Supplemental Information

Technical Note: The influence of temperature calibration on the OC-EC results from a Dual Optics Thermal Carbon Analyzer

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The temperature calibration kit was provided by the manufacturer of the dual-optics TOA instrument and is designed to satisfy QA/QC requirements, increase the reliability of carbon results, and improve inter-instrument comparisons. The calibration kit consisted of a serial temperature data acquisition unit (precision ± 0.3 ºC for temperature range -80 ºC - 500 ºC and ± 0.55 ºC for the 500 ºC – 1350 ºC range (Model MDSi8, Omega Engineering, Stamford, CT), NIST-traceable thermocouple (type-K), and front oven interface hardware. The thermocouple is an Inconel shielded K-type thermocouple certified for high temperatures required by the experiment (Omega Engineering Calibration Report # OM-110802626) with 1/16" sheath diameter. Thermocouple-produced temperature data were recorded at a frequency of 1 Hz and with 0.1˚C resolution. For calibration, the front oven interface hardware outfitted with the NIST-traceable thermocouple (Figure S1b) replaced the quartz boat and quartz filter (Figure S1a) used during normal TOA operation.

The tip of the oven calibration thermocouple was positioned where the center of the quartz filter typically resides during TOA operation which is about 2 cm upstream of the thermocouple used to monitor oven temperature (Figure 1). This also happens to be where the laser beam (λ = 632.8 nm) used to monitor pyrolysis passes through the filter. Oven calibrations were performed using both the NIOSH 5040 and IMPROVE temperature operating conditions.

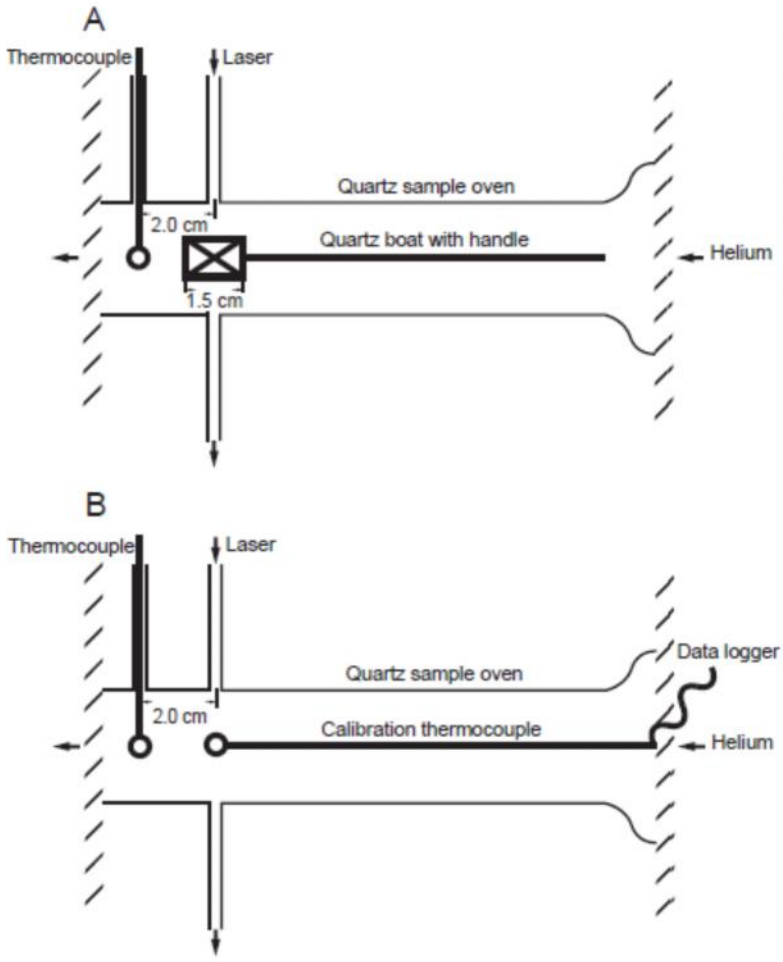

Figure S1. The sample analysis set (A) and calibration set (B) of the Sunset Laboratory Carbon Analyzer. *Note the position of the oven temperature sensor relative to the filter sample.*