

Frequently Asked Questions

about the Los Gatos Research

Methane Carbon Isotope Analyzer

1. What does the Methane Carbon Isotope Analyzer do?

The Los Gatos Research (LGR) Methane Carbon Isotope Analyzer (MCIA) measures the two stable isotopes of carbon (^{12}C and ^{13}C) in methane (CH_4) for continuous flow and discrete gaseous samples. The MCIA reports $\delta^{13}\text{CH}_4$, as well as $^{13}\text{CH}_4$ and $^{12}\text{CH}_4$ concentrations. Stable isotopes act as tracers for studying flows and fluxes of material through ecosystems and the atmosphere and the MCIA is an invaluable instrument for studying these effects.

2. What are the key benefits of the LGR MCIA compared to other analyzers on the market?

There are many benefits, but the key ones include:

- **Availability:** There is no other instrument that provides real-time measurements of $\delta^{13}\text{CH}_4$, as well as $^{13}\text{CH}_4$ and $^{12}\text{CH}_4$, directly over such a wide range of mixing ratios.
- **$\delta^{13}\text{C}$ measurements over a wide range of CH_4 concentrations:** The LGR MCIA has an extremely wide dynamic range and is able to respond very quickly to changing CH_4 concentrations with no artifacts.
- **Precision:** LGR's MCIA has a guaranteed precision of 1‰ for $\delta^{13}\text{C}$ and 0.2% for total CH_4 concentration.
- **Measurement Range:** LGR offer two different MCIA models (denoted Range 1 and Range 2) to span the entire range of methane levels expected in scientific studies. For measurements of methane mixing ratios expected in ambient air, LGR's MCIA Range 1 provides measurements up to 20 ppmv. For applications in which higher levels of methane are encountered, such as biogas, mud logging and oil/gas exploration, LGR's MCIA Range 2 provides measurements to 1% (i.e. to 10000 ppmv). With LGR's Dynamic Dilution System, which extends measurements by a factor of 100, LGR's MCIA Range 2 can report measurements to 100%.
- **Data Rates:** LGR's MCIA reports measurements at rates up to 1 Hz allowing users to monitor transient and rapidly varying flows.
- **Power Consumption:** LGR's MCIA, including its vacuum pump, requires only 150 watts of power. Low power usage is often important for measurements in the field. Pumps required for the highest data rates would require additional power.
- **Technology:** The founder of Los Gatos Research (Dr. Anthony O'Keefe) invented the first cavity enhanced absorption based technique called Cavity Ringdown Spectroscopy (CRDS)¹. Since then, LGR has made several improvements to this technology. The fourth-generation, patented, Off-axis ICOS technology used in all our commercial analyzers has several advantages over first-generation CRDS systems such as being alignment insensitive, having a much shorter measurement time, and not requiring expensive and power consuming auxiliary components. Visit our website at www.LGRinc.com/resources/technology for more details.
- **Reliability:** LGR's technology is simple to use, rugged and easy to manufacture. As a result, many LGR instruments have been in use for more than 4 years with no reported issues.

3. Can I view the measured high resolution absorption spectra as it is recorded on an MCIA?

Yes, of course. The ability to review the spectra can be an important diagnostic tool especially if interferences are suspected. On all LGR Analyzers, the measured spectra can be viewed in real time. If a manufacturer doesn't let you see their spectra, what are they hiding?

4. Is the MCIA durable enough to be used for field (non-laboratory) applications?

Yes. In fact, LGR's MCIA is the ideal choice for field applications:

- **Low Power:** In field applications, minimizing power consumption is often critical.
- **Rugged:** The patented Off-Axis ICOS technology is relatively alignment insensitive so it is largely immune to the effects of vibration and rough handling that can occur during field deployments.
- **Optional features and Accessories:** Several options are available for field measurements including:
 - Multiport Inlet Unit – provides the ability for the analyzer to automatically control up to 16 separate input sources
 - Syringe Injection – allows samples to be manually injected into the analyzer via syringe, greatly enhancing the flexibility of the instrument.
 - Dynamic Dilution System – provides automatic dilution of high concentration samples with methane-free air to bring the sample concentration into measurement range of the instrument..
- **Field Experience:** LGR instruments are in use on all 7 continents in some of the toughest environments.

5. Other manufacturers claim that temperature control, pressure control, wavelength monitoring, and shock testing are necessary for high quality measurements. Is this true?

This is completely untrue. Just compare the spec sheets and speak to our customers. The reality is competitor's systems require those "features" because of the technology they use. LGR's more advanced technology outperforms (faster, higher accuracy and precision, wider dynamic range) competing technology in a system that is far simpler, easier to use, requires less power, and is less expensive.

6. Other manufacturers claim that they are the only ones to test every analyzer 100% to specifications before shipping. Is this true?

This is completely untrue. Los Gatos Research tests all of our analyzers to all of our published specifications before being approved for shipment. In fact, our manufacturing specifications go far beyond our published, guaranteed specifications.

7. What are some technical references for the MCIA Analyzer?

Many of our customers use these instruments for industrial applications. These applications do not generally result in journal publications. In addition, since this analyzer is fairly new, our academic and research customers have not yet had time to write papers taken with the data from the analyzer. However, here is one resource (copies or links are on our website www.lgrinc.com/resources):

"Development of a Field-Deployable Methane Carbon Isotope Analyzer," Feng Dong and Douglas Baer, European Geophysical Union General Assembly, May 3 - 7, 2010, [EGU2010-5583](#).

8. How do I get more information or purchase a system?

Contact us anytime at:

+1-650-965-7772 or sales@lgrinc.com

In some countries we use distributors to better support our customers. Check our website (www.lgrinc.com/about/distributors) for a list and contact information.

¹"Cavity ring-down optical spectrometer for absorption measurements using pulsed laser sources," Anthony O'Keefe and David A.G. Deacon, *Review of Scientific Instruments*, (ISSN 0034-6748), vol. 59, Dec. 1988