

Effects of Meteorological Data Processing on AERMOD Output Concentrations

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ABSTRACT

The current study evaluates the effect that different parameters used to process meteorological data have on AERMOD concentrations. Specifically, this study evaluates the effect from the use of AERMET processed with; 1-minute wind data collected by the Automated Surface Observing System (ASOS) and pre-processed using AERMINUTE, refined National Weather Service (NWS) station location and anemometer height, surface moisture, and urban/rural options. In this evaluation, one year of meteorological data was processed with nine different sets of input parameters and then used in AERMOD to run a short, medium and tall stack scenario for 1-hour, 24-hour and annual averaging periods. Downwash and terrain effects were not considered in this study. The results indicate that all three stack scenarios are sensitive, to varying degrees, to the location used for the meteorological station. Anemometer height changes had a small effect on concentrations for all scenarios except for the tall stack scenario which produced a modest increase in concentrations for the annual averaging period. Surface moisture was not found to have a strong effect on any of the scenarios evaluated. The use of AERMINUTE data resulted in significantly higher concentrations for the 1-hour (85%), 24-hour (81%), and annual (88%) averaging periods for the tall stack scenario. The ice free group station option in AERMINUTE was also evaluated. When using AERMINUTE without specifying that the station is part of the ice free wind group stations, the concentrations obtained for tall stack scenario were lower for the 1-hour (64%), 24-hour (68%), and annual (78%) averaging periods. Finally, when it comes to the urban/rural evaluation, the greatest effect is observed in the medium stack scenario where concentrations double for the 1-hour scenario when using the rural option. However, in the tall stack scenario, significantly lower concentrations were obtained by using the urban parameter for the three averaging periods evaluated.