6.014 Insight into the Global Distribution of Ground-level Fine Particulate Matter from Satellite Remote Sensing and from the SPARTAN Aerosol Network.

Presenting Author:
Randall V Martin, Dalhousie University, Halifax, Canada, randall.martin@dal.ca

Co-Authors:
Graydon Snider, Dalhousie University, Halifax, Canada
Aaron van Donkelaar, Dalhousie University, Halifax, Canada
Crystal Weagle, Dalhousie University, Halifax, Canada
Clement Akoshile, University of Ilorin, Ilorin, Nigeria
Nguyen X. Anh, Vietnam Academy of Science and Technology, Hanoi, Vietnam
Jeff Brook, University of Toronto, Toronto, Canada
Fatimah D. Qonitan, Institut Teknologi Bandung, Bandung, Indonesia
Jinlu Dong, Tsinghua University, Beijing, China
Derek Griffith, Council for Scientific and Industrial Research (CSIR), Pretoria, South Africa
Kebin He, Tsinghua University, Beijing, China
Brent N. Holben, NASA Goddard Space Flight Center, Greenbelt, United States
N. Christina Hsu, NASA Goddard Space Flight Center, Greenbelt, United States
Ralph Kahn, NASA Goddard Space Flight Center, Greenbelt, United States
Nofel Lagrosas, Manila Observatory, Quezon City, Philippines
Puji Lestari, Institut Teknologi Bandung, Bandung, Indonesia
Robert C. Levy, NASA Goddard Space Flight Center, Greenbelt, United States
Alexei Lyapustin, NASA Goddard Space Flight Center, Greenbelt, United States
Zongwei Ma, Nanjing University, Nanjing, China
Amit Misra, Indian Institute of Technology, Kanpur, India
Kalaivani, K. Murdymootoo, Dalhousie University, Halifax, Canada
Sajeev Philip, Dalhousie University, Halifax, Canada
Eduardo Quel, UNIDEF (CITEDEF-CONICET), Buenos Aires, Argentina
Amanda Ring, Dalhousie University, Halifax, Canada
Yvonne Ritchie, Dalhousie University, Halifax, Canada
Abdus Salam, University of Dhaka, Dhaka, Bangladesh
Andrew Sayer, NASA Goddard Space Flight Center, Greenbelt, United States
Bret Schichtel, Cooperative Institute for Research in the Atmosphere, Colorado State, United States
Lior Segev, Weizmann Institute, Rehovot, Israel
Sachi N. Tripathi, Indian Institute of Technology, Kanpur, India
Chien Wang, MIT, Cambridge, United States
David Winker, NASA Langley Research Center
Chao Yu, Emory University, Atlanta, United States
Abstract:

Fine particulate matter (PM$_{2.5}$) is believed to be the leading environmentally-related risk factor for premature mortality worldwide. However, ground-level monitoring remains sparse in many regions of the world. Satellite remote sensing from multiple platforms (e.g. MODIS, MISR, SeaWiFS, CALIOP) and algorithms (e.g. Dark Target, Deep Blue, MAIAC) offers a global data source to address this issue. Global numerical modeling plays a critical role in relating these observations to ground-level concentrations. The resultant satellite-based estimates of PM$_{2.5}$ indicate dramatic variation around the world, with implications for global public health. A new ground-based aerosol network (SPARTAN) offers valuable measurements about PM$_{2.5}$ in globally dispersed urban areas across more than 10 countries to evaluate and improve satellite-based PM$_{2.5}$ estimates, and to provide near-surface chemical and microphysical detail unobtainable from space. These SPARTAN measurements offer insight into the global mass, optical properties, chemical composition, and trace metals in PM$_{2.5}$. This presentation will highlight recent advances in combining satellite remote sensing, global modeling, and ground-based measurements of atmospheric aerosols to improve understanding of global population exposure to PM$_{2.5}$.