NO/NO_2 FLUXES MEASUREMENT EXPERIENCE IN ARABLE LAND IN DNIESTER CATCHMENT

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Soil-atmosphere exchange of nitric oxide is the important issue causing the concern due to directly effect on atmospheric ozone levels (Fowler et al., 2009) with estimated global emission rate from soil around 8.9 Tg NO-N yr-1 (IPCC, 2007).

The measurements of NO/NO_2 fluxes at field scale give us possibility to determine southern Chernozem, typical for south of Ukraine, as a source or a sink of N oxides, observe annual and seasonal peculiarity, estimate annual budget and assess NO_x exchange in a regional/country scale for the territory with similar soils.

Automatic dynamic chamber system for $NO/NO_x/O_3$ gas analyzing (KIT, Germany), described in details by Butterbach-Bahl et al. (1997), has been implemented for continuous measurements with frequency 10 s for O_3 and 3 min for NO/NO_2 in September 2012 at monitoring site of ONU. Flux measurement time episode (19.09-05.10.2012) was presented in this study to demonstrate possibility of system, an importance and complexity of exchange evaluation of NO_x fluxes.

Measurement period on field site has started from rather high emission rate, following perturbation of surface top layer of soil, with gradual reduction of emission probably due to declining microbial activity. The mean flux was 6.98±2.36 μg N m^{-2} h^{-1}, with the peak 12.2±4.46 μg N m^{-2} h^{-1} (at 12:00-14:00, 29th of September) and the minimum (0.69±0.42 μg N m^{-2} h^{-1}) at 3:00-5:00 am, 1st of October. Calculated first results of NO fluxes corresponded well with reported data by Cruvinel et al. (2011) on arable land under bare condition. Nevertheless we found that NO fluxes after soil perturbation lasted during ca. 4 days and was at the same level (10-12 μg N m^{-2} h^{-1}), as NO fluxes from bare soil during first days after tillage (Cruvinel et al., 2011). It is known that NO_2 is formed rapidly from emitted NO and could be re-deposited on plant and soil surface with intensity depending on atmospheric concentration and compensation point (concentration where no gas exchange is observed) for that particular site. The absolute peak of NO_2 deposition rate (-21.31 μg N m^{-2} h^{-1}) was registered in October, 1st at 18:00, of October, while the mean value was -6.30±4.75 μg N m^{-2} h^{-1} for entire period of study. Slight emissions of NO_2 were observed several times in a range of 0.3-0.4 μg N m^{-2} h^{-1}, when ambient NO_2 concentration was less than 0.9 ppb, which well compared with those data reported by Butterbach-Bahl et al. (1997) and could be described by compensation point approach.

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