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# Role of agricultural organic waste product recycling on volatile organic compounds emission and secondary organic aerosols formation

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The agricultural soils emit volatile organic compounds (VOCs) that contribute to the formation of secondary pollutants such as ozone or secondary organic aerosols (SOA). It has been showed that under certain conditions and for specific ecosystems, VOC emissions from soil could reach the same order of magnitude as canopy emissions (Peñuelas et al., 2014). These gases and aerosols emissions occur from major agricultural practices including confined animal feeding operations, crop production or amendments application.
Organic waste products (OWPs) are used in agriculture as organic amendments to improve soil fertility. The valorization of different types of OWPs from farms (bovine manure, pig slurry...), urban origin (sewage sludge, green waste) or industrial origin (sweets, etc.) is currently promoted as a substitute for mineral fertilizers. OWPs have a wide variety of characteristics due to their origin and the treatments that they may undergo before spreading and this diversity of characteristics could have a significant impact on gaseous and particulate emissions following soil application. There are few studies quantifying the concentrations and emission rates of gaseous compounds emitted from organic waste products, and those studies primarily address their odorant properties in order to identify suitable odor abatement techniques. Some of these laboratory studies have quantified the VOCs emissions from OWPs, including non-methane hydrocarbons VOCs, sulfur compounds, nitrogen compounds and oxygenated volatile organic compounds (Feilberg et al., 2015). Chemical transformations of these atmospheric organic compounds can further lead to products of lower volatility that subsequently partition into the condensed phase.
The aim of this study is to investigate SOA formation from agricultural soil amended with different OWPs. The experiments are currently performed in an atmospheric chamber coupled to an aerosol flow tube. A high panel of scientific equipment allows the physical and chemical characterization of the VOCs and freshly formed aerosols (proton transfer mass spectrometer, scanning mobility particle sizer...). Aerosol sampling on filters allows their chemical and molecular characterization by off-line analysis (gas chromatography, time of flight secondary ions mass spectrometry, laser desorption/ionization time of flight mass spectrometry).

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