GC-Vocus Elf

A compact GC-PTR-TOF system for the in situ monitoring of volatile organic compounds (VOCs)

Online gas chromatograph (GC) system with integrated thermal desorption preconcentration

Elf Proton Transfer Reaction Time-of-Flight Mass Spectrometer
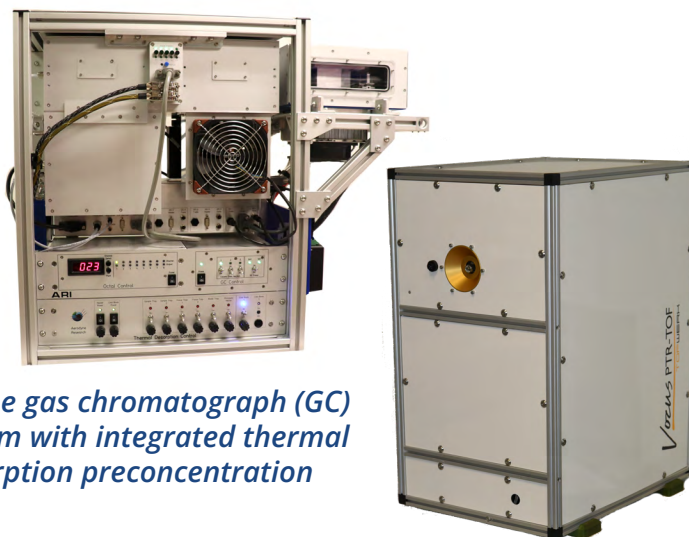
Applications

- Long-term monitoring of VOCs, including primary emissions and oxidation products.

- Quantitative detection of environmentally relevant biogenic and anthropogenic VOCs, including air toxics and ozone precursors.

- Mobile monitoring for detailed source characterization.

Data Analysis Software

Analysis software packages offer fully-autonomous, real-time processing of mass spectral and chromatographic data.

- **AuTofware** offers automated data pre-averaging, mass calibration, diagnostic capabilities, background and calibration corrections, and data export procedures.

- **AutoTERN** works seamlessly with AuTofware to provide automated chromatographic analysis of processed mass spectral data. AutoTERN includes automated retention time correction and chromatographic peak fitting.

Advantages

- Field-deployable. Compact, robust design makes advanced, research-grade measurements possible in challenging and remote environments.

- Fully automated switching between GC-Elf and direct-Elf measurements, providing automated acquisition of both online isomer-resolved data without sacrificing high time resolution detection.

- Innovative ionization cell provides exceptional sensitivity and acquisition speed without humidity dependence.

- GC thermal desorption preconcentration increases system sensitivity while the GC preseparation enhances compound resolution and aids interpretation of complex spectra.

- **Low detection limits:** < 1 - 5 ppt (10 min) GC-Elf; 50 ppt (1 min) direct-Elf detection. Compact footprint (72 x 65 x 80 cm). Low power (< 600 W typical).

- Fully automated analysis software provides real-time processing for a faster, more efficient data output.

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GC-Elf Specifications

Weight, Size, Power

Weight: 160 kg

Volume: 0.37 m^3

Dimensions: 72 cm x 65 cm x 80 cm

Power: 600 W (typical); < 1100 W (start-up)

	Elf PTR-TOF	GC-Elf PTR-TOF
Sensitivity (cps/ppb)	300	Increased by a factor of 300*
Mass Resolution	300	Molecular resolution provided by GC separation
Limit of Detection (ppt)	50 (1 min)	< 1 – 5 (speciated, 10 min)

* Due to preconcentration by the GC, enhancement by factor of 300 typical for a 1 L preconcentrated sample.

Rendering of the GC-Elf system

65 cm

72 cm

80 cm
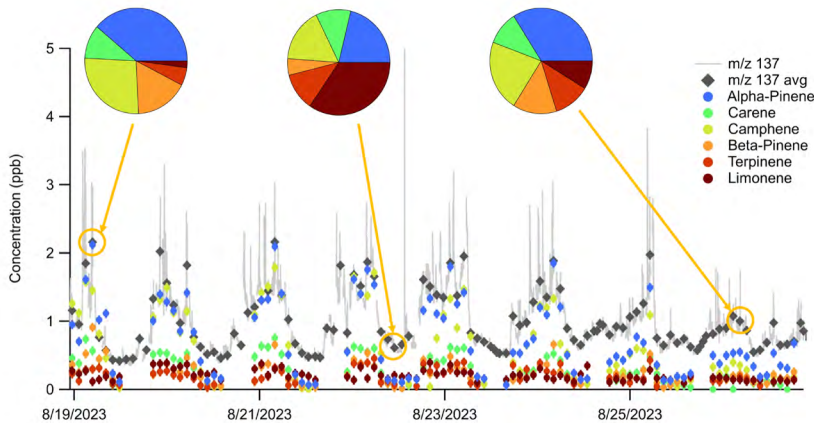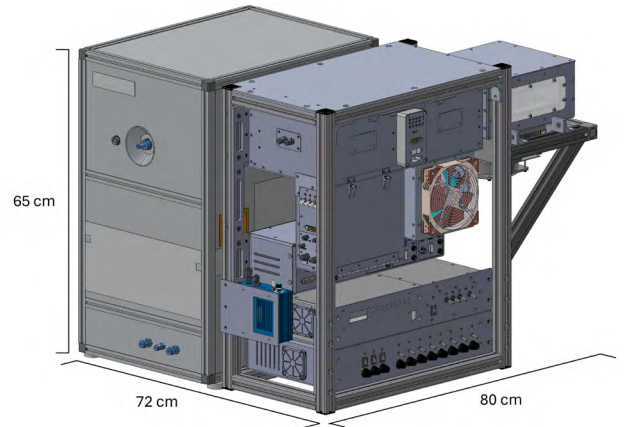
GC-Elf time series demonstrating ambient detection of monoterpenes. The system is fully automated to switch between GC resolution (colored markers) of the isomers and direct detection (light gray) of their summed characteristic ion. The pie charts demonstrate changing isomer compositions, measured by the GC-Elf.

Switching between GC- and direct-sampling, occurring on a user-defined interval, results in semi-continuous isomer speciation without the loss of high time resolution PTR-TOF data.

GC-Elf time series demonstrating the detection of ambient C9 aromatics. With regular GC operation, the system provides isomer resolved diurnal patterns, which give information about source identification, health impacts, photochemical processes and reactivity, and aerosol formation.

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