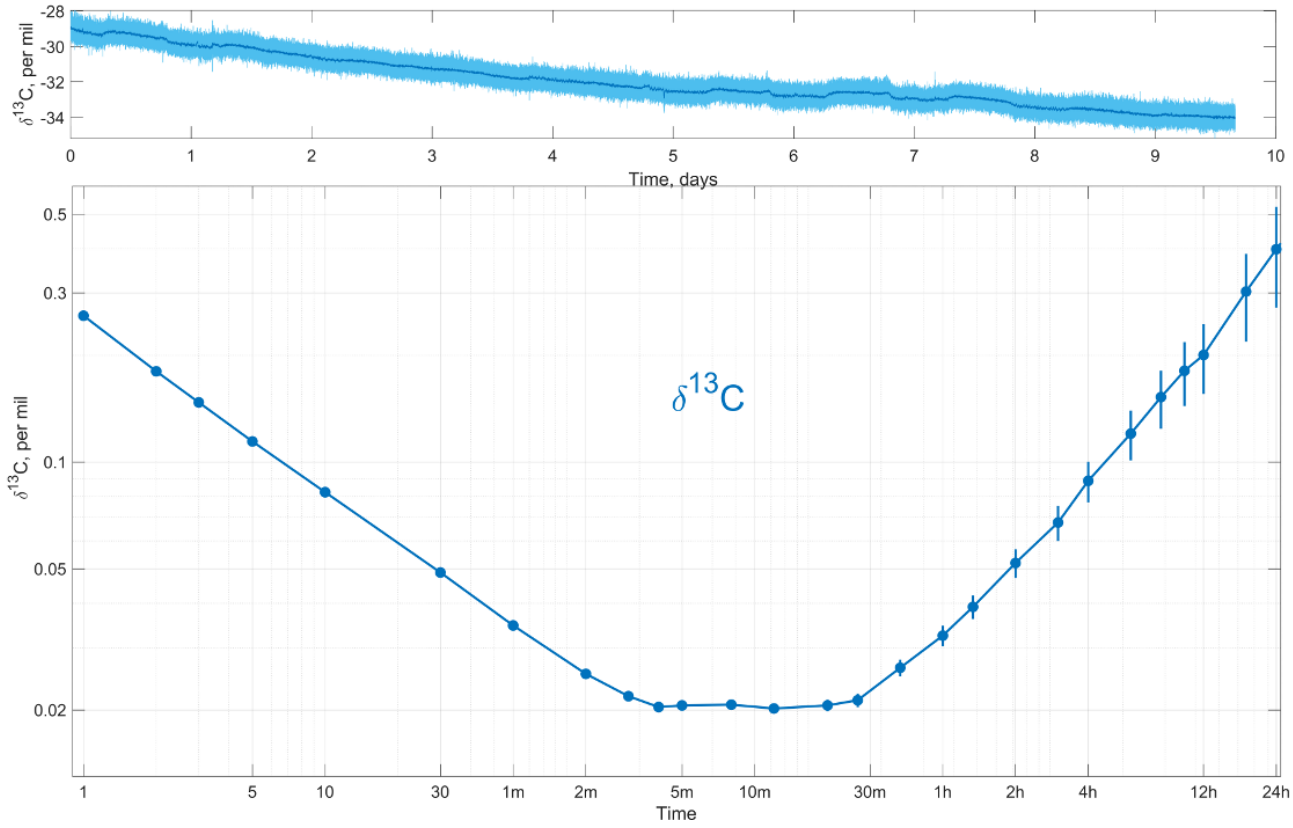

Figure 1. $\delta^{13}C$ Allan Deviation

Data for the Allan Deviation plots were collected over a 10-day period, where, prior to the measurement of test gas, the LI-7825 prototype was powered on/warmed up while sampling ambient air for 24 hours. It was then connected to a 400 ppm CO_2 tank via stainless steel tubing for the test.