In the manuscript entitled 'On the role of non-electrified clouds in the Global Electric Circuit' (ACPD-14-9815), Andreas Baumgaertner and colleagues compare several methods on how to include non-electrified clouds in global modelling of the global electric circuit. This is a significant scientific challenge because the spatial scale of clouds is too small to be included directly in global model calculations. As a result, the authors investigate parametric models to approximate the effect of non-electrified clouds on small spatial scales and subsequently use the approximation on the global scale. The results slightly depend on the approximation used but are as close as possible to the physics derived from first principles. The paper is very well written and easy to follow, the Figures are informative and complete such that I have only a few minor comments which might be considered by the authors to improve the quality of the manuscript.

1. p9817, l21: Move ZT10 to l18 where the paper is mentioned first.

2. p9819, l9: Include page number for reference to Pruppacher and Klett.

3. p9821, l20: Quantify ‘local area’ and ‘high resolution’.

4. p9823, l18: Explain what is meant by the ‘fixed potential of the Earth’. What is used as a reference?

5. p9824, l5: For S=0, eq. 14 becomes the Laplace equation such that it is not clear why the term ‘Poisson equation’ is used.

6. p9823, l23: Shower clouds can also be electrified. Convective clouds typically become electrified when they reach a height of ~4-6 km when charge separation starts to occur in the mixed phase region, well before deep convection has developed.

7. p98272, eq23: There seems to be an r^2 in the integrand missing to fit the units.

8. p9829, eq25: Why not use 0.3 instead of 2-beta, beta =1.7? What is the physical significance of 2000 km cloud size?

9. p9831, l2: Up to this point, no result of the global resistance calculation has been reported such that it is not clear what the quoted percentages relate to. The wording ‘overestimate’ and ‘underestimate’ implies a deviation from a ‘true’ global resistance.

10. p9833, l14-22: Give a range of values for n to enable an assessment of the degree of non-linearity introduced by gamma. Would it not be more straightforward to use a Taylor expansion of the denominator in eq29? Why is only the largest gamma physically meaningful? Does a sensitivity analysis for the inversion of gamma indicate a unique solution without competing relative minima? How is the reliability of the solution tested, e.g. with a set of forward models?

11. p9834, l17: Perhaps best to start a new section named ‘Discussion’.

12. p9834, l27: I think there is only a superposition of fields, but no mutual coupling.

13. P9844, Fig.5: Perhaps better to use 10^15 instead of the rather unusual P.