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Oxidation of a new Biogenic VOC: Chamber Studies of the Atmospheric Chemistry of Methyl Chavicol

William Bloss (1), Mohammed Alam (1), Modinah Adbul Raheem (1,6), Andrew Rickard (2,3), Jacqui Hamilton (3), Kelly Pereira (3), Marie Camredon (4), Amalia Munoz (5), Monica Vazquez (5), Teresa Vera (5), and Mila Rodenas (5)

(1) University of Birmingham, UK (w.j.bloss@bham.ac.uk), (2) National Centre for Atmospheric Science, (3) University of York, UK, (4) Lisa, University of Paris-Est Créteil, France, (5) EUPHORE Laboratories, Instituto Universitario CEAM-UMH, Valencia, Spain, (6) University of Ilorin, Nigeria

The oxidation of volatile organic compounds (VOCs) leads to formation of ozone and SOA, with consequences for air quality, health, crop yields, atmospheric chemistry and radiative transfer. Recent observations have identified Methyl Chavicol ("MC": Estragole; 1-allyl-4-methoxybenzene, C10H12O) as a major BVOC above pine forests in the USA, and oil palm plantations in Malaysian Borneo. Palm oil cultivation, and hence MC emissions, may be expected to increase with societal food and bio fuel demand.

We present the results of a series of simulation chamber experiments to assess the atmospheric fate of MC. Experiments were performed in the EUPHORE facility, monitoring stable product species, radical intermediates, and aerosol production and composition. We determine rate constants for reaction of MC with OH and O_3, and ozonolysis radical yields. Stable product measurements (FTIR, PTRMS, GC-SPME) are used to determine the yields of stable products formed from OH- and O_3- initiated oxidation, and to develop an understanding of the initial stages of the MC degradation chemistry. A surrogate mechanism approach is used to simulate MC degradation within the MCM, evaluated in terms of ozone production measured in the chamber experiments, and applied to quantify the role of MC in the real atmosphere.