

Measurements of Trace Gas and Aerosol Properties at the University of Michigan Biological Station during CABINEX

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Objective

Much has been learned over the last two decades about the impact of biogenic volatile organic compound (BVOC) emissions on atmospheric photochemistry and on aerosol loading. Many basic tropospheric processes are altered by proximity to forest canopies, which are large sources of BVOC. Complicating the story, many forests are experiencing changing environmental conditions as a result of forest succession and climate change. These issues suggest that the chemistry of BVOC, their contribution to the chemistry of ozone and aerosol formation/growth in the atmosphere, and their feedbacks with climate are incompletely understood. Consequently, the ability to assess potential changes to atmospheric chemistry resulting from alterations in emissions in a changing forest environment is limited.

At the boundary between the humid continental climate of the US and the subarctic boreal climate of Canada, the University of Michigan Biological Station (UMBS) is an ideal location to study the changing environment. Over the last century, considerable work has been conducted at UMBS on recoveries of ecosystem structure and function during forest regrowth after the large-scale cutting and burning that culminated at the start of the 20th century. This well-characterized and intensively studied landscape presents a unique opportunity to improve the understanding of how atmospheric chemistry, including aerosol production, is impacted by forest environments and how that chemistry may change in the context of climate change as forest composition changes.

In summer 2009 several WSU researchers expect to participate in the Community Atmosphere-Biosphere INteractions EXperiment (CABINEX). The experiment will occur at the UMBS site in northern Michigan during July and August 2009. Up to two REU students may be chosen to participate in this effort. These students will be primarily responsible for one of the research instruments in the field, and will assist in maintaining and operating other instruments.

Preliminary Training

WSU's participation in CABINEX will involve the deployment of its recently acquired Mobile Atmospheric Chemistry Laboratory (MACL). The MACL includes an extensive suite of atmospheric trace gas, aerosol, and meteorological instruments. While all REU students will receive some exposure to these instruments during the workshop sessions, to use the instruments in the field will require significant additional training. A significant part of the research experience will be training on these instruments, including the measurement technique, the operational software, routine maintenance, and data analysis techniques. This training will occur under the supervision of one or more REU mentors and WSU graduate students.