Department of Chemical and Environmental Engineering

2015—2016 Seminar Series

Friday, November 6, 2015

9:30-10:30am

WCH 205/206

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Atmospheric Pollution Sources and Air Quality in the Colorado Front Range

The Denver Metropolitan Area is classified as a marginal non-attainment area for ozone during summertime and occasionally has exceedances of the PM2.5 National daily standard during winter. The highly complex topography and meteorology in the Colorado Front Range drive the mountain-valley flow patterns in this region, resulting in formation of the Denver Cyclone or up-slope/down-slope circulations, thus impacting transport and evolution of emissions from point sources to different extents. Oil and gas exploration activities (O&G) in Wattenberg Field, located north of the Denver Metropolitan area, have expanded in the last few years. Although hydrocarbon emissions and the potential for ozone formation in the area from these sources have been studied previously, no information is available on the impact on secondary organic aerosol (SOA) formation. During the Front Range Air Pollution and Photochemistry Experiment (FRAPPE), airborne measurements of trace gases and aerosol composition were made in the northern Front Range during July-August 2014. Analyses on evolution of aerosol species and their precursors as well as aerosol optical extinction will be presented in order to assess the impact of various sources and meteorological conditions on air quality in the region. Pronounced increase in mass concentrations of aerosol species in the Front Range were observed during the cyclone episodes, in contrast to the non-cyclonic days. Additionally, significant contribution of SOA to total organic aerosol was observed in pure urban and urban plumes mixed with O&G emissions. Photochemical processing of the plumes resulted in a significant increase in the SOA fraction and the observed extinction coefficient. Current summertime state of air quality in the Front Range will be compared to recent wintertime measurements in the region.

BioSketch: Roya Bahreini received her M.S. and Ph.D. in Environmental Science and Engineering from the California Institute of Technology in 2003 and 2005, respectively. Dr. Bahreini's undergraduate training was at U. of Maryland, College Park where she obtained a B.S. degree in Chemical Engineering in 1999. In 2005, Dr. Bahreini received a CIRES Visiting Scholar Fellowship from University of Colorado in Boulder to work on field measurements of aerosol chemical properties at NOAA Earth Systems Research Laboratory, where she continued to work as a Research Scientist until 2012. During this period, Dr. Bahreini had the opportunity to participate in 3 airborne and 2 ground-based field studies, and authored/coauthored 30 peer-reviewed publications, investigating aerosol formation processes as well as aerosol chemical, physical and optical properties in different environments. In 2012, Dr. Bahreini was appointed as an Assistant Professor of Atmospheric Science in the Environmental Sciences Department at the University of California, Riverside. Dr. Bahreini's research interest continues to be *investigation of aerosol chemical and optical properties* in the ambient and laboratory settings to better *understand the role of aerosol particles on local and regional air quality and climate*.

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