nature chemistry

Research Highlights

Nature Chemistry
Published online: 8 January 2010 | doi:10.1038/nchem.541

Subject Category: Environmental chemistry

Atmospheric chemistry: Growing old together

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Atmospheric organic aerosols from very different sources evolve towards similar characteristics, simplifying the models needed to investigate their effects on climate and air quality.

Atmospheric aerosols are known to have a great influence on global climate and regional air quality, with its associated health issues. They consist of a complex, dynamic mixture of hydrocarbons that is extremely difficult to characterize. Rather than trying to identify the constituents separately, an international team of researchers led by Jose-Luis Jimenez at the University of Colorado and André Prévôt at the Paul Scherrer Institute in Switzerland has now shown that the properties of organic aerosols converge as they age in the atmosphere[1].

Combining field and laboratory data, the team developed a model to estimate the evolution of species from extremely diverse sources — including those emitted directly, such as by diesel or biomass burning, and those formed by reactions occurring in the atmosphere. The dominant process in these simulations was oxidation in the gas phase. On aging, the primary and secondary aerosols were continuously oxidized, and evolved to become more hygroscopic, less volatile oxygenated organic aerosols.

In particular, these findings revealed that hygroscopicity — an important property owing to the fact that species that easily absorb water can cause cloud nucleation — was closely related to oxygen content. The present model holds the promise of considerably simplifying the atmospheric models used to monitor the effect of organic aerosols on climate and regional air quality.

Reference

1. Jimenez, J. L. *et al*. Evolution of organic aerosols in the atmosphere. *Science* **326**, 1525–1529 (2009). | Article | PubMed | ChemPort |

Nature Chemistry ISSN 1755-4330 EISSN 1755-4349