Review of the discussion paper entitled "Influence of a single lightning on the intensity of an air electric field and acoustic emission of near surface rocks" by S.E. Smirnov and Y.V. Marapulets submitted for a publication in Solid Earth Discussions

The paper presents an interesting observation of acoustic emission in the 6.5-11 kHz frequency band that occurred simultaneously with the change of atmospheric electric field caused by a lightning stroke, (distant ~ 8 km). The paper is based on the case study – observation of one event. The figures are instructive, and the text is mostly clear. There are however some points that should be addressed more carefully or explained in more details (see specific comments). I hope that these comments will help improving the paper. English could be improved in general. I provide several corrections (suggestions) in the section "Technical corrections", but the list should be considered incomplete.

Specific comments (suggestions):

I think that the authors should avoid a possibility that the signal in the 6.5-11 kHz channel recorded at the time of lightning stroke is a consequence of a bad electromagnetic compatibility for this channel - sensitivity of electronics to the lightning electric field. I understand that it is very unlikely because the other channels are clean at that time, but still some tests (verification) should be done. It is the widest channel, acquiring the highest frequencies, so it is potentially most sensitive to the interference. Also, the primary data processing of the acoustic emission signal should be described in more details – see the next comment.

Page 630, lines 12-16. This part of the text is difficult to understand. Please reformulate and/or explain in more details. 4 s ....is it a mean value computed each 4 s (over which time interval ?), or is it just one sample each 4 s? To which quantity ~10^{-7} is related ?

Section 2, please provide resolution and dynamic range of electric field measurements.

Page 631, lines 3-4, and Fig. 3b and 3c, it is not clear how the electric conductivity and electric current are measured. In section 2, only the measurement of electric field is described. You mentioned that the electric field is transformed into the electric current, but it is not obvious that you can measure electric field and atmospheric current independently, and hence to compute the electric conductivity. Please explain.

Page 631, lines 21-22, "*If we imagine cloud ground system as a capacitor...*". It is often considered that the thunderclouds act as batteries in the global electric circuit, and that the ionosphere and the ground form a large spherical capacitor which is charged. Might be, it is here more appropriate to consider the relaxation constant τ as the time needed for the charge redistribution.

Page 631, last line, "*...indicates non-nil value of the surface charge density*". It is not obvious. It can be just a consequence of the electric field configuration in the system "cloud – ground" after the discharge. The field is primary given by the geometry (relative position of cloud-ground) and charge distribution within the cloud at that

moment. Also, there are many types of lightning strokes: Intracloud (IC), Cloud to Ground (CG), which can be both positive and negative (CG+, CG-). So without the information about the geometrical configuration and information about the discharge type it is difficult to draw such conclusions. Also, it is not clear which model the authors mean in the previous line.

Page 633, last paragraph, The estimate of 10 J of lightning energy at the observation point is not clear. Considering the given distance ~ 8 km, generally anticipated radius of lightning discharge channel (typically 3 cm), and the given lightning energy (10^9-10^{10}) I will get much smaller value using the simple approach based on $1/r^2$ scaling. Please explain. (Also, the energy numbers concern the total energy at all frequencies...)

Conclusions, point 2, 10 s was not mentioned before (it seems a little bit less from Figure 5). Also, as I requested in one of the previous comments, more information about data processing (time resolution) of acoustic signal should be given.

Technical corrections (suggestions):

Figure 3, the text on axes is difficult to read, it should be enlarged

Page 628, line 5, replace “17 c” by “17 s”

Page 628, line 10, replace “The excepted at the present moment conception...” by “The currently accepted concept...”

Page 628, lines 16 and 19, “lightnings”, lightning does not have plural in English, so replace by “lightning strokes” or just by “lightning”

Page 629, line 4, introduce the term MHD

Page 630, line 19, replace “Weather parameter control...” by “Measurements of basic meteorological parameters ... ”. Also, specify these parameters.

Page 632, lines 21 and 22, replace “examples” by “samples”