2UA.8
Development and Evaluation of Air Pollution Model into a Horizontal Wind Flow in Kosovo. AFRIM SYLA, Fatbardh Syla, Erik Solbu, *University of Prishtina, Kosovo*

Kosova is a mountainous farm region which at past was in the process of industrialization because of its reach coal and mineral resources. The problem of air pollution in the surroundings of Power Plants appeared as early as 1954 when Thermal Power Plant of Kosova has started work in Obiliq.

The city of Obiliq, approximately 5 km north of Prishtina-capital of Kosova, is the site of one the largest air pollution. Coal - related industries have been a major element of the economy of Kosova, but created extensive health risk due to environmental pollution with PM and a variety of other substances. A field study was conducted at the Kosovo Central Power and North part of Kosovo, from 15 February 2011 to 15 March 2012.

The downwash algorithms in the Industrial Source Complex (ISC3) model, currently recommended for regulatory application, were largely developed with data that represented neutral stability, moderate to high wind speeds, winds perpendicular to the building face, and non-buoyant or low buoyancy plumes. Some of the limitations of the ISC3 downwash algorithms are (1) the location of the stack is not considered (if the stack is determined to be within the general region of influence of the building, the stack is always treated as though it were at the center of the lee wall of the building), (2)streamline deflection is not considered (ascent of the mean streamlines upwind of and over the building and descent in the lee of buildings), (3) there are no effects on plume rise due to the velocity deficit in the wake or vertical wind speed shear, (4) there is no linkage between plume material captured by the near wake and far wake concentrations, (5) there are discontinuities at the interface between the two downwash algorithms, (6) there are no wind direction effects for squat buildings, and (7) large concentrations predicted during light wind speed, stable conditions that are not supported by observations.The PRIME model includes several advances in modeling building downwash effects including enhanced dispersion in the wake, reduced plume rise due to streamline deflection and increased turbulence, and a continuous treatment of the near and far wakes. All of these effects consider the location of the plume within the wake. Comparisons of the model with wind-tunnel and field data have shown improved performance over the current ISC3 model. The model is implemented within the ISC3 model code, but can be implemented in other refined or screening air quality models.

2UA.9
Quantification of Ultrafine Particles with Electric Charges in On- and Near-freeway Environments. EON LEE, Bin Xu, Yifang Zhu, *University of California, Los Angeles*

Previous studies have reported the presence of ions and charged particles in motor vehicle exhaust. However studies characterizing electric charges on particles on and near traffic emissions are limited. This study presents the fraction of charged particles measured on and near two major freeways in Los Angeles. A tandem Differential Mobility Analyzer (DMA) system was used to evaluate the fraction of ultrafine particles (UFPs) carrying different number of charges across a broad range of electrical mobility diameters (30, 50, 80, and 100 nm). We first attempted to characterize the fraction of charged particles on two distinctively different freeways: a gasoline-vehicle dominated freeway (I-405) and a diesel traffic dominated freeway (I-710 i.e., up to 20 % diesel traffic). We found that the fraction of charged particles was higher on I-710 than on I-405, and the fractions on both freeways were significantly higher than the background. We also found that the background UFPs carried only up to two charges but traffic-induced particles could carry up to three charges across the tested electrical mobility diameters. Downwind from the I-405, we found the decay rates of charged particles were generally slower than that of total cluster ions but faster than that of particle number concentration. Particles with higher charges had the faster decay; that is, the fastest decay for triply charged particles and the slowest decay for singly charged particles. Further investigation on bipolar charged particle distributions showed strong net positive charges on nucleation mode particles. In comparison with Boltzmann steady-state charge equilibrium theory, we found that charged particles (especially, those in nucleation mode) might not necessarily reach the charge equilibrium distributions in the near-freeway environments.

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