

Analyzer of stable carbon isotopes in CO₂ and CH₄

Description/Parameters

Picarro G2201-i analyzer allows carbon stable isotope measurement in CH₄ and CO₂ without separation. The analyzer operates in one of three modes:

- 1) CO₂ only,
- 2) CH₄ only, and
- 3) CO₂ and CH₄ combined.

In all modes, the analyzer precisely measures CO₂, H₂O and CH₄ concentrations, with fewer calibration events than other spectral absorption-based instruments. The analysis of trace gases is based on Cavity Ring-Down Spectroscopy (CRDS). In conventional infrared spectrometers, trace gases provide far too little absorption to measure, typically limiting sensitivity to the parts per million at best. CRDS avoids this sensitivity limitation by using an effective pathlength of many kilometers. It enables gases to be monitored in seconds or less at the parts per billion level, and some gases at the parts per trillion level.

The G2201-i analyzer can be paired with a variety of peripherals to extend and expand functionality:

- Gas Autosampler: up to 150 positions for 12 ml vials (exetainers).
- A dynamic transparent soil flux measurement chamber.
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Specification of parameters:

- d¹³C precision: δ¹³C-CO₂ <0.12 ‰, δ¹³C-CH₄ <0.4 ‰
- Concentration precision: CO₂ 200 ppb + 0.05% of reading (¹²C), 10 ppb + 0.05% of reading (¹³C), CH₄ 5 ppb + 0.05% of reading (¹²C), 1 ppb + 0.05% of reading (¹³C), H₂O 100 ppm
- Dynamic range: CO₂ 100 – 4,000 ppm, CH₄ 1.8 – 1,500 ppm, H₂O 0-5 %
- Measurement Cell Temperature Control: ±0.005°C, Measurement Cell Pressure Control: ±0.0002 atm

Utilization/Services

Studying carbon soil flux, determination of the relative contributions of root and microbial CO₂ production to total soil CO₂ flux, differentiation of biological versus geological sources of gas, examination of the mechanisms of methane production and oxidation.

