



Method for flux and isotopic measurements from soil chambers using cavity ring-down spectroscopy (CRDS)

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The use of cavity ring-down spectroscopy (CRDS) within the flux community is rapidly expanding due to its ability to simultaneously measure multiple gas species and isotopologues in situ and in real-time. To support the growing demand for new, high-precision and high-resolution datasets, Picarro analyzers are being paired with third-party flux chambers and deployed in a variety of remote field settings. To better illustrate the modularity and flexibility of a Picarro flux solution, we present a methodology on how a Picarro concentration and/or isotopic analyzer may be integrated with commercial and home-made flux solutions. We provide guidance on chamber compatibility, flow path design, analyzer configurations and data processing, highlighting how to tackle real-time isotopic measurements from flux chambers. Support for vehicle deployments further improves on these real-time datasets by adding an impressive spatial dimension. Soil flux solutions enhanced with Picarro analyzers can decrease deployment times, improve low flux detection limits and generate multi-species datasets. New analyzers open up doors for new studies of CO₂, CH₄, C₂H₆, N₂O, NH₃ and H₂O flux, and measurements of carbon and nitrogen isotopes. The modular nature of this methodology can accommodate other Picarro analyzers if so desired. Similar methods have already been adopted by the community and we highlight some key case studies from the field.