The manuscript "Relative importance of gas uptake on aerosol and ground surfaces characterized by equivalent uptake coefficients" presented a theoretical approach to characterize the relative importance of uptake of trace gases on aerosols versus on ground. The authors proposed a new parameter "equivalent uptake coefficient" (γ_{eqv}) at which the flux of gas uptake on aerosols is equal to that on ground and derived γ_{eqv} under various environment (vertical velocity and particle surface concentration). By comparing γ_{eqv} with the effective uptake coefficient of gases on aerosols (γ_{eff}) reviewed from literature, the authors assessed the relative importance of gas uptake on aerosols to dry deposition. It was found that under urban environment, gas uptake on all types of aerosols (mineral dust, sea salt, organic aerosol, and soot) is important, while in pristine Amazonia forest the contribution of uptake on aerosols to gas loss is minor. N_2O_5 uptake on all types aerosol, HNO_3 and H_2O_2 on mineral aerosols, O_3 on liquid organic aerosol, NO_2, SO_2 and HNO_3 on sea salt aerosol are as important as dry deposition. The author also pointed out that H_2O_2 uptake on various aerosols need further laboratory studies and to be evaluated.

The approach presented is a novel and convenient way to compare the relative importance of uptake of gases on aerosols with dry deposit. This manuscript is well written and easy to follow. And the discussion is well balanced. I have only a few minor comments, mainly to clarify some discussion. I recommend the direct publication of this manuscript on ACP after these minor comments are fixed.

1. Pg. 4 line 18, a typical value of ω of 300 m^{-1} is used. I understand this can simplify the equation and γ_{eqv}, since different gases have slightly different mean velocity, especially in order to get a clear picture as shown in Fig. 2. Are the γ_{eqv} values in Fig. 3-5 also calculated in this way? It might be helpful to briefly mention the influence of this simplification in the discussion part "Sect. 4.3".
2. Pg. 10 line 11, I am curious why the authors mainly discussed the model schemes in the studies Liao and Seinfeld (2005) and Wang K et al. (2012) among other model studies including heterogeneous reactions.
3. Pg. 11 line 24,"…Sect. 3.5.1…", I guess that the authors meant "4.1.1". Also check line 26.
4. Pg. 13 line 27-Pg. 14 line 5, it might be helpful to also mention that the variability of aerosol surface concentration under each environment could also contribute to the variability of γ_{eqv}.
5. Pg. 14 line 25, it seems that one leading sentence is missing before "(a)…". Please double check.
6. Pg. 14 line 20, "…HNO_3 and H_2O_2 on mineral…", according to Fig. 2 should SO_2 be also listed here?
7. Pg. 38 line 6, "…the purple bar…" should be "blue bar".