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CLIMATE/ATMOSPHERIC SCIENCE & ENGINEERING COLLOQUIUM

Desert Dust, Wildfire Smoke, Volcanic Ash, Urban Pollution – Satellite Contributions Toward Grasping the Role Particles Play in Global Climate and Regional Air Quality

Ralph Kahn, senior research scientist
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- **Friday, July 30, 2021 | 10:30-11:30 a.m. (CT) | Via Zoom**
- **Free Registration:** https://uiowa.zoom.us/meeting/register/tJcqf-uorz0pG9On3Oi1e25eQc-oZff-Z13c

Registration takes less than a minute. A confirmation email will follow with instructions to join the event.

ABSTRACT: Airborne particles are ubiquitous components of our atmosphere, originating from a variety of natural and anthropogenic sources, exhibiting a wide range of physical properties, and contributing in multiple ways to regional air quality as well as regional-to-global-scale climate. Most remain in the atmosphere for a week or less, but can traverse oceans or continents in that time, carrying nutrients or disease vectors in some cases. Bright aerosols reflect sunlight, and can cool the surface; light-absorbing particles can heat the atmosphere, suppressing cloud formation or mediating larger-scale circulations. In most cases, particles are required to collect water vapor as the initial step in cloud formation, so their presence (or absence) and their hygroscopic properties can affect cloud occurrence, structure, and ability to precipitate. Grasping the scope and nature of aerosol environmental impacts requires understanding microphysical-to-global-scale processes, operating on timescales from minutes to days and longer. Satellites are the primary source of observations on kilometer-to-global scales. Spacecraft observations are complemented by suborbital platforms: aircraft in situ and remote sensing measurements and surface-based instrument networks that operate on smaller spatial scales, some on shorter timescales. Numerical models play a third key role in this work — providing a synthesis of current physical understanding with the aggregate of measurements, filling observational gaps, and allowing for some predictive capability. This presentation will focus primarily on what we can say about aerosol amount and type from space. Constraining particle "type" is at present the leading challenge for satellite aerosol remote sensing. We will review recent advances, including the strengths and limitations of available approaches, and will cover a little about the need to better integrate satellite and suborbital measurements with models to create a clearer picture of aerosol environmental impacts, globally.

BIO: Dr. Kahn received his PhD in applied physics from Harvard University in 1980. He spent 20 years as a Research Scientist and Senior Research Scientist at the Jet Propulsion Laboratory, where he studied climate change on Earth and Mars, and also led the Earth & Planetary Atmospheres Research Element. Kahn is Aerosol Scientist for the NASA Earth Observing System's Multi-angle Imaging SpectroRadiometer (MISR) instrument. He focuses on using MISR's unique observations, combined with other data and numerical models, to learn about wildfire smoke, desert dust, volcano and air pollution particles, and to apply the results to regional and global climate-change and air quality questions. Kahn has lectured on Climate Change and atmospheric physics at UCLA, Caltech and many other venues, is Adjunct Professor at the University of Maryland, and is editor and founder of PUMAS, the on-line journal of science and math examples for pre-college education. He has authored over 200 publications in refereed scientific journals and book chapters. Kahn is chair of Commission A of COSPAR (the international Committee on SPAce Research) and co-chair of AeroSat, the international association of the satellite aerosol remote-sensing community. He has received the NASA Exceptional Service Medal, the NASA Outstanding Leadership Medal, the Robert H. Goddard award for Exceptional Achievement in Science, the American Geophysical Union's Yoram J. Kaufman award, the William Nordberg Memorial Award for Earth Science, and is a Fellow of the American Geophysical Union.

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