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New High-Precision Low-Power CO_2 and CH4 Analyzers For Multiple Applications

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In 2018, a new lightweight high-precision closed-path technology became available. The technology aimed to provide WMO-quality measurements of CH4, CO_2 and other gases with a time response of 1 Hz, the power consumption of 25 W, and with a relatively low cost. This technology resulted in the development of the first two new models of high-precision gas analyzers, for CH4 and CO_2 respectively. Both models can enable the multitude of methods and approaches including the following:

• Approaches relying on very high precision CH4 concentrations, encompassing those often employed by WMO-GAW and EPA communities, such as a family of the Atmospheric Inversion Modeling, Lagrangian Modeling, Mass Balance Method, Fence-Line Monitoring, etc.
• Micrometeorological tower methods relying on relatively slow but well-resolved CH4 concentrations, such as Disjunct Eddy Covariance, Relaxed/Eddy Accumulation, Aerodynamic Resistance, Integrated Horizontal Flux, Control Volume, Bowen Ratio, etc.
• Long-term and survey Chamber Flux measurements, including both CH4 and CO_2 from the same CH4/CO_2/H_2O gas analyzer.
• Distributed Sensors techniques.
• Mobile monitoring, including measurements from various moving platforms.

This presentation will describe key instrument principles and elements of the design, and show laboratory and field results on CH4 and on CO_2 from a new high-precision low-power CH4/CO_2/H_2O gas analyzer (e.g., LI-7810), and CO_2 results from a new high-precision low-power CO_2/H_2O analyzer (e.g., LI-7815), including mean atmospheric concentrations tests, long-term soil flux measurements and survey soil flux measurements.