

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

### **Anonymous Referee #2**

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The authors study four dust events in Greece, using a combination of ground-based electric field measurements and lidar. The events involve dust that originated in the Sahara 48 to 72 hours previously. Two of the events enhance the electric field relative to the reference fair weather field, and the other two events diminish the electric field.

This paper presents a simple model to describe these electrical effects. There are two components of the model. First, that the dust will reduce the conductivity in the region it occupies by scavenging ions; this effect occurs even with neutral dust particles. Second, there could be regions of charged dust – this is modeled as cylinders of monopolar charge (there could be two cylinders, one of positive and one of negative

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charge). Some of the parameters for the model can be obtained from the lidar, while other parameters cannot be independently obtained.

Here is where I get lost. I found the results section very hard to follow. It appears to me the authors show experimental results for dust event (Figs 4-7), and then present results of the model under various parameters (Figs 8-13).

I do not think there is much interest in the results of the simple model under various parameters. I think these figures and the associated text should be removed.

Rather, I think they should focus (succinctly) on using the model to rationalize the experimental results. This must be done much better in order for the paper to be publishable

Also, it is important to justify the assumptions in the model (this is much more important than the mathematical details, which they cover in great depth). – give physical reason why eqn 4 has this form – why do uncharged aerosol particles scavenge ions? This is a key assumption for their model, as it leads to the reduction factor  $n$ , but its not clear to me that this is physically correct. The authors must provide strong evidence to support this

And overall, I think the paper needs to be communicated much more clearly, and walk the reader through the results and the logic behind their ideas. Figure captions should clarify what the data represents (cannot assume someone knows this). As I said above, I got lost and couldn't understand things.

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