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Interannual and seasonal variability of CH$_{4}$ and N$_{2}$O exchange over a temperate mountain grassland

L. Hörtnagl and G. Wohlfahrt
University of Innsbruck, Institute of Ecology, Innsbruck, Austria (lukas.hoertnagl@uibk.ac.at)

Methane (CH_4) and nitrous oxide (N_2O) are major greenhouse gases and therefore play an important role in the atmosphere due to their warming potential. The various processes and mechanisms associated with the release and uptake of both compounds need further investigation to reliably assess CH_4 and N_2O budgets in different ecosystems.

The exchange of CO_2, CH_4 and N_2O was measured over 2 years at a temperate mountain grassland managed as a hay meadow near the village Neustift in the Stubai Valley, Austria. The three wind components, the speed of sound and the CO_2mole densities were acquired at a time resolution of 20 Hz and used to calculate true eddy covariance CO_2fluxes. $CH_4$and N_2O concentration values were recorded at 2 Hz, resulting in a disjunct time series when compared to the 20 Hz wind data. Fluxes of both compounds were then calculated using the virtual disjunct eddy covariance method (vDEC).

The net ecosystem exchange of CO_2 is monitored since 2001, while the measurement of CH_4 and N_2O fluxes started in April 2010. During the vegetation period, typical concentration values for CH_4 and N_2O were around 2.0 and 0.3 ppm, respectively, with both compounds exhibiting distinct diurnal cycles. Preliminary flux calculations showed minor, close-to-zero fluxes for both CH_4 and N_2O associated with large uncertainties owing to a number of corrections that need to be applied during post-processing.

In this presentation we present final fluxes over two vegetation periods and investigate drivers on observed $CH_4$and N_2O emission patterns. The role of management events like harvesting of the vegetation and the spreading of manure will be investigated in detail and set in relation to previously published studies.