Authors' response to reviewer #1

Reviewer comments are in ***bold italics***.

"***In a note to the authors for future work, it may be worth estimating sound pressure levels from US NLDN data of peak lightning currents. Anecdotally, there are also indirect measurements from electric field changes of some negative lightning discharges, for example in Africa, with mega amp currents (personal communication with Phil Krider). These would translate to sound pressure levels of near 200 dB (energy*** $E=I^2R\Delta t$ ***assuming*** $R=2\ \Omega$ ***and*** $\Delta t = 50\ \mu s$***, peak overpressure*** $P=sqrt(2pc^2 \cdot E_{acoustic})$ ***assuming*** $E_{acoustic}$ ***is 0.01E,*** $L_p = 20 \cdot log(p/p_0)$***)***": We thank the reviewer for the suggestion. Indeed, we envisage multiple aspects related to lightning and thunder that are worth investigating to refine parts of the calculations we present, including also the estimation of SPL level distribution and their occurrence frequency distribution.

"***Line 99–100: It's unclear where the We values stated derive from for droplets, ice crystals, etc.*** ": We rephrased "*For this particle size, even when the front velocity drops to 1 km* s^{-1}*, for a droplet We=167, for an ice particle We=63, and for a solid* Al_2O_3 *particle We=71*" to "*Substituting in the Weber number equation for this particle size, of 10 µm, and the corresponding surface tension (or surface energy), even when the front velocity drops to 1 km* s^{-1}*, for a droplet We=167, for an ice particle We=63, and for a solid* Al_2O_3 *particle We=71*".

"***Lines 123 and 292: It's unclear why*** Al_2O_3 ***and ice crystals must have 3 times the diameter of a water droplet to break up, if this could be explained further in this sentence***": It has to do with the surface tension (surface energy, for solids) σ, which in the Weber number equation $We=\rho g v 2d/\sigma$ is in the denominator. σ is higher in Al_2O_3 and ice crystals than in liquid droplets, so a higher σ results in lower *We*. Setting *We* equal to 12 (critical Weber number) and solving for *d* (particle diameter), one gets $d=12\sigma\rho g v/2$, so for higher *σ*, *d* will also be higher. As *σ* for water droplets is 0.072 N m^{-1} while for water ice crystals it is 0.19 N m^{-1} (2.64 times higher) and Al_2O_3 it is 0.169 N m^{-1} (2.35 times higher), *d* will be correspondingly higher for the latter two. We now added in the sentence "This is not surprising, as setting *We* equal to 12 (critical Weber number) and solving the Weber equation for *d* (particle diameter), one gets $d=12\sigma\rho g v/2$, so for higher *σ*, *d* will also be higher. As *σ* for water droplets is 0.072 N m^{-1} while for water ice crystals it is 0.19 N m^{-1} (2.64 times higher) and, e.g., Al_2O_3 it is 0.169 N m^{-1} (2.35 times higher), *d* is correspondingly higher for the latter two".

"***Few spelling mistakes where "extent" is misspelled "extend": lines 134, 276, 298***": Spelling mistakes corrected.