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## Methyl chavicol: characterization of its biogenic emission rate, abundance, and oxidation products in the atmosphere

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**Abstract.** We report measurements of ambient atmospheric mixing ratios for methyl chavicol and determine its biogenic emission rate. Methyl chavicol, a biogenic oxygenated aromatic compound, is abundant within and above Blodgett Forest, a ponderosa pine forest in the Sierra Nevada Mountains of California. Methyl chavicol was detected simultaneously by three in-situ instruments – a gas chromatograph with mass spectrometer detector (GC-MS), a proton transfer reaction mass spectrometer (PTR-MS), and a thermal desorption aerosol GC-MS (TAG) – and found to be abundant within and above Blodgett Forest. Methyl chavicol atmospheric mixing ratios are strongly correlated with 2-methyl-3-buten-2-ol (MBO), a light- and temperature-dependent biogenic emission from the ponderosa pine trees at Blodgett Forest. Scaling from this correlation, methyl chavicol emissions account for 4–68% of the carbon mass emitted as MBO in the daytime, depending on the season. From this relationship, we estimate a daytime basal emission rate of  $0.72\text{--}10.2\ \mu\text{gCg}^{-1}\ \text{h}^{-1}$ , depending on needle age and seasonality. We also present the first observations of its oxidation products (4-methoxybenzaldehyde and 4-methoxy benzene acetaldehyde) in the ambient atmosphere. Methyl chavicol is a major essential oil component of many plant species. This work suggests that methyl chavicol plays a significant role in the atmospheric chemistry of Blodgett Forest, and potentially other sites, and should be included explicitly in both biogenic volatile organic carbon emission and atmospheric chemistry models.

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