



Nitrous acid (HONO) emission from Northern agricultural soil

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Agricultural soils are important sources of nitrogen (N) gases; nitrous oxide (N₂O) and nitric oxide (NO). Apart from these soil also can be an important source of reactive nitrous acid HONO) gas. It has been found only recently that the presence of soil nitrite (NO₂⁻) is closely linked to HONO formation in soils regardless of its origin; via nitrification or denitrification. HONO is an important source of hydroxyl radical (OH) to the atmosphere contributing up to ~ 55 % daytime production and thereby increasing the oxidative potential of the atmosphere where it lowers the lifetime of organic compounds (VOCs) and also atmospheric methane (CH₄) concentration. In our experiment, we hypothesize that in addition of N fertilizer in agricultural soil HONO emission will increase because the availability of soil NO₂⁻ will also increase. Our experiment was conducted on agricultural soil growing grass (*Phleum pratense* L.) with C: N ratio of 9.0 and organic matter content 2.7 %. Three annual fertilization levels; 0, 250 and 450 kg N ha⁻¹ y⁻¹ were established and intact soil cores for the gas flux measurements were collected four times during the growing season of 2016. HONO, NO, and N₂O gas fluxes were measured in the laboratory immediately after sampling and soil physical properties were analyzed from the respective cores after gas flux measurement. Our results show that N₂O and NO emissions rates increased with the increasing N level. HONO emissions were detected from all treatments and the emission rate was significantly increased during one sampling day with the highest measured concentration of NO₂⁻ in soil receiving 450 kg N ha⁻¹ y⁻¹. Thus our study suggests that northern N-fertilized agricultural soils have potential to release HONO to the atmosphere and thus changing the atmospheric chemistry.