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Geoscientific Instrumentation Methods and Data Systems Discussions

Interactive comment on "TARANIS XGRE and IDEE Detection Capability of Terrestrial Gamma-Ray Flashes and Associated Electron Beams" *by* David Sarria et al.

Anonymous Referee #1

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In this paper, the authors report an evaluation of detector efficiencies, from which they infer Terrestrial Gamma ray Flashes (TGFs) and Terrestrial Electron Beams (TEBs) detection rates for the current space missions RHESSI, AGILE, and Fermi, and for the planned mission TARANIS. The paper is timely, well-written, presents a rigorous work, and is logically articulated. It is of high interest to the High-Energy Atmospheric Physics community. Figures are of good quality and the paper is fairly referenced. For these reasons, I strongly support it for publication in *Geoscientific Instrumentation, Methods and Data Systems*. Minor revisions are suggested below.

Main comments:

1. The detection constraint is defined by the number of photons detected by the instrument. It is understandable that comparing the efficiency of various detectors of various kinds and associated with different electronics is not an easy task. However, it would be important to comment on the role of the duration of the "discovery bin" to be used to accumulate n_X^{min} counts, and the related comparison between different detectors. What is the impact of the discovery bin on the results? It seems that addressing this question is possible using the results shown in Figure 3b.

2. p. 4, ll. 21–23. What would be the impact of a distribution of tilted broad-beam sources (such as that assumed in Section 4.2).

3. In the whole text. It is important to give readers an idea about the accuracy of the effective areas and TGF detection rates estimated. Please indicate uncertainties on these results anytime they are given in the text, in the tables, and if they are sufficiently large, in the figures as error bars.

Line-by-line comments:

1. p. 4, l. 1. "Figure 1.A." to be changed in "Figure 1.a.". Please verify the typography in the whole paper.

2. p. 4, l. 16. Please replace “by a international collaboration lead by CERN” with “by an international collaboration led by CERN”. Please verify grammar typos in the whole paper.

3. Caption of Figure 2.a. Please indicate all the references or sources for the various results presented in this figure.

4. p. 6., l. 3. The viewing angles mentioned here are not consistent with those p. 7, l. 12.

5. p. 6., l. 9. “blue curve” needs to be changed with “black curve”.

6. p. 7., l. 19. “black curve” needs to be changed with “blue curve”. Please check consistently in the whole paper.

7. p. 8., l. 19. “cooled down to nitrogen temperature” likely needs to be changed with “cooled down to liquid nitrogen temperature”.

8. p. 8., l. 21. Please complete “publicly available from ...”

9. p. 10, l. 6. Please indicate the year of the private communication.

10. p. 11., l. 3. Please indicate the year of the private communication.

11. p. 12, l. 3. Please provide references for justifying your choices for the source spectrum, the source altitudes, the geodetic coordinates, the opening angle of the beam, an the tilt angle of the source.

12. p. 12, l. 15. Please indicate that the t_{90} durations obtained here are consistent with Compton scattering in the atmosphere acting on a source lasting $\sim$20 μs [Celestin and Pasko, Geophys. Res. Lett., 39, L02802, 2012].

13. p. 14, l. 8. “supposed” probably needs to be changed with “assumed”.

14. p. 14, ll. 7–10. There are a few references to cite at this point about the effects of the tropopause heights [e.g., Smith et al., J. Geophys. Res., 115, A00E49, 2010; Nisi et al., J. Geophys. Res., 119, 8698–8704, 2014].

15. p. 15, Figure 4. It would be convenient if landmasses were drawn on this map.

16. p. 16, l. 1. “R_{XG}^{lim}” should probably be replaced with “R_{A}^{lim}”. Please check consistently in the whole paper.

17. p. 16, l. 11. “R_{lim}^{X}” subscripts and superscripts are inverted as compared to the notation used in the rest of the text. Please check consistently in the whole paper.

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