

### **Reviewer's comments:**

The manuscript “Deposition velocity concept does not apply to fluxes of ambient aerosol” has been submitted to the journal GMD. In general, the manuscript argues that the near-surface aerosol loss process is not related to deposition velocity ( $V_d$ ), but that chemical decomposition is the primary concern. The present result showed that the  $V_d$ /flux/concentration of  $\text{NH}_4\text{NO}_3$  was not consistent with those of  $\text{NH}_3$  and  $\text{HNO}_3$ , particularly near the surface, which is inspiring and highlights the research gap and the challenges encountered in deposition velocity. The reviewer has several major concerns: (1) I am not sure if there is any difference between the  $V_d$  mechanism in both the model and measurement (Eq. (1) and Eq. (2) in the manuscript). However, Eq. (2) mentioned in the present manuscript is defined assuming there is only one particular surface type. In fact, Eq. (1) adopts  $V_d$  at different surface types represented by vegetation height or surface roughness length. For instance, the grassland/forest/water surface layer has different surface roughness lengths, which can lead to different  $V_d$  levels, particularly during long-range transport, resulting in different aerosol and gas concentrations. The results from Fig. 2 were estimated from a forest site in the Netherlands. Could a similar result be duplicated over other surface types? (2)  $\text{NH}_4\text{NO}_3$  is the major contribution of  $\text{PM}_{2.5}$ . What about other  $\text{PM}_{2.5}$  species such as BC,  $\text{SO}_4$ , dust ...? Have you considered other non-volatile compounds and coarse particles to prove non-relation between  $V_d$  and the flux? Or the entire manuscript content might not closely align with the title. (3) I agree that the formulation through wind tunnel studies is not guaranteed for ambient particles in outdoor experiments. Hence, robust observations are vital for model validation. It is suggested to conduct a thorough model comparison with ground observation station data, particularly over a longer period.