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Interactive comment on "Earth's radiation belts ions: Patterns of the spatial-energy structure and its solar-cyclic variations" *by* Alexander S. Kovtyukh

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Reply to Interactive comment by Peter Kollmann (Referee #2) from December 19, 2019 on the manuscript "Earth's radiation belts ions: Patterns of the spatial-energy structure and its solar-cyclic variations" by Alexander S. Kovtyukh

Deeply respected Peter Kollmann, I am very grateful to you for such an exclusively

generous and thorough review. All these comments are very helpful for me and take into account in the manuscript.

I tried to take it into account as completely as possible. In my answers, the first line numbers refers to the original text of the manuscript, and the second numbers (after /) of the line refers to its final text.

I corrected grammar inaccuracies in the manuscript (thanks to Referee # 1). Corrections connected to your comments and with the supplement to your comments are given for the latest revised version of the manuscript (see RC1-RC3 and AC1-AC3 in the Interactive discussion of this manuscript).

Lines 9-10/9-11: I agree. Text corrected. Line 15/16-21: I agree. Text corrected. Line 22/28: I agree. Text corrected. Lines 30/35-37: I agree. Text corrected. Line 33/39: Here I do not quite understand what you mean. Lines 46-53/51-59: I add references. Line 83/86-87: I agree. Text corrected. I calculate isolines for smaller flux values. In some cases, break of the proton spectra in the region of the green line is observed. But this is unreliable: low-intensity proton fluxes are close to the instrumental background. Such work should be carried out for strong storms and the relaxation rates of the fluxes of captured protons should be considered depending on their energy. Line 98/98-99: I agree. Text corrected. Lines 125-126/123-124: I agree. I have make shorter and corrected this and subsequent paragraphs (until the end of the section). Lines 139-140/134-139: I agree. Text make shorter and corrected. I did not average the experimental data, but I used the averaged results in the corresponding papers. Line 145: This paragraph is destroyed as excess. As the errors of the experimental points in Fig. 1-6, I consider only standard deviation of the counts. Lines 159-161/145-147: I did not average the experimental data for a different satellite orbits, but I used the averaged results in the corresponding papers. Line 166: The results in Figs 1-2, as well as in Figs. 3-6, were received in missions that lasted for more than a year (usually 2-3 years or more). Line 191/176: The spectrum below the red line has a maximum, and between the maximum and the red line the spectrum is close to exponential. The

positions of the maximum and the exponential part change when L changes, according to adiabatic laws (in quiet periods). Below the maximum, the spectrum has a deep dip (during storms it is filled with ring current particles), and at the lower end of the dip, the spectrum is strongly indented (one or more peaks corresponding to auroral particles). I investigated all this in detail in 1984-2001 by other methods. In the figures given here, these spectral features are almost not visible, and I did not write about it. For other planets, see lines 394-398. Line 194/179: I agree. Text corrected. Lines 201/171-175: I agree. Text corrected. Line 214/197: Like many other things in the dynamics of the magnetosphere, this, of course, is a rather conventional upper boundary Kp for quiet conditions. Simply, all the data presented here were obtained at Kp <2 (see also lines 95/98 and 249/235). Lines 232-238/217-226; 276/262: Yes, I agree, with a small number of experimental data, this method does not work. The conclusions about the parameters of the power-law tail of the He and CNO ions were in fact bring here from my work (1984-2001), where they were obtained by other, more sophisticated and comprehensive methods, but they were all published in Russian journals. Text corrected. Lines 242-247/227-233: I agree. Text corrected. Lines 257-258/243-244: Yes, and it is also. Lines 268-270/254-256: I agree. Text corrected. Lines 294-296/281-298: I agree. Text corrected and supplemented. Lines 309-310/301-302 and 317-320: I agree. Text corrected. Lines 313/306-309: I agree. Text corrected. Lines 329/323-326: I agree. Text corrected. Lines 334-335/330-334: I agree. The text is supplemented. Line 377/373-375: I agree. Text corrected. Line 380/376: Yes, it is. Lines 382-383/380-381: I agree. Text supplemented. Lines 386-387/384-386: I agree. Text corrected and supplemented. Lines 389/387-388: I agree. Text supplemented. Lines 391/390-393: I agree. Text supplemented. Line 393/396: I agree. References have been supplemented. Line 401/403: I agree. Text corrected.

Deeply respected Peter Kollmann, I am very grateful to you for such an exclusively generous and thorough review.

With grand regard, Alexander S. Kovtyukh

Please also note the supplement to this comment:
https://www.ann-geophys-discuss.net/angeo-2019-152/angeo-2019-152-AC4-supplement.pdf

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