

Wood burning releases high amounts of secondary organic aerosols - current emission estimates too low

March 30 2017

Aerosol emissions from logwood combustion increase significantly when the emission ages in ambient air. A significant increase occurs already within three hours of aging, according to a new study from the University of Eastern Finland. The emission increase was caused by the formation of secondary organic aerosols (SOA) in which gaseous organic compounds, released during the combustion, oxidise and condense on aerosol particles. This observation is very important, because current emission inventories do not take SOA emissions into consideration at all.

The analyses were carried out in the ILMARI research laboratory at the University of Eastern Finland in collaboration with the Finnish Meteorological Institute, and they constituted part of the activities of the European HICE Helmholtz Virtual Institute network. The laboratory experiments showed that plenty of organic gaseous [compounds](#) get released especially during the ignition and fuel addition phases in batch combustion, and these compounds form secondary aerosols in the atmosphere. Furthermore, the ignition method greatly impacts the emission level: a slower ignition significantly increased the emissions of organic compounds.

The researchers also found that there are differences in secondary emission levels during the day and night, and lower levels of SOA emissions formed during nighttime ageing. However, a substantial fraction of the particulate emissions were organonitrates during

nighttime aging experiments. Organonitrates are an important but so far poorly characterized nitrogen-containing chemical group in the atmosphere. Out of the nitrate compounds present in the atmospheric particle phase, 34-44 per cent are organonitrates. A detailed analysis of the [emission](#) ageing process in a smog chamber revealed that the majority of primary organic aerosols (POA) released during wood combustion oxidized during their atmospheric ageing, unlike previously thought.

The transformation process during [aerosol](#) ageing is important when considering the health and climatic effects of emissions, and these changes are currently being studied by an international multidisciplinary research network.

More information: Petri Tiitta et al. Transformation of logwood combustion emissions in a smog chamber: formation of secondary organic aerosol and changes in the primary organic aerosol upon daytime and nighttime aging, *Atmospheric Chemistry and Physics* (2016). [DOI: 10.5194/acp-16-13251-2016](#)

Provided by University of Eastern Finland

Citation: Wood burning releases high amounts of secondary organic aerosols - current emission estimates too low (2017, March 30) retrieved 29 June 2024 from <https://phys.org/news/2017-03-wood-high-amounts-secondary-aerosols.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.