

Department of

Chemical and Environmental Engineering

2013—2014 Seminar Series

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9:30—10:30 AM

WCH 205/206



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**Particulate Matters: Warming the Arctic, cooling the southeastern US and
Influencing human health everywhere...and that's not all.**

Atmospheric particulate matter (PM) comes from a variety of both natural and anthropogenic sources. Since the industrial revolution the amount of ambient PM has increased by at least two-fold, dominated by increases in fossil fuel combustion and biomass burning. Anthropogenic PM has a variety of impacts on both the environment and human health. Recent work indicates that black carbon (BC), often termed soot, from combustion sources is a key component of PM that is harmful to human health. In addition, the absorption of solar energy by BC in the atmosphere and deposited to snow and ice in cold regions such as the Arctic may be significantly contributing to the warming trend observed in the atmosphere. Other light absorbing PM, including dust and organic 'brown' carbon may also be playing a role in the radiation balance of the Earth.

At this time it is still relatively difficult to assess the overall impacts of PM on both climate and human health in a large part due to the lack of widespread measurements of PM chemical, physical and optical properties. The lack of measurements can be attributed in part to the fact that compact, robust, inexpensive wireless sensors do not exist to make measurements of key aerosol parameters.

In this talk I will focus on several recent projects that have involved making a wide variety of PM related measurements focused on better understanding the impacts of aerosols on human health and climate. We will travel from the pristine Arctic, where just a small amount of soot can substantially alter the radiation balance, to urban Atlanta where emissions from rail yards and vehicles can impact local human health. I will also discuss why the Taj Mahal, one of the great wonders of the World, is turning brown. Lastly, I will discuss the need for wireless sensors for air quality measurements, existing related measurement technologies, and suggestions for a path forward.