

Combining three different methodologies to quantify N₂O emissions at the landscape scale on the OS² INGOS site (Central France)

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Although performances of N₂O gas analyzers are now very high, a confident estimation of N₂O fluxes emitted locally by the soil remains a challenge because of the very high spatial and temporal variability whatever the investigated scale. The aim of this study is to associate different techniques of N₂O fluxes measurements at the landscape scale. Specific information obtained by each technique will be combined to each other in order (i) to study temporal and spatial variability (ii) to identify local and temporary sources of these emissions (iii) to compare N₂O values obtained by each system.

The measurement campaign took place during two months from mid-March to mid-May 2015 in a small agricultural region in Central France (INGOS site OS²).

The experimental device included:

- (1) an Eddy covariance (EC) measurements system with a 15 m high mast to cover a 3 km² area, with a closed-path QCL spectrometer (Aerodyne Research Inc.) measuring N₂O, H₂O and CH₄ at 7.9 μm
- (2) 8 automated chambers in line with a mobile gas chromatograph allowing continuous measurements on a 100 m² area
- (3) a fast box system in line with a laboratory-built QCL spectrometer (Guimbaud et al., 2011) weekly used on different sites in the footprint of the eddy covariance measurements.

Climatic conditions and soil parameters were recorded during this campaign. First results reveal N₂O fluxes comprised between 0 and a local peak value of 164 g N-N₂O.ha⁻¹.d⁻¹. Further data analysis is ongoing.

