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Measurements of NO and NH3 soil fluxes at the Savé super site in Benin, West Africa, during the DACCIWA field campaign.

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In the next decades South West Africa will be subject to a strong increase in anthropogenic emissions due to a massive growth in population and urbanization. The impact of global climate change, local or regional land use changes, and the strong sensitivity to the West African monsoon lead to complex interactions between surface emissions and atmospheric dynamics and chemistry.
Anthropogenic pollutants are transported northward from the mega cities located on the coast, and react with biogenic emissions, leading to enhanced ozone (O_3) production outside urban areas, as well as secondary organic aerosols formation, with detrimental effects on humans, animals, natural vegetation and crops.
Nitrogen oxide (NO) emissions from soils, among other sources, directly influence NO_x concentrations. Changes in NO sources will consequently modify the rate of O_3 production.
The largest source of ammonia (NH3) emissions is agriculture, via the application of synthetic fertilizer. When released into the atmosphere, NH3 increases the level of air pollution. Once deposited in water and soils, it can potentially cause two major types of environmental damage, acidification and eutrophication, both of which can harm sensitive vegetation systems, biodiversity and water quality.
We investigate the role of soil fluxes of NO and NH3 on atmospheric chemistry in West Africa, making use of the observations taken in June and July 2016 at the Savé super-site, Benin (8°02′03" N, 2°29′11″ E), during the Dynamics-Aerosol-Chemistry-Cloud Interactions in West Africa (DACCIWA) field campaign, which took place in June-July 2016.
These observations also include meteorological and soil parameters such as air temperature and humidity (at 2 m height), radiation, soil temperature and moisture at different depths (5 cm and 10 cm). The climate in Savé is typical of a wet Guinea savanna, and the wet season takes place from June to October.
Soil fluxes of NO and NH3 were measured on: bare soil, grassland, maize fields and forest, which are four typical land cover types at the Savé site. Maximum soil emissions of NO up to 25 ng m-2 s-1 and maximum NH3 deposition up to 4.5 ng m-2 s-1 were measured over bare soil. The observations show high spatial variability even for the same soil type, same day and same meteorological conditions.
The influence of local environmental conditions on soil NO and NH3 fluxes, as well as the influence of remote anthropogenic emissions on ambient NO_x concentrations, are discussed.