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Observations of biogenic isoprene emissions and atmospheric chemistry components at the Savé super site in Benin, West Africa, during the DACCIWA field campaign.

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Tropospheric oxidation of VOCs (Volatile Organic Compounds), including isoprene, in the presence of NO_x and sunlight leads to the formation of O_3 and Secondary Organic Aerosols (SOA). Changes in NO or VOCs sources will consequently modify their atmospheric concentrations and thus, the rate of O_3 production and SOA formation. NO_x have also an impact on the abundance of the hydroxyl radical (OH) which determines the lifetime of some pollutants and greenhouse gases.
Anthropogenic emissions of pollutants from mega cities located on the Guinean coast in South West Africa are likely to increase in the next decades due to a strong anthropogenic pressure and to land use changes at the regional or continental scale. The consequences on regional air quality and on pollutant deposition onto surfaces may have some harmful effects on human and ecosystem health. Furthermore, the regional climate and water cycle are affected by changes in atmospheric chemistry. When transported northward on the African continent, polluted air masses meet biogenic emissions from rural areas which contributes to increase ozone and SOA production, in high temperature and solar radiation conditions, highly favourable to enhanced photochemistry.
During the Dynamics-aerosol-chemistry-cloud interactions in West Africa (DACCIWA) field campaign, we measured the atmospheric chemical composition and the exchanges of trace components in a hinterland area of Benin, at the Savé super-site (8°02′03" N, 2°29′11″ E).
The observations, monitored in June and July 2016, in a rural mixed agricultural area, include near surface concentrations of ozone (O_3), carbon monoxide (CO), nitrogen oxides (NO_x) and isoprene, isoprene fluxes and meteorological parameters. We observed hourly average concentrations of O_3 up to 50 ppb, low NO_x concentrations (ca. 1 ppb and CO concentrations between 75 and 300 ppb. An 8 m tower was equipped with a Fast Isoprene Sensor and sonic anemometer to measure isoprene concentrations and determine isoprene fluxes with eddy-covariance technique over a mixed (patched maize, manioc and anacardium) agricultural plot.
We discuss the influence of meteorological conditions on biogenic emissions (i.e. isoprene fluxes) and on ambient atmospheric chemistry (i.e. isoprene, NO_x, O_3 and CO concentrations observed on the site). We also studied the impact of remote anthropogenic emissions from cities on the Guinean southern coast on local chemistry.