Climatic Sensitivity Analysis of AERMOD and CALPUFF Air Dispersion Models

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Air dispersion models are practical tools for predicting livestock odours in the vicinity of livestock operations. Climatic conditions are the most important determining factors for odour dispersion. In this study, climatic sensitivity analyses are conducted for two air dispersion models, AERMOD and CALPUFF. The climatic conditions studied include atmospheric stability class, wind speed, wind direction, ambient air temperature, and mixing height. Six stability classes (A, B, C, D, E, and F) with nine wind speeds (1, 2, 3, 4, 5, 6, 8, 10, and 15m/s) will be studied under steady state weather conditions. Wind directions from west-north-west (WNW), west (W), south-west (SW), and south (S) will be selected. The ambient air temperature will range from -20 to 30^{o}C. The climatic sensitivity analysis is carried out regarding the impact of the changing of the selected climatic parameters on the maximum odour travel distance for odour concentration of 10 OU/m^{3} within 5 km from odour sources. Comparison of the two models' sensitivities to climatic parameters will be made.