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Intercomparison of eight state-of-the-art eddy covariance methane gas analysers

Olli Peltola (1), Arjan Hensen (2), Carole Helfter (3), Luca Belelli Marchesini (4), Ivan Mammarella (1), Sami Haapanala (1), Jutta Holst (5), Jan Elbers (6), Fred Bosveld (7), Pim van den Bulk (2), Thomas Röckmann (8), Anders Lindroth (5), Tuomas Laurila (9), Alex Vermeulen (2), and Eiko Nemitz (3)

(1) University of Helsinki, Helsinki, Finland (olli.peltola@helsinki.fi), (2) ECN, Petten, The Netherlands, (3) CEH, Edinburgh, United Kingdom, (4) VU, Amsterdam, The Netherlands, (5) Lund university, Lund, Sweden, (6) Alterra, Wageningen, The Netherlands, (7) KNMI, De Bilt, The Netherlands, (8) IMAU, Utrecht, The Netherlands, (9) FMI, Helsinki, Finland

During the last decade several gas analysers became available that are capable of measuring methane concentration with high sampling frequency needed for eddy covariance measurements. These new gas analysers require less maintenance compared with the models used in the 1990's and they give more reliable estimates for the ecosystem scale methane fluxes. However, with different instrument types available now, their performance should be crosscompared and validated.

A gas analyser intercomparison campaign was held at Cabauw measurement station in the Netherlands between 6th and 27th of June, 2012. The campaign was organized within the InGOS FP7 project. Cabauw is well-established site with a long history in greenhouse gas monitoring and the surrounding landscape is a considerable source of methane. In total eight methane gas analysers manufactured by Picarro Inc., Los Gatos Research, Aerodyne Research Inc. and LI-COR Inc. were used in the experiment.

Tentative results show relatively good agreement between the eight methane flux estimates and they also agree with previous studies done at the site. Magnitude and variation of the flux estimates are similar. Cumulative methane emissions calculated from not gapfilled data during a 10 day episode agree within 10 %, values ranging from 190 mg(CH_4) m^{-2} to 210 mg(CH_4) m^{-2}. Comparison of random errors of the measured methane fluxes did not reveal any big differences between the instruments. Some of the gas analysers measuring methane were also capable of measuring water vapour at the same time. This is a big asset during data processing, since effect of water vapour on methane concentration measurement can then be easily corrected without need of additional water vapour measurement. The presentation will discuss the intercomparison campaign setup, instrument performance and will provide recommendations for CH_4-EC measurements.