PM2.5 Measurements for Air Quality Management

The Ministry of Environmental Protection of the People's Republic of China promulgated National Ambient Air Quality Standards (NAAQS) in 2012 with Class II (urban areas) annual and 24-hr averages of 35 and 75 μg/m^3, respectively. $PM_{2.5}$ particles exacerbate adverse human health effects, degrade visibility, and alter the global radiative balance; their measurement is complicated by the presence of semi-volatile material (ammonium nitrate and some organic material). This course introduces multipollutant/multieffect air quality management strategies and network design principles for $PM_{2.5}$ and $PM_{10.}$ It reviews sampling techniques available for determination of both in-situ real-time and integrated $PM_{2.5}$ mass, chemical composition, and particle size distribution. Uncertainties of particle collection on filters and their comparability with real-time instruments are explained. Real-world emissions characterization for speciated emission factors, source profiles, and emission inventories for major pollution sources will be discussed. Basic components for quality assurance/quality control (QA/QC) are enumerated.

Course Outline:

- Air Quality Management Strategies: Multiple Pollutants and Multiple Effects
- Network Design Principles and Practices for $PM_{2.5}$ and PM_{10}
- Integrated and Continuous $PM_{2.5}$ Monitoring Methods
- Real-world Emission Characterization for Speciated Emission Inventories and Source Profiles
- Importance of and Methods for Laboratory Chemical Speciation of $PM_{2.5}$
- Standards and Traceability for Multipollutant Air Quality Measurements
- Open Discussion

Course Instructors:

Dr. Judith C. Chow, Nazir and Mary Ansari Chair in Entrepreneurialism and Science and Research Professor in the Division of Atmospheric Sciences (DAS) at the Desert Research Institute (DRI) , part of the Nevada System of Higher Education (NSHE), has over 37 years of experience in conducting air quality studies and performing statistical data analysis. She received her Doctor of Science degree in Environmental Health Science and Physiology from Harvard [illegible] 1985. As leader of DRI's Environmental Analysis Facility (EAF), Dr. Chow supervises a group of 30 research scientists and technicians in developing and applying advanced analytical methods to characterize suspended atmospheric particles. Dr. Chow is the principal author or co-author of ~315 peer-reviewed articles and ~90 peer-reviewed book chapters and has been recognized by ISIHighlyCited.com in ecology and environment with more than 10,700 citations of her work.

Dr. John G. Watson, Research Professor in the Division of Atmospheric Sciences (DAS) at the Desert Research Institute (DRI), part of the Nevada System of Higher Education (NSHE), has over 41 years of experience in physics, environmental sciences, air quality network design and measurement, and source/receptor modeling. He received his Ph.D. in Environmental Sciences from Oregon Graduate Institute (now Oregon Health and Science University) in 1979. Dr. Watson has conducted and managed >100 air quality studies. He is known for formulating conceptual models as well as organizing and planning large-scale, multi-year air quality studies in the U.S. Dr. Watson established DRI's Source Characterization Laboratory and developed an in-plume sampling system for real-time measurement of vehicle exhaust. Dr. Watson is the principal author or co-author of ~300 peer-reviewed publications and ~120 peer-reviewed book chapters and has been recognized by ISIHighlyCited.com in ecology and environment with more than 8,600 citations of his work.