Dry deposition and resuspension are two opposite processes for atmospheric aerosols. In this study, we first developed a new dry deposition scheme for use in atmospheric dispersion models. Secondly we reviewed the current existing methods for resuspension modeling, and implemented two parameterizations of resuspension rate into our dispersion models.

To deposit on the ground surface, an airborne aerosol particle needs to pass through an aerodynamic resistance layer and a quasi-laminar sublayer just adjacent to the surface. Traditionally it is believed that the main mechanisms through which a particle overcomes the resistance from the quasi-laminar sublayer are Brownian diffusion, interception, inertial impaction and gravitational settling. In this study, we developed a size-resolved dry deposition model, which includes a new proposed dry deposition mechanism, the burst effect of eddy turbulence. The effect on dry deposition is parameterized with the roughness Reynolds number.

Currently there are three methods for predicting resuspension of atmospheric aerosols, namely the resuspension factor method, the resuspension rate method, and the mass-load method. In this study we focused on the second one, the resuspension rate method. This method is appropriate for short-term (a few minutes to days) prediction of resuspension of freshly deposited particles. When the parameterization of resuspension rate is incorporated into dispersion models, it can be used to predict the air concentration of resuspended materials over the resuspension and downwind regions.