EGU2020-13389
https://doi.org/10.5194/egusphere-egu2020-13389
EGU General Assembly 2020

Quantification of methane emissions from waste water treatment plants

Marcel Bühler[1,2,3], Christoph Häni[3], Thomas Kupper[3], Christof Ammann[4], and Stefan Brönnimann[1,2]

[1]Oeschger Centre for Climate Change Research (OCCR), University of Bern, Bern, Switzerland (marcel.buehler@giub.unibe.ch)

[2]Institute of Geography, University of Bern, Bern, Switzerland

[3]School of Agricultural, Forest and Food Sciences (HAFL), Bern University of Applied Sciences, Bern, Switzerland

[4]Climate and Agriculture Group, Agroscope, Zürich, Switzerland

Quantification of gaseous emissions from waste water treatment plants (WWTPs) is challenging due to the heterogeneity of the emissions in space and time. The inverse dispersion method (IDM) using concentration and turbulence measurements in combination with a backward Lagrangian stochastic (bLS) dispersion model based on Flesch et al. (2004) is a promising option. It is increasingly used to determine gaseous emissions from confined sources (Flesch et al., 2009; VanderZaag et al., 2014), as it offers high flexibility at reasonable costs. For the application on WWTPs the bLS model assumption of spatially homogeneous turbulence, which implies absence of obstacles as buildings and trees that disturbe the flow, is often not fulfilled. However, studies showed that with the correct instrument setup and data filtering the bLS can be used for emission estimates. Methane emissions from two WWTPs of different type and size were quantified using the IDM with the bLS model. Methane concentrations were analysed with open-path tunable diode laser spectrometers (GasFinder, Boreal Laser, Inc., Edmonton, Alberta, Canada) placed up- and downwind of the source. At each site at least 20 days of measurements averaged to 30-minutes intervals are available. Here we present first results from these two WWTPs emission estimates.

References

Flesch, T. K., Wilson, J. D., Harper, L. A., Crenna, B. P., and Sharpe, R. R.: Deducing ground-to-air emissions from observed trace gas concentrations: A field trial, J. Appl. Meteorol., 43, 487–502, doi:10.1175/1520-0450(2004)043<0487:DGEFOT>2.0.CO;2, 2004.

Flesch, T. K., Harper, L. A., Powell, J. M., and Wilson, J. D.: Inverse-dispersion calculation of ammonia emissions from Wisconsin dairy farms, Trans. ASABE, 52, 253–265, doi:10.13031/2013.25946, 2009.

VanderZaag, A. C., Flesch, T. K., Desjardins, R. L., Baldé, H., and Wright, T.: Measuring methane emissions from two dairy farms: Seasonal and manure-management effects, Agricultural and

Forest Meteorology, 194, 259–267, doi:10.1016/j.agrformet.2014.02.003, 2014.