



Drivers of seasonal nitrous oxide fluxes from a cropland in Switzerland

Regine Maier and Nina Buchmann

ETH Zürich, Agricultural Sciences, Grassland Science, Zürich, Switzerland (regine.maier@usys.ethz.ch)

Increasing nitrous oxide (N_2O) concentrations in the atmosphere originate from intensive agricultural practices like nitrogen fertilizer application, slurry, manure and soil management. Quantification and understanding of seasonal and diurnal N_2O fluxes are of major interest for future mitigation strategies in agricultural management. This requires a thorough understanding of their temporal variability, which can only be assessed by high-resolution measurements throughout the growing season. However, continuous flux measurements at high temporal resolution are rare.

The main objective of our study is to quantify the exchange of nitrogen between the soil and the atmosphere. At a long-term observation site (Swiss FluxNet Oensingen, Switzerland; CH-OE2), we installed an high resolution eddy covariance system equipped with a sonic anemometer and a N_2O laser spectrometer in early summer 2018 providing continuous flux measurements recorded at 10 Hz.

Overall, the seasonal variability in N_2O fluxes were more dependent on soil water content rather than on different management practices. Occurrence and leveling-off of N_2O emissions differed strongly from similar measurements in grassland. The measurement set-up proved to be a valuable, low maintenance and reliable system, providing robust N_2O fluxes to improve and develop climate-smart agricultural management strategies.