2A.1

Historical Highlights of Mass Spectrometry and Aerosol Chemical Analysis. CHRISTOPHER A. NOBLE, Northrop Grumman.

Mass spectrometry has played an important role in the chemical characterization of airborne particulate matter-particularly atmospheric aerosols-both for bulk aerosol composition and single particle chemistry. Although mass spectrometry dates back over one century, the application of mass spectrometry to aerosol particles dates back only about thirty-five years. The relatively late application of mass spectrometry to aerosol problems was the result of technological advances that were required before the problems could be addressed, such as the development of microelectronics, personal computers, and lasers. This presentation highlights important events in the historical development of mass spectrometry research and the eventual application of mass spectrometry to aerosol characterization.

* Email address: chris.noble@ngc.com

2A.2

Atmospheric Radiochemistry, Aerosols and Cancer: The Career of Edward Martell. WILLIAM R. STOCKWELL, Howard University; John M. Lewis, National Oceanic and Atmospheric Administration.

Edward Martell was a highly successful atmospheric scientist and a colleague of Willard Libby and Christian Junge. Willard Libby was a central figure in the development of atmospheric radiochemistry and a Nobel prize-wining radiochemist. Christian Junge made many contributions to aerosol science and he was the discoverer of the stratospheric aerosol particles known as the Junge layer. Martell was a member of the original group of researchers that joined the National Center for Atmospheric Research (NCAR) in 1961. Martell left mainstream atmospheric science to pursue his interest in health physics and lung cancer during the middle of his career. His theory of lung cancer was grounded in his understanding of the interactions between radioactive materials, tobacco leaves and aerosol particles. He believed that radon emitted from the soil could attach itself to tobacco leaves. Tobacco leaves have numerous fine hairs that may serve as excellent collectors of radioactive aerosol particles generated from radon decay. This idea was also extended to the smoking of marihuana because this plant has even hairier leaves. Martell experimentally found radon decay products among the components of tobacco smoke. The contributions of Martell to aerosol science will be addressed as well as potentially fruitful areas that conceivably would benefit from additional research.

2T.1

A Web-Based Interactive Program on Atmospheric Aerosols for Undergraduate Education. YING LI, Chang-Yu Wu, Randy Switt, Anne Donnelly, Adam Denny, University of Florida; Pratim Biswas, Washington University in St. Louis.

A web-based computer module on Atmospheric Aerosols has been developed and evaluated for undergraduate education. The objective of this module is to give an overview of the sources and dynamic behavior of atmospheric aerosols and to instruct students how to assess one of its most prominent impacts - visibility degradation. The module introduces the three common classifications of atmospheric aerosol (nuclei, accumulation, and coarse particle modes), their sources and chemical compositions, the dynamic processes of atmospheric aerosol formation, growth and removal, and their influences on climate and human health. Animations are included to help students better understand the concepts and mechanisms. An interactive web-calculator is also included for students to calculate the light extinction due to atmospheric aerosol and the visual range in typical rural and urban settings. This calculator aims to aid students' understanding of the parameters of atmospheric aerosols that have significant impact on the visibility.

Formative and summative evaluation was conducted to ensure that the module is effective at teaching the desired content as well as to determine the degree of satisfaction of the modules as a learning tool. Students at the University of Florida and North Carolina Agricultural and Technical State University completed a qualitative questionnaire focused on the design aspects of the module including, format and ease of navigation. A pre- and post-test was used to determine the effect on learning. The mean of the post-test score was higher than that of the pre-test score with an average student increase in score of 7.92 points (SD = 3.54) and a paired-sample t-test showed a statistically significant difference between the means, $t(37) = 13.807$, $p = 0.00$. The evaluation of the data clearly supports evidence of the usefulness of the modules as a teaching tool.