

MAY 2023

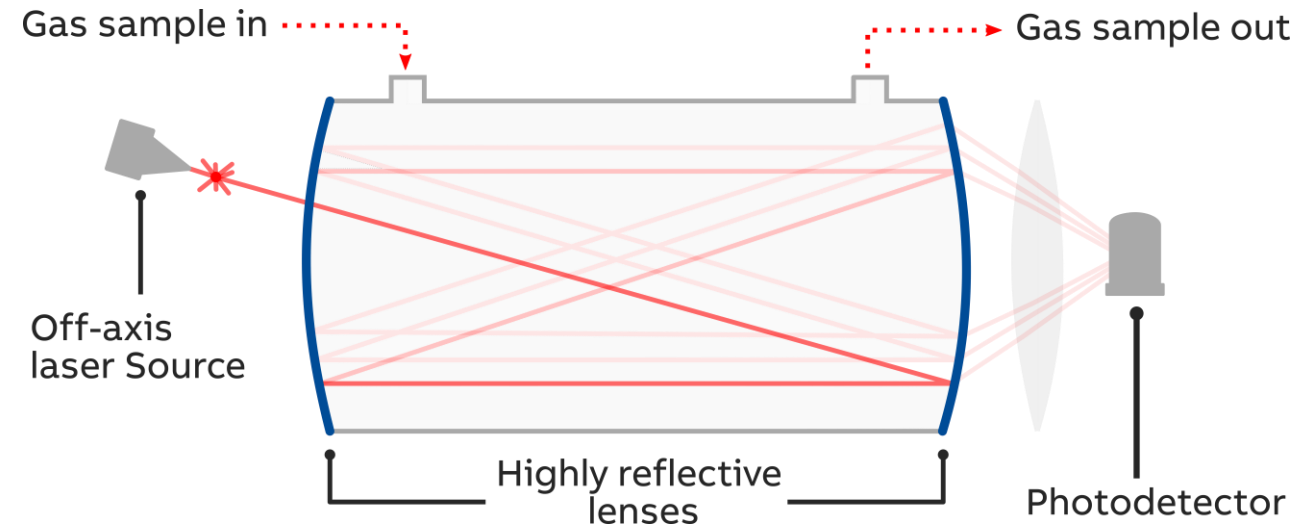
Analyzers for Agricultural Greenhouse Gas Emissions

ABB Measurement & Analytics

Off-Axis Integrated Cavity Output Spectroscopy

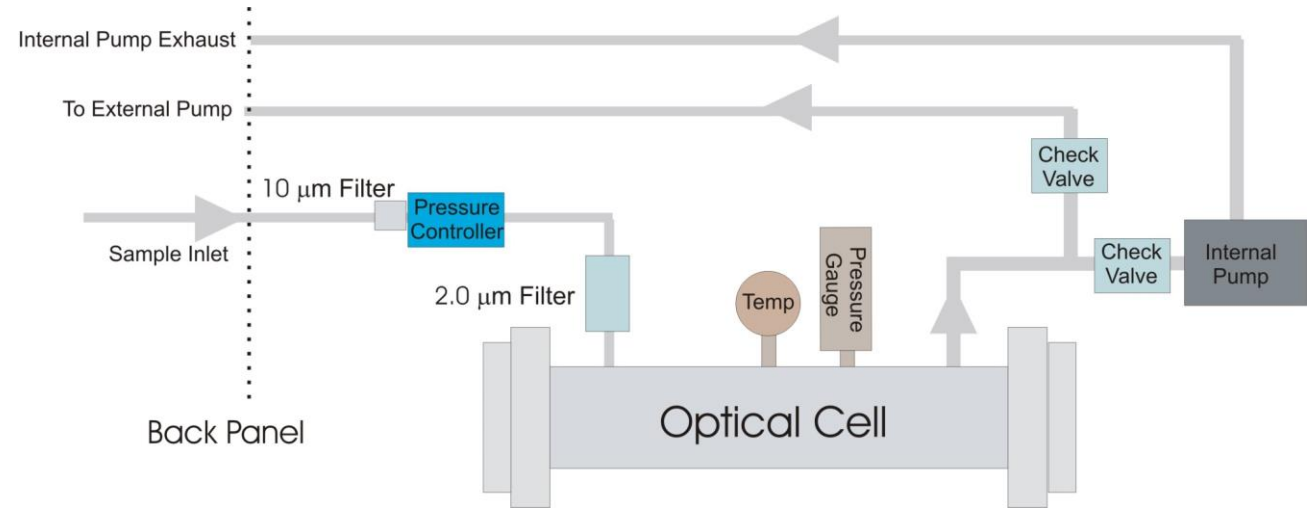
Technology principle

- Based on absorption spectroscopy.
- Portion of laser power transmits through the front mirror.
- Effective path-length up to kilometers, compared to <1 meter to just a few meters for most TDLAS and 50 meters for Herriot cells.
- Allows for very low detection limit.
- Robust - exact alignment, gas pressure, and gas temperature are not critical.
- Vacuum inside the cavity/plumbing reduces cross-interference and eliminates use of scrubbers.
- OA-ICOS unique off-axis geometry enables multiple lasers to be used + alternating their transmission, for multi-component measurement with a single cell.
- High tolerance for background gas composition and changes. All advantages of conventional TDLAS, plus a wide dynamic range.



Off-Axis Integrated Cavity Output Spectroscopy

Anatomy of an OA-ICOS analyzer



Off-Axis Integrated Cavity Output Spectroscopy

Product offering

Portables – GLA100 Series



Rackmounts – GLA200 Series



EP Rackmounts – GLA300 Series



EP Benchtops – GLA400 Series



Wallmounts – GLA500 Series



Mobile Gas Detection



Greenhouse gas analysis with ABB OA-ICOS instruments

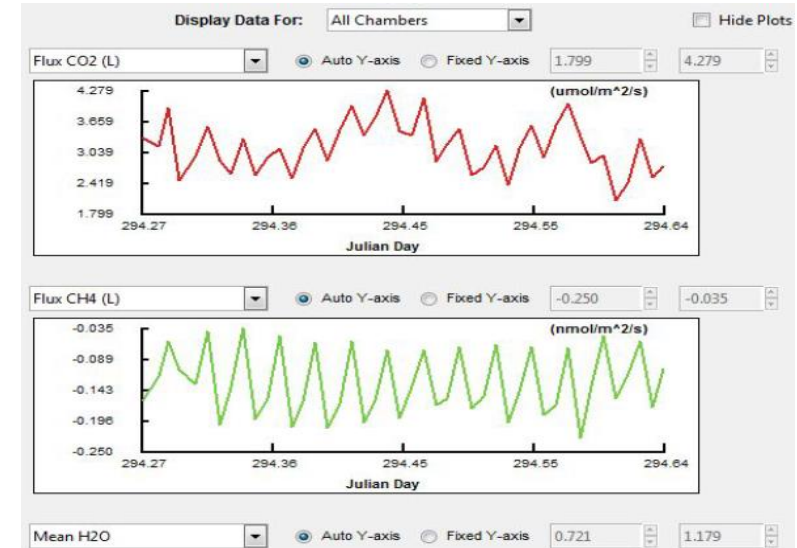
Typical configuration for field applications

Exact configuration is case-dependent but will typically include:

- ABB OA-ICOS gas concentration or isotopic analyzer (either rackmount or portable) for CO₂, CH₄, N₂O, H₂O, CO, NH₃.
- External power supply (except for GLA131 series microportable models using internal battery).
- Soil flux chamber(s) custom-made or from specialized suppliers such as EoSense, Li-Cor, LICA, DMR Ecoflux.
- Multiplexer if several chambers are monitored (ABB or 3rd party).
- Data logger (ABB or 3rd party).

Typical customers:

- University researchers and other scientists in the fields of environmental, atmospheric, agricultural, geology, biology, forestry or carbon sequestration.
- Meteorological and environmental agencies.
- Geographic institutes.



Greenhouse gas analysis with ABB OA-ICOS instruments

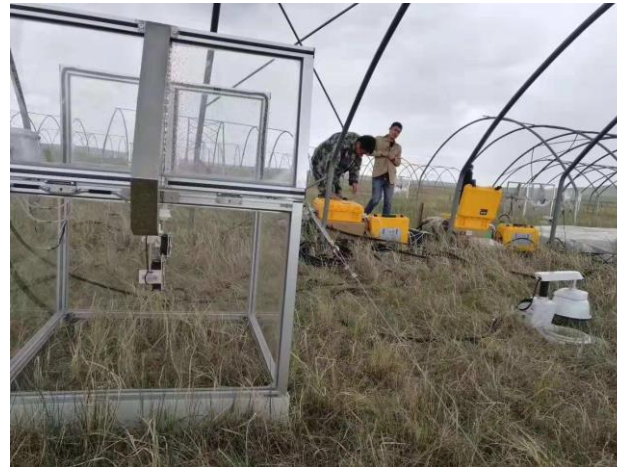
Benefits

- Pre-calibrated, highly sensitive and inherently stable.
- Robust against cross-interference and matrix effects.
- Highly cost-effective: no consumables required and 2-year factory warranty.
- Proven robustness of OA-ICOS enables *in-situ* soil flux measurements in most extreme conditions and harsh environments, “*from the Arctic to the Amazon*”.
- Compact portable analyzers facilitate surveys in remote locations.
- Multiplexing capability.
- Some versions can be used @10Hz for eddy covariance applications.
- Field-serviceability enables on-site maintenance and cavity cleaning operations without requiring expensive and time-consuming factory repair.



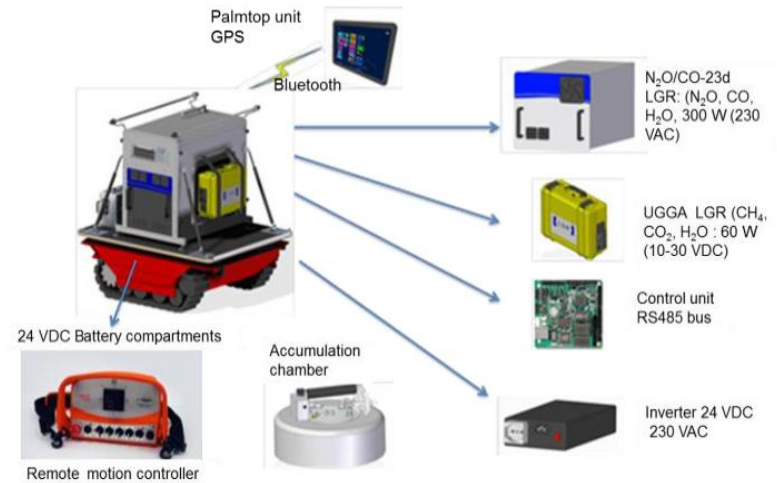
Application examples

Soil flux measurements



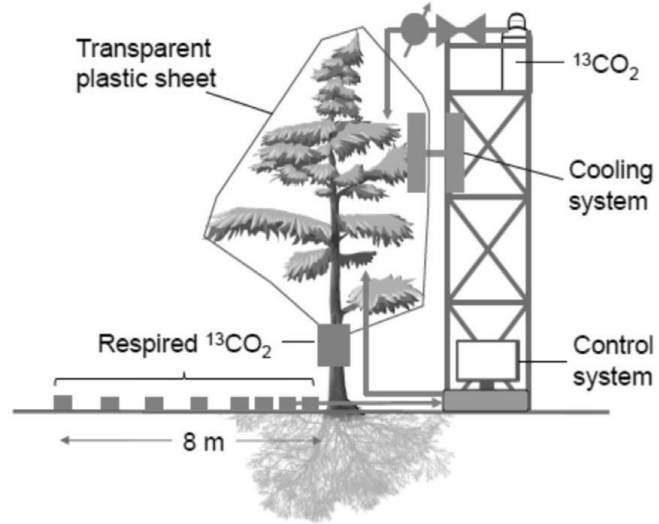
Application examples

Soil flux measurements



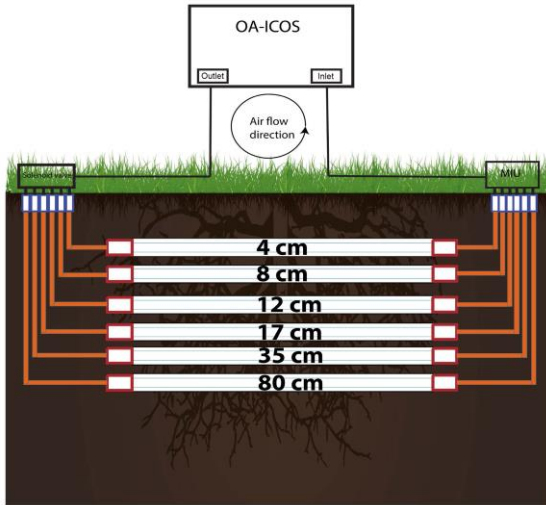
Application examples

Plant and soil respiration

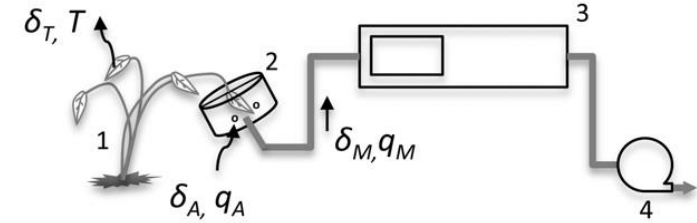


Application examples

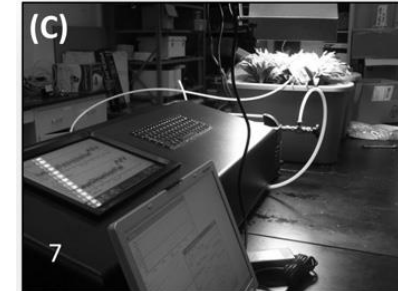
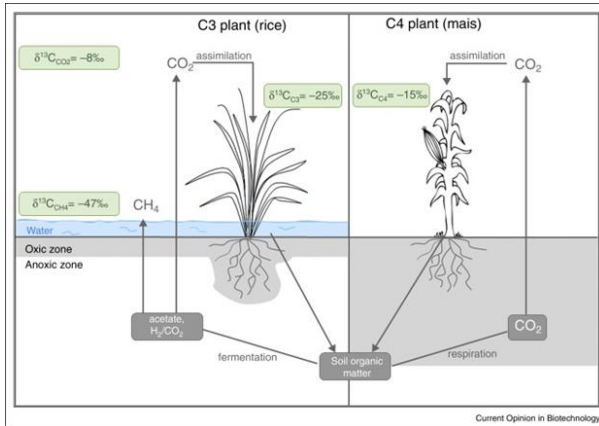
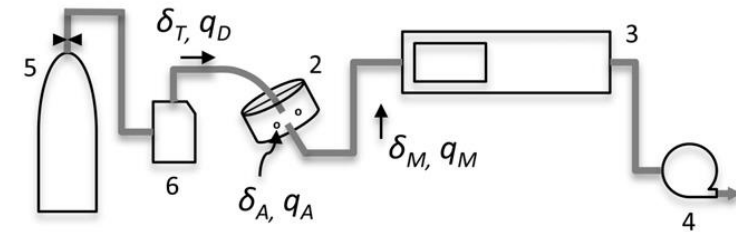
Plant and soil respiration



(a) Field Measurement Setup



(b) Laboratory Validation Setup



- 1: Sample plant
- 2: Transpiration chamber
- 3: OA-ICOS
- 4: Pump
- 5: High purity nitrogen tank
- 6: Dew Point Generator
- 7: Inset picture of setup

Contact information

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A large, stylized red logo consisting of the letters 'A', 'B', and 'B' in a bold, sans-serif font. Each letter is composed of two overlapping shapes, creating a sense of depth and movement.