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# Soil Nitrite as a Source of Atmospheric HONO and OH Radicals

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Hydroxyl radicals (OH) are a key species in atmospheric photochemistry. In the lower atmosphere, up to ∼30% of the primary OH radical production is attributed to the photolysis of nitrous acid (HONO), and field observations suggest a large missing source of HONO. Photoenhanced reactions of $NO_2$ on various surfaces (e.g., soil surfaces) have been proposed to explain the observed missing source of HONO.

We show that soil nitrite can release HONO and explain the reported strength and diurnal variation of the missing source. Fertilized soils with low pH appear to be particularly strong sources of HONO and OH. Because of enhanced fertilizer use and soil acidification in developing countries, the release of HONO from soil nitrite might strongly increase in the course of global change, resulting in elevated OH concentrations and amplified oxidizing capacity of the lower troposphere. Besides fertilization and intensified agricultural use of soils in populated environments, nitrite production and HONO release may also be important in natural environments, including forests and boreal soils, because of increasing N deposition, acid deposition, and the ubiquity of (de)nitrifying microbes. In view of the potentially large impact on atmospheric chemistry and global environmental change, we recommend further studies of HONO release from soil nitrite and related processes in the biogeochemical cycling of N in both agricultural and natural environments.

References:

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