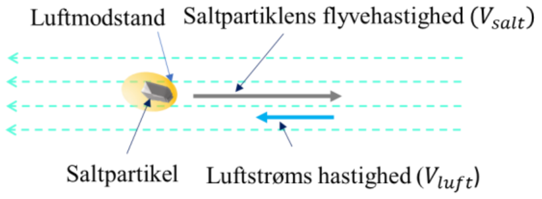
APPENDIX 3

Algorithm to involve information about turbulence airflow in 3S

Salt particles are flying through airflow, that changes character, in form of speed and direction, when the distance is increasing from the salt spreader. The new algorithm developed for 3S calculates salt particles' flight path under above mentioned circumstances. The procedure is as following (Ref. Figure 1):

1. Calculate the average speed of airflow ($\bar{V}_{luft}$) that the particles are flying through.
2. Calculate the particles relative flying speed (V_{rel}) compared to $\bar{V}_{luft}$.
3. Calculate air resistance.
4. Calculate air transportation distance (L_{luft}).
5. Calculate flying and jumping distance compared to the road (L_{vej}).

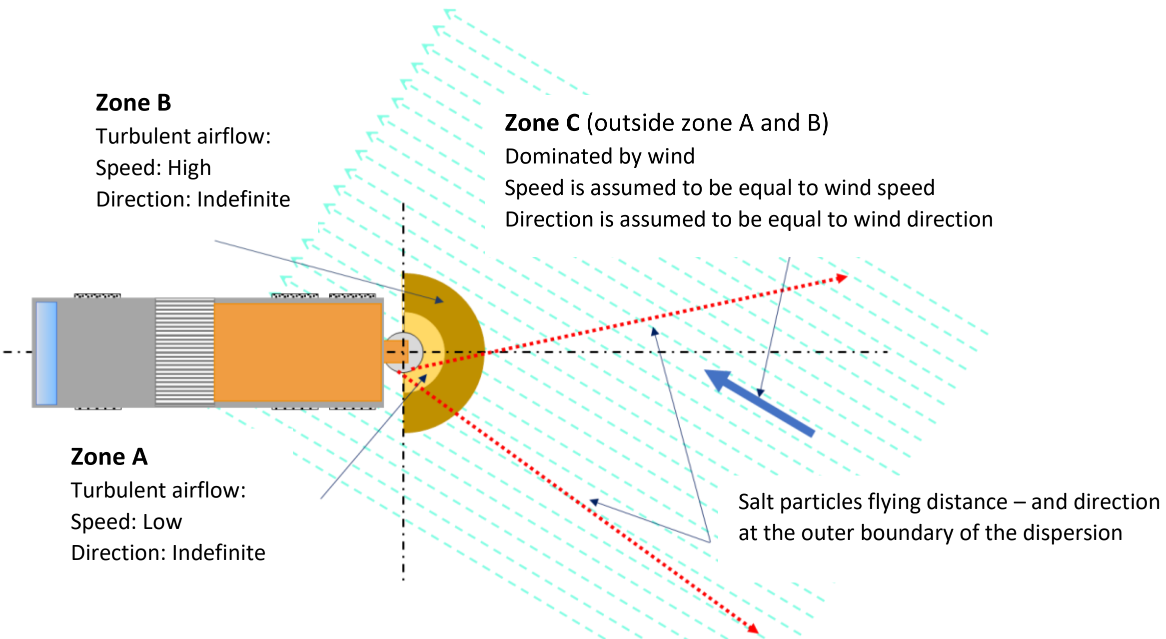


Particles relative flying speed: $V_{rel} = V_{salt} - \bar{V}_{luft}$
Particles flying distance I comparison to air: $L_{salt} = V_{rel} * flying\ time$
Air transportation distance: $L_{luft} = \bar{V}_{luft} * flying\ time$
Particles flying distance I comparison to road: $L_{vej} = L_{salt} - L_{luft}$

Figure 1: Elements in the algorithm

Calculation of the $\bar{V}_{luft}$ (airflow average speed, Ref figure 2)

The imposition of $\bar{V}_{luft}$ simplifies the calculation process. It is assumed that airflow, where salt particles are flying through, roughly can be divided into 3 zones (A, B and C) depending on the distance from the spreading disc. The time for the salt particles to fly through each zone is calculated and multiplied with air speed in the respective zones. The results show how much the airflow moves while the particles flies through each zone. The sum of these distances is divided with the total flying time and gives a flying time weighted $\bar{V}_{luft}$. (Notice: Net air transportation of the particles in zone A and B is assumed to be 0, because the airflow eddies around and transport the particles in every direction)



Airflow speed in zone A and B can be calculated with the use of statistical models developed based on full-scale experiments conducted in 2015. Net air transport of the particles in zone A and B is assumed to be zero as airflow whirl around and transport the particles in all directions.

Figure 2: Airflow salt particles fly through, can roughly be divided in 3 zones: A, B and C