"The influence of surface charge on the coalescence of ice and dust particles in the mesosphere and lower thermosphere" by Joshua Baptiste et al.

We thank the referees for making a number of insightful comments regarding the subject matter of the manuscript and for identifying areas where additional discussion would lead to its improvement. To follow up the published response to the interactive comments, the following main changes to the revised manuscript have been made to address referees' comments shown in italic.

Hervig and co-workers has shown that mesospheric ice particles are heavily "contaminated" with meteoric smoke particles (MSPs)

Our calculations on the coalescence of ice particles and dust are given support to the experimental observations of Hervig *et al* (J. Atmos. Solar-Terr. Phys., 84, 1, 2012), who have identified the presence of meteoric smoke in ice particles. Our results also point to coagulation rather than condensation as a possible growth mechanism.

The following text has been added to section 4 (lines 196 - 200): "The results in Table 2 and Figure 5 demonstrate that there are several routes whereby ice particles can become contaminated by both neutral and like-charged MSPs. These calculations on the coalescence of ice particles and dust are supported by the experimental observations of Hervig et al. (2012), who have identified the presence of meteoric smoke in ice particles. Our results also point to coagulation rather than condensation as a possible growth mechanism. Further studies are however required to help understanding how the collision probabilities influence the magnitudes of rate coefficients for coagulation."

and to abstract (lines 5 - 7): "These attractive forces are governed by the polarisation of surface charge and can be strong at very small separation distances. In the mesosphere and lower thermosphere, these interactions could also contribute to the formation of stable aggregates as well as contamination of ice particles through collisions with meteoric smoke particles."

The authors do not discuss the nature of the dusty plasma in the 80 – 85 km region.

This region is quite narrow in comparison to the complete MLT; however, it is important to identify all sources of ions. A new section, now section 2, entitled "Ionospheric Dusty Plasma Conditions" has been added to the text (lines 76 - 104). The new section contains a number of new references.

The authors do not produce a quantitative comparison of the coagulation rate of like-charged particles with charged-neutral or neutral-neutral rates. This leaves the reader not knowing whether this process could be significant, or is of negligible importance! What would be extremely useful is to produce rate coefficients for like-particle coagulation that could be applied in dusty plasma models.

The presented results provide a basis for future work to estimate the coagulation rates between particles of a given size and charge and their variation with temperature. However, the evaluation of rate coefficients adds another layer of complexity to the presented calculations. This is certainly something that will be focus on in the near future. As the referee states, the treatment of charged oxide particles as dielectrics could yield different rate coefficients to those derived from the image charge (conducting particle) treatment of Natanson (Sov. Phys. Tech. Phys., 30, 573, 1960).

The treatment here of the effects of 'polarization of surface charge' is equivalent, for conducting spheres and dielectrics of ε > 80, treatments of collisions in terms of 'image charges'."

Introduction has been extended to state "In atmospheric science, method of image charges is routinely used to study collision outcomes if particles can be approximated by conducting spheres (or having the dielectric constant greater than 80). The image charge model can also be applied to study qualitatively the interaction between dielectric particles if the value of the image charge is corrected as $q' = \frac{\varepsilon_1 - \varepsilon_2}{\varepsilon_1 + \varepsilon_2} q$, where ε_1 and ε_2 are the dielectric constants, q' is image charge, and q is real charge. (Jackson, 1999) In contrast, quantitatively accurate theoretical studies of interacting dielectric spheres began only quite recently." (lines 47-53)

All additional points identified by the referees have been also addressed at appropriate points in the text (highlighted in red).