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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Atmospheric electric field anomalies associated with solar flare/coronal mass ejection events and solar energetic charged particle "Ground Level Events"" *by* E. A. Kasatkina et al.

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In general one could have agreed with remarks on the paper that atmospheric Ez variations around the events are small, the behavior of Ez is not identical at all stations, and there is no an unambiguous definition of physical reasons (Why in some cases the atmospheric electric field variations were observed before the onset of Ground Level Event itself?). It is true and the authors should agree with it.

Moreover, we have to note:

1. The number of the known GLE events is very small (less than 70 events up to date). They are very important being analogous to galactic cosmic rays (GCR), which permits us to use them in some model simulations, for example, in the process of ion nucleation in the atmosphere. The last one is very important in climatic application of the problem of external factor (solar activity and GCR) influence on the climate.

2. Concerning the measurements of atmospheric electricity we may add that it is very difficult to find simultaneous Ez measurements in the polar cap, auroral latitudes and middle latitudes and moreover, to find them under fair weather conditions.

3. The combination of points 1 and 2 makes the problem of comparison even more difficult.

4. We are aware of fair weather conditions and, of course, of bad weather conditions. But it is very difficult to define a sharp boundary between these two types of weather conditions. Most of atmospheric phenomena occur under "grey weather conditions". This makes the problem even more ambiguous.

5. The list of references demonstrates that there were very many attempts to interpret the pre-event (pre-flare) activity in atmospheric phenomena. Up to date there seems to be no such interpretation, and there are many physical reasons for it. But the experimental facts do exist. Sometimes atmospheric disturbances were observed before solar flares.

We as well only give information on the experimental fact and give a list of physical interpretation, which exists. However the results presented in the paper demonstrate that sometimes before and during GLEs, solar flares and CMEs one can observe atmospheric Ez variations in the polar cap, auroral zone and at middle latitudes. This means that the response of atmospheric Ez to GLEs is global. Taking into account that direct penetration of GLE particles takes place inside the polar cap the last conclusion seems to be important in the light of the problem of "Space climate".

We are grateful to the unknown reviewer for correct and interesting comments.

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