

## ***Interactive comment on “Evaluation of Monte Carlo tools for high energy atmospheric physics” by Casper Rutjes et al.***

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Reply to: gmd-2016-147-RC2: 'Second comment on the paper submitted to Geoscientific Model Development (GMD) “Evaluation of Monte Carlo tools for high energy atmospheric physics” by Casper Rutjes, David Sarria, Alexander B. Skeltved, Alejandro Luque, Gabriel Diniz, Nikolai Østgaard’, by Ashot Chilingarian, 09 Jul 2016

In which the referee comments on our statement – in our reply to gmd-2016-147-RC1 (not part of the paper): “Furthermore, long TGE events are supposed to be associated with cosmic ray induced extensive air showers (EAS), but for x-ray glows such an association has not been stated”. ————— The discussion is interesting, but it is out of the scope of the paper. The quoted natural phenomena just motivate our study.

We do not imply with the word association that TGE signal is actually an EAS signal.

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We agree that the two are systematically different, as illustrated clearly in the referee's references and comment RC1 & RC2.

We want to say that the TGE signal must be caused by one or more energetic cosmic rays. In [Chilingarian et al, 2015] it is stated clearly: "furthermore lightning terminates TGE, did not gives rise to it". This in contrast to the x-ray glows, which could have a causality relation with the lightning stroke.

In addition, there seems to be a difference in terminology here. Dr. Chilingarian clearly states now and also illustrates in his Figure 1, that he uses the term "secondary cosmic particle" for any energetic particle in the atmosphere, independently of whether it was created by a cosmic ray or by radioactive decay or by runaway avalanches of thermal electrons in the electric fields of a thunderstorm. In contrast, we use "cosmic" only in relation with particles coming from outside the Earth's atmosphere.

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