Physics Colloquium

Michigan Technological University

Thursday, September 8, 2011 at 4:00 pm
Room 139 Fisher Hall

Optical Measurement and Aerosol Filter Loading for Climate Studies

(Aethalometer)

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Abstract: Aerosols (small particles suspended in the atmosphere) contribute to climate change by altering Earth's radiative balance. Aerosol optical properties determine their effects on climate, causing either positive forcing (increasing temperature) or negative forcing (decreasing temperature). For these reasons recent climate research has been focused on understating the aerosol properties and roles.

Aerosols are not "pure" uniform species, they are complex mixtures of several types with different scattering and absorption specific coefficients, that can be associated to specific source types. Therefore, the best approach to understand the aerosol effect on climate would be to characterize each type of aerosols and provide parametrizations for climate models.

The increased importance to comprehend the aerosol role in the atmosphere is responsible for the continuous development of novel optical techniques capable of responding to their presence and providing information on their properties. These techniques can be split in two types of groups: the ones that measure the radiation perturbation due to the aerosol presence in a column of air; and the others that measure the radiation perturbation that results from the aerosol accumulated on a filter surface. The present talk will consider the last group, in particular the use of the Aethalometer, and will show an ongoing research work for empirically compensating the attenuation coefficient, $\sigma ATN(\lambda, t)$, due to the cumulative loading effect.

Bio: Dr. Fialho is a Full Professor of Chemistry at the Azores University, Portugal. He earned a PhD in Chemistry in the field of Chemical-Physics at the Lisbon University in 1991. He is founder and coordinator of the Group of Chemistry and Physics of the Atmosphere at the Azores University where the AZONET (AZores Observation NETwork) is integrated. Dr. Fialho represents the Azores University as Associated Partner of the European Supersites for Atmospheric Aerosol Research (EUSAAR) and also as Associated Partner of the Atmospheric Composition Change the European Network of Excellence (ACCENT). Dr. Fialho is also cofounder of the Pico Mountain Observatory in the Azores, in collaboration with MTU and Colorado University. His research activities are focused on the physical properties of aerosols and the optical instrumentation used to characterize them.

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