

***Interactive comment on* “The Electrical Activity of Saharan Dust as perceived from Surface Electric Field Observations in Greece” by Vasiliki Daskalopoulou et al.**

Konstantinos Kourtidis (Referee)

kourtidi@env.duth.gr

Received and published: 19 August 2020

Major comments:

1. The title does not exactly reflect the contents of the manuscript. The manuscript, apart from the surface E-field observations mentioned in the title, also presents height profiles of dust AND e-field modelling. "The electrical activity of Saharan dust" suits better the contents to my taste.

2. The different Y-axes in Figs. 4-7 of the E-field, make it extremely difficult for (or even deter) the reader to compare the observations.

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Minor comments:

Lines 37-39: The statement that “The Global Electric Circuit (GEC) is an electrical circuit, and specifically a spherical capacitor that is formed between two conducting planes, with one being the Earth’s surface, a good conductor of electricity, and the other the Ionosphere” is not correct. The GEC CAN BE THUS COCEPTUALISED but it IS NOT what it is stated. Please rephrase.

Line 40: “GEC, greatly depend on ambient weather conditions and convective meteorological systems...”, a passing reference here would also be Kourtidis et al., The influence of circulation weather types on the exposure of the biosphere to atmospheric electric fields, International Journal of Biometeorology DOI: 10.1007/s00484-020-01923-y

Lines 85-86 “In this study, we focus on monitoring perturbations of the E-field near the ground caused by the transported dust layers, with special emphasis on slow E-field perturbations (with period larger than 6 hours), ...”: Period or duration?

Lines 91-92: “by the ground-based electrometer ” → “by ground-based electrometers”.

Lines 106 “are prevalent during the intermediate season ”: which season is that? Please clarify.

Line 128-129 “VLDR is defined as the ratio of the cross-polarized to the parallel-polarized backscattered signal ... and typical pure dust values are between 30% - 40% ...”: Please give some information also on VLDR values for mixed dust as well as VLDR values above 40%.

Line 155, for LREF: “The specific reference field represents the electric field behavior under local fair weather conditions, ...”, but at line 158 “the local fair weather days are classified as the less electrically disturbed days, ...”. So, does LREF represent fair weather days or not so unfair weather days? Also, it is not so clear to me what do the authors mean by fair weather. I am unclear about whether they mean days representative of GEC influence.

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Line 168-169 “first five principal harmonics to the diurnal cycle of the electric field ...”: Please add something to help the reader understand why the diurnal cycle of the field should or could be represented by 5 harmonics.

Lines 174-175 “ $f_i = i * (t/24) * 360$ is the frequency of each harmonic”: is t the same as in eq. (1) above? If yes, then f_i is a time-varying frequency? I believe t should be removed, else it results in terms of t^2 in (1). I believe the correct is $f_i = (i/24) * 360$.

Line 204 “Under fair weather atmospheric conditions, complete lack of particles in the atmospheric circulation is expected”: Not by me. By whom is COMPLETE LACK of particles expected? I believe the sentence should be rephrased to a less emphatic form.

Line 209 “near ground atmospheric conductivity and the atmospheric scale height...”: So, you assume σ to be proportional to density I guess. Perhaps you could add a line or two on the foundations of this assumption.

Line 246: A reference to Instructor’s Solution Manual for Introduction to Electrodynamics, 4th Edition, 2013, is needed.

Figure 1 could (and should, to my taste) be incorporated into Figs 4-7.

Figs 4 and 5 captions “VLDR values between 25% and 30% indicate the presence of mostly mixed dust”, Figs 6 and 7 captions “VLDR values between 35% and 40% indicate a pure dust layer”: Values >30% but <35% indicating what?

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-668>, 2020.

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