IMPLEMENTATION OF ASTM D6589 PROCEDURES IN THE NEW BOOT MODEL EVALUATION SOFTWARE

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The BOOT model evaluation software package, originally developed by Hanna, Strimaitis, and Chang, has been included in so-called Model Validation Kit since the 1993 Harmonization Workshop held in Manno, Switzerland. The software has been extensively used by scientists around the world in the field of dispersion modeling, where the variables of interest are primarily the maximum concentration, cross-line integrated concentration, and dosage. However, the evaluation methodology is also generic enough to be applied to other comparisons.

The U.S. Environmental Protection Agency (USEPA) recently recommended standard procedures for statistical performance evaluation of atmospheric dispersion models. These procedures were adopted in 2000 by the American Society for Testing and Materials (ASTM), Designation D 6589-00. The basic premise of the ASTM procedures is that since the atmosphere is turbulent, field observations represent realizations of an infinite ensemble. On the hand, most dispersion models generate only deterministic results. Hence, in order to compare, for example, predicted and observed centerline concentrations, the procedures suggest that the data be first averaged based on (1) regimes of similar meteorological and geographic conditions, and (2) the proximity to the plume centerline. The software so far developed by the USEPA is all-inclusive in that a single code does the regime stratification, determination of near-centerline locations, bootstrap resampling, and calculation of performance measures. As a consequence, the code is highly specific to a particular field experiment, and not easily adapted to other experiments with different configurations.

The new BOOT model evaluation software seeks to implement the ASTM procedures while still maintains its generality. Like the original version, the new code still reads the input in a fixed format. It is assumed that all field experiment-specific analyses are done by separate pre-processors. The Prairie Grass field data are used to demonstrate the consistency between the USEPA program and the independently developed BOOT program based on the same ASTM procedures.