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## Reactive oxidation products promote secondary organic aerosol formation from green leaf volatiles

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**Abstract.** Green leaf volatiles (GLVs) are an important group of chemicals released by vegetation which have emission fluxes that can be significantly increased when plants are damaged or stressed. A series of simulation chamber experiments has been conducted at the European Photoreactor in Valencia, Spain, to investigate secondary organic aerosol (SOA) formation from the atmospheric oxidation of the major GLVs *cis*-3-hexenylacetate and *cis*-3-hexen-1-ol. Liquid chromatography-ion trap mass spectrometry was used to identify chemical species present in the SOA. *Cis*-3-hexen-1-ol proved to be a more efficient SOA precursor due to the high reactivity of its first generation oxidation product, 3-hydroxypropanal, which can hydrate and undergo further reactions with other aldehydes resulting in SOA dominated by higher molecular weight oligomers. The lower SOA yields produced from *cis*-3-hexenylacetate are attributed to the acetate functionality, which inhibits oligomer formation in the particle phase. Based on observed SOA yields and best estimates of global emissions, these compounds may be calculated to be a substantial unidentified global source of SOA, contributing 1–5 TgC yr<sup>-1</sup>, equivalent to around a third of that predicted from isoprene. Molecular characterization of the SOA, combined with organic mechanistic information, has provided evidence that the formation of organic aerosols from GLVs is closely related to the reactivity of their first generation atmospheric oxidation products, and indicates that this may be a simple parameter that could be used in assessing the aerosol formation potential for other unstudied organic compounds in the atmosphere.

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