On the calculation of separation distances to avoid odour annoyance from livestock farms

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The Austrian Odour Dispersion Model (AODM) is a Gaussian model adapted for the prediction of odour sensation. It consists of three modules to estimate the daily and seasonal variation of the odour emission, the average odour concentration and the momentary (peak) concentration for the time interval of a single human breath (approx. 5 seconds). Peak concentrations further downwind are modified by use of an exponential attenuation function for which the ratios of the standard deviations of the wind components to the average wind speed have either to be taken from the literature or to be calculated e. g. from ultrasonic anemometer data.

AODM calculates direction-dependent separation distances for a combination of odour threshold and exceedence probability which are a function of the prevailing wind velocity and atmospheric stability conditions. Two sites in Styria in southern Austria and one site in the Austrian North-Alpine foreland are used for a sensitivity study of separation distances. At all sites, separation distances are calculated for a 1000 head pig fattening unit. The sensitivity study investigates (1) the influence of the schemes to determine atmospheric stability on the separation distances, and (2) the influence of the use of measured or literature values for the ratios used in the exponential attenuation function. The results show systematic differences in the calculated separation distances. These will be explained, and advice on which scheme to use will be given.