

**Reply to Interactive comment by Anonymous Referee #2 from 30 November 2020  
on the manuscript “Distribution of the Earth’s radiation belts protons over  
the drift frequency of particles” by Alexander S. Kovtyukh**

Deeply respected Referee #2,

I am very grateful to you for this review. All your comments are very helpful for me and it is taken into account in the manuscript. In the last version of the manuscript, the text has been carefully checked and aligned with the rules of English grammar. Corrections made by Referee # 1 highlighted in blue. This revised version of the article contains several clarifying notes (Lines 137-143, 362-363, 383-386), which are highlighted in green.

With grand regard,  
Alexander S. Kovtyukh

Some comments:

1 Introduction The English in the paper should be improved line 85(as an example) On the drift shells only protons . . . . .(near the equatorial plane) can be trapped.

AC: I agree. Text corrected.

2.2 Spatial-energy distribution . . . . . OK

2.3 Drift . . . . . It is more common to use  $j$  for differential flux than  $J$ , but OK

AC: I agree. I also use the letter  $j$  to denote differential particle fluxes, but in this, as in the previous article, I use the letter  $J$ . Please save it here.

3 Discussion The discussion part of the paper is somewhat long and should be shorten. There is a lack of references to older work.

AC: I tried to write this part of the article as briefly as possible, excluding everything secondary. The first four paragraphs of Sect. 3 could be moved to the end of Sect. 2.2, but I think they are more appropriate here. A very detailed list of works on the ERB, starting from 1961, is presented in the review (Kovtyukh, 2018) in Space Sci. Rev., but here only the most important works are given (some of the most important old works added to Lines 110-115).

4 Conclusions Good

On the figures.

Figure 1. Good figure. It exhibits how the protons are ordered in (E,L) space. Data from some of the satellites measure particles in and near the loss cone. How are these measurements transformed to particles mirroring at the equator should be explained.

AC: Some of the data shown in Fig. 1 were obtained on polar satellites (Injun-5, OV1-19 and Azur), but in Fig. 1 (Kovtyukh, 2020) we use only data of these satellites at  $L < 1.6$  which were obtained near the equatorial plane.

Figure 2. The anisotropy factor  $A$  should be defined.

AC: Here, the generally accepted definition of the anisotropy index of the ERB particle fluxes is used (Lines 95-97). At small equatorial pitch angles, these distributions may have a more complex shape and cannot be described by one simple parameter, but here we consider only particles with mirror points within 30 degrees in geomagnetic latitude.