'Particle soup' discovery will improve climate predictions

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Prof Hugh Coe

(PhysOrg.com) -- New research from scientists at The University of Manchester is set to improve predictions about climate and air quality - and make life easier for those suffering from respiratory problems.

Atmospheric researchers from the Centre for Atmospheric Science in the School of Earth, Atmospheric and Environmental Science (SEAES) worked with an international team of 60 scientists to study the behaviour of organic particulate once it has been released into the atmosphere.

Their findings appear in the world-leading journal *Science*.

Scientists have previously struggled to work out where the organic particulate comes from, why there is so much in the air and what

happens to it.

A lack of information about their behaviour has led to incomplete or inaccurate prediction models for climate and air quality.

This is important for people suffering from respiratory illnesses like asthma, as better modelling and predictions could help them avoid atmospheric conditions which will adversely affect their health.

Now Manchester researchers and international colleagues have taken a more holistic approach to tracking the life cycles of airbourne compounds - and this promises to improve future predictions.

Organic compounds coat airbourne particles and make up as much as 90 per cent of all fine particle mass floating around in the atmosphere.

These particles influence cloud formation and therefore rainfall, as well as contributing to human disease and illness.

Through field observations and lab experiments, scientists have now found that organic matter tends to end up as a type of 'goo' with very similar physical and chemical properties - regardless of the source or where it is found in the atmosphere.

Researchers were surprised to find that organic matter found in airbourne particles looked very similar, whether collected in the heart of Mexico City, in an island in Japan, in a forest in Finland or up a mountain in the Swiss Alps.

As part of the new study, scientists have also created a chemical 'map', which provides some clear visualisation of how organic aerosols change once they become part of the particle soup. This promises to let people predict the ability of the organics to participate in cloud formation.

The research paper's co-author Prof Hugh Coe of The University of Manchester said: "The organic content of airbourne particles is highly complex, but the approach we have taken in our research greatly simplifies our understanding.

"The particle soup we have found can be boiled down into a few measureable characteristics, such as oxygen to carbon ratio and the volatility of the particles, which are key variables for predicting climate and air quality.

"This international research provides a new framework for improving our knowledge of how organic material forms and how it evolves over time. It shows how in future air quality and climate models can incorporate this complexity in a simple but inclusive way."

More information: The paper, 'A New Look at Aging Aerosols', published in the 11 December 2009 edition of 'Science.'

Provided by University of Manchester