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Performance assessment of the mobile G4301 Cavity Ring-Down Spectroscopy analyzer for atmospheric CO₂, CH₄ and H₂O measurements

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Carbon dioxide (CO₂) and methane (CH₄) are the most important greenhouse gases, and there is an increasing need to measure these greenhouse gases with mobile measurement devices. Picarro's G4301 Cavity Ring-Down Spectroscopy (CRDS) analyzer is a high-performance, light-weight, portable, battery-powered gas concentration analyzer that has enabled real-time measurements of CO₂ and CH₄ in challenging environments in the field of ecosystem [1]–[3], soil science [4], glaciology [5], limnology [6] and indoor air quality [7]. Here we evaluate the performance of this portable greenhouse gas analyzer for atmospheric measurements, and discuss data obtained with this analyzer during balloon flights.

The performance of the G4301 analyzer was assessed at the Metrology Laboratory (MLab) that is part of the Atmospheric Thematic Center of ICOS. The MLab regularly tests greenhouse gas analyzers that are used within the European monitoring network ICOS (Integrated Carbon Observation System). We will present CO₂ and CH₄ performance data on the continuous measurement repeatability (CMR), the short-term repeatability (STR), the long-term repeatability (LTR), the ambient temperature sensitivity, the inlet pressure sensitivity, and the built-in water vapor correction. We will discuss these findings in light of measurement requirements for different atmospheric applications.

To assess the performance of the analyzer in mobile field measurements, the G4301 was deployed at several balloon flights over Paris.

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