Improved understanding of agricultural N_2O emissions using a combination of chambers together with eddy covariance flux measurements

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Agricultural soils are the largest source of global anthropogenic emissions of the greenhouse gas nitrous oxide (N_2O), accounting for an estimated emission of 4.1 Tg N_2O yr^{-1} according to current estimates (approximately 60% of global anthropogenic emissions) (IPCC, 2013). Quantifying N_2O fluxes from agricultural soils using the traditional chamber method requires a high degree of spatial and temporal gap filling. The relatively new laser instruments, on the other hand allow us to capture the hot moments and hot spots. Combining eddy covariance with high precision dynamic chamber measurements together with soil physical and chemical parameters can therefore greatly improve the quality of N_2O flux estimates and their drivers. In this talk we will (i) compare eddy covariance with static chamber measurements from a range of arable and grassland fields, (ii) discuss how these two methods applied together provide more information on spatial variability, and (iii) demonstrate the need of using high precision chambers when only small N_2O fluxes are expected.