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Temporal variability of nitrous oxide fluxes from a fertilized grassland in Belgium: preliminary results from dynamic closed chambers.

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This work presents preliminary results of nitrous oxide (N_2O) fluxes measured by dynamic closed chambers from a fertilized grassland grazed by the Belgian Blue breed of cattle. It is part of a project funded by the public service of Wallonia (SPW-DGARNE), whose objectives are to make a carbon/CO_2 balance of the grassland (*Jérôme et al., 2013*) and to quantify CH_4 (*Dumortier et al., 2013*) and N_2O fluxes.

The site is located in Dorinne (Dorinne Terrestrial Observatory), Belgium (50° 18' 44" N; 4° 58' 07" E; 248 m al.). It is a permanent grassland of ca. 4.2 ha with a moderate slope of 1 to 2 %. Mineral fertilisation took place in March and May 2012.

Two cylindrical chambers of 19,2 cm diameter and 11,5 cm height were placed inside a protected area around a micrometeorological station. An infrared gas analyser (Thermofischer 46i) was used in order to measure the N_2O concentrations inside of the chambers, closed by automatically controlled lids and ventilated by a constant air flow of 1liter/min. These devices were completed by adjacent soil humidity and temperature sensors.

The first measurement campaign took place during June and July 2012. The chambers were installed in the field and N_2O fluxes were followed without manipulation. N_2O fluxes were characterised by a background emission (between 2 and 10 ngN.m^{2}s^{-1}) on which intense but time limited peaks (between 50 and 300 ngN.m^{2}s^{-1}) superimposed. Peaks were found to be mainly linked to fertilisation and driven by precipitation. Background fluxes were found to correlate positively with soil temperature.

Secondly, a manipulation experiment took place in November 2012: two different fertilizer treatments were applied to the chambers. Doses of respectively 100 and 200 kg N/ha of ammonium nitrate were sprayed in the chambers (equivalent to a 8 mm precipitation). N_2O fluxes peaked shortly after fertiliser application (respectively 300 and 550 ngN.m^{2}s^{-1}), as well as after a posterior rain event (respectively 800 and 1500 ngN.m^{2}s^{-1}). The peak dynamics suggests a complex interaction between soil humidity and nitrogen availability, which is under study.

Dumortier et al., Geophysical Research Abstracts, Vol. 15, EGU2013-2083-1, 2013

Jérôme et al., Geophysical Research Abstracts Vol. 15, EGU2013-6989, 2013

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