FAST MOVING FRONTS - 2009

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Alex Guenther talks with *ScienceWatch.com* and answers a few questions about this month's Fast Moving Front in the field of Geosciences.

Article: Estimates of global terrestrial isoprene emissions using MEGAN (Model of Emissions of Gases and Aerosols from Nature)
Authors: Guenther, A;Karl, T;Harley, P;Wiedinmyer, C;Palmer, PI;Geron, C
Journal: ATMOS CHEM PHYS, 6: 3181-3210 AUG 2 2006
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SW: Why do you think your paper is highly cited? Does it describe a new discovery, methodology, or synthesis of knowledge?

The accurate characterization of isoprene emissions and their response to a changing earth system is a difficult challenge. There are physical, chemical, and biological controlling factors that operate on scales ranging from individual cells to plant canopies and the global earth system. The paper describes a model, called MEGAN, which integrates knowledge from plant physiology, biochemistry, genomics, ecology, analytical chemistry, micrometeorology, atmospheric chemistry, and other scientific disciplines.

The model is used by observational scientists, to interpret field measurements, as well as regional regulatory modelers and global earth system modelers. This results in a large community with interest in isoprene emissions and their response to a changing earth system. It is both a synthesis of knowledge and a description of a methodology.

SW: Would you summarize the significance of your paper in layman's terms?

Isoprene is a volatile hydrocarbon produced by vegetation and emitted into the atmosphere where it can have a major role in determining distributions of pollutants and climate-relevant atmospheric constituents. On the global scale, isoprene emissions from vegetation greatly exceed that of total anthropogenic hydrocarbon emissions.

The paper describes an approach for incorporating isoprene emissions into quantitative models that attempt to describe the functioning of the earth system, and for assessments of air quality and climate. These emissions are highly sensitive to changes in land use, climate and ecosystem stress; it is critical that they be quantified as accurately as possible.

SW: How did you become involved in this research and were any particular problems encountered along the way?

This research allowed me to combine my interests in biology, micrometeorology, and atmospheric chemistry. It is often challenging to find funding for work that crosses disciplinary boundaries and it is also difficult to bring together the wide range of expertise required to tackle some interdisciplinary research topics.

SW: Where do you see your research leading in the future?

The next step in this research is to use airborne flux systems to directly measure isoprene emissions on the scales used in regional and global models and to provide empirical evidence of the role of isoprene in earth system interactions and feedback couplings. There is also much to be learned about the biological controls over the response of biogenic emissions to stress and other changes in the earth system.

SW: Do you foresee any social or political implications for your research?

Isoprene and other biogenic emissions are a key input for the air quality models that are used to develop regulatory strategies for controlling regional ozone and particle pollution. These biogenic compounds establish the background conditions that are the starting point for determining air pollution management strategies. Errors in estimates of these emissions could impact regulatory decisions that have important implications for human and ecosystem health and financial implications for many industries.

"Isoprene and other biogenic emissions are a key input for the air quality models that are used to develop regulatory strategies for controlling regional ozone and particle pollution."

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