

Supplement—Details of gas chromatography

GC system for measuring isoprene concentrations attached directly to the LI-6400

Determination the isoprene concentration of air exiting the LI-6400 system was accomplished with an online GC-FID. The GC system is more fully described in Papiez et al. (2009). Briefly, isoprene was concentrated on a fixed Tenax-TA (60/80mesh) trap made from 3.2 mm (1/8 in) O.D., 2.16 mm (0.085 in) I.D. fused-silica-lined stainless steel tubing. After an automated valve was switched, the trap was heated to 200 °C and the sample injected into the column (0.53mm I.D. by 30 m, 3.0 µm film MXT-624 capillary column, Restek). The oven temperature program was 2 min at 50 °C followed by a 15 °C min⁻¹ ramp to 200 °C. The gas chromatograph was similar to the one employed for cartridge-based measurements (model 8610C, SRI Instruments, Torrance, California, USA). Calibration was performed by a cross comparison to the other GC-FID system. The calibration was checked with a gas-phase standard containing isoprene from Scott-Marrin, Inc. (Riverside, California, USA) upon return to Chicago. This on-line system had the advantage of performing a series of automated measurements when coupled to the LI-6400. For the campaign in 2011, the GC-FID was transported to the Imnavait Creek flux tower and powered by the gasoline generator. This allowed for a comparison of intact versus excised leaves.

GC system for measuring isoprene concentrations collected on solid absorbent tubes

For measuring isoprene from the chamber systems and ambient air, isoprene samples were collected on solid absorbent cartridges (6.4 mm (1/4 in) O.D. stainless-steel tubes filled with Tenax TA, Carbotrap and Carboseive) and analysed on a GC-FID (model 310, SRI). A battery powered pump (SKC, Eighty Four, Pennsylvania, USA) was used to draw a known amount of air through the solid absorbent cartridges. The air entering the cartridge was scrubbed of O₃ with a filter made of glass wool impregnated with potassium iodide when ambient air was being sampled. The GC-FID has a custom-designed preconcentration system using a solid absorbent bed (Tenax TA and Carbotrap). The system was calibrated by running cartridges filled with a known standard that were brought to the Toolik Field Station. Isoprene identification was confirmed by sending a subset of duplicate sample cartridges to the laboratory for GC-MS (gas chromatograph-mass spectrometer) analysis (HP5890/5971, Hewlett-Packard, Palo Alto,

California, USA). For transport of the prefilled standard cartridges to Toolik and the return of the cartridges for GC-MS analysis, the cartridges were kept refrigerated (typically 4 °C) for a majority of the time.

Works cited

Papiez, M. R., Potosnak, M. J., Goliff, W. S., Guenther, A. B., Matsunaga, S. N., and Stockwell, W. R.: The impacts of reactive terpene emissions from plants on air quality in Las Vegas, Nevada, *Atmos Environ*, 43, 4109-4123, DOI 10.1016/j.atmosenv.2009.05.048, 2009.