



Intercomparison of gas analyzers for methane flux measurements

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During the last years there has been a rapid development in application of laser spectroscopy for greenhouse gas measurements. Four gas analyzers, capable of measuring methane concentration at a response time necessary for eddy covariance flux measurements, were operated in parallel for about six months between March and August 2010. Their reliability, need of maintenance, user friendliness, data coverage, and data quality were evaluated. The primary aim of this campaign was to provide an instrumentation suggestion for the European Research Infrastructure ICOS (Integrated Carbon Observation System). In addition, methods for flux calculation using laser spectrometer data were evaluated.

The instruments used were TGA100A (Campbell Scientific Inc.), RMT-200 (Los Gatos Research Inc.), G1301-f (Picarro Inc.), and LI-7700 (Li-Cor Inc.). The last one, LI-7700, was a prototype of a later commercialized open path analyzer. The other instruments were closed path analyzers.

The measurement site is an oligotrophic open fen Siikaneva, located in southern Finland. The site provides spatially quite uniform methane flux within the footprint. The methane flux rises in the spring, peaks in early August and falls down during the autumn. This provides excellent opportunity to study the performance of the analyzers at different CH₄ flux levels from near zero up to over 5 mg m⁻² h⁻¹.

The results show great similarity among the instruments in both concentrations and fluxes. Detailed numbers of the measurement characteristics will be provided. Suitability of the instruments for specific purposes will be discussed. There were some differences between the instruments in reliability and need on maintenance. However, these are difficult to evaluate quantitatively during that short period, and using just one instrument of a kind.