

## ***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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This paper provides a compilation of radiation belt measurements from different missions from the 60s until the contemporary Van Allen Probes. This compilation is unique to my knowledge and a good reference for other studies.

Changes in intensity over solar cycle are studied in this paper. As different ion species are used, the observations can be compared with expectations of the mass dependence of different processes. Also, processes that are unique to protons can be ruled out. The observations are consistent with being shaped by energy loss in Earth’s exosphere. This is a solid and useful scientific result. The study also supports that at

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least protons are transported adiabatically, which is commonly assumed but less often properly proven.

A literally universal question in space physics is how particles are accelerated to the observed high energies. Analysis of the spectral shape in this paper suggests that MeV ions are accelerated through Fermi acceleration in the plasma sheet, which also is a valuable result.

I do have some comments, most importantly about the discussion and interpretation. Nevertheless, I see NO major problem here, so I suggest to accept the paper after MINOR revision. My detailed comments can be found in the attached PDF as highlighted text and sticky notes.

There are grammar issues in the article, even though less than in earlier papers. As I only highlighted a few of them, I suggest additional proofreading by a native speaker.

Best regards, Peter Kollmann

Please also note the supplement to this comment:

<https://www.ann-geophys-discuss.net/angeo-2019-152/angeo-2019-152-RC4-supplement.pdf>

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Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2019-152>, 2019.

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