Physics Colloquium

Michigan Technological University

Thursday, March 17, 2011 at 4:00 pm
Room 139 Fisher Hall

MULTISPECTRAL PHOTOACOUSTIC ANALYSIS OF ATMOSPHERIC AEROSOL

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Abstract: Atmospheric aerosol modulate climate by absorbing and scattering sunlight in the UV, visible, and near infrared, and to a lesser degree, by absorbing, emitting, and scattering terrestrial radiation in the mid infrared. Aerosol light absorption is usually only 10% as large as light scattering by aerosol though is an important component of atmospheric radiation transfer because sooty aerosols strongly absorb sunlight in all spectral regions. In situ photoacoustic methods are displacing older filter-based techniques for aerosol light absorption measurement because filters introduce a strong bias that requires situation dependent calibration.

The presentation will summarize our theoretical work and measurements from campaigns in many cities and laboratories. The technology we have developed for simultaneous photoacoustic measurements of aerosol light absorption at multiple wavelengths will be discussed along with our use of reciprocal nephelometry to measure aerosol light scattering. We present our work in the context of others, and seek to clarify and address the observed spectral variation of aerosol light absorption for urban and laboratory generated aerosol.

Bio: Dr. Arnott earned Ph.D. in Physics in the general area of underwater optics in 1988 from the Washington State University. He was a Postdoc from 1988 to 1991 at the National Center for Physical Acoustics, University of Mississippi, subjects included theory and experiments for thermoacoustic heat engines and outdoor sound propagation measurements and applications. Dr. Arnott is a Full Research Professor at the Desert Research Institute, Reno Nevada since 1992 and an Associate Professor of Physics and Atmospheric Sciences at the University of Nevada Reno sicne 2005. He is also the Director of the undergraduate program for Atmospheric Sciences. His research interests include in situ observations of cirrus cloud microphysics, laboratory measurements of infrared radiation transfer in water and ice clouds, development and commercialization of photoacoustic instruments for aerosol optics measurements, and remote sensing of aerosol optical depth using sun photometry as well as boundary layer temperature structure retrieval using infrared spectrometer measurements of the downwelling IR radiance.

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