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Reply

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We are pleased that our paper (Yahnin *et al*., 1997) has been carefully read and critically examined. But, the main purpose of that paper was not to draw one more scheme. Figure 4 has been intended to illustrate our conclusion that the discrete arcs can be originated from the *whole* magnetotail current sheet (between the energetic electron isotropic boundary and DNL) where B_z is small enough (roughly, less than 5 nT), but not from some specific part(s) of the current sheet. Moreover, we believe that any such scheme cannot be accurate enough because of, at least two reasons:(1) the magnetospheric structure is variable and cannot be accurately reproduced in a simple 2D cartoon; (2) the observational signatures used for identification of the boundaries between different plasma sheet domains are often very approximate tracers. An example of the latter is a stable trapping boundary used by Y. I. Feldstein and Y. I. Galperin in their scheme(s) as a tracer of the inner edge of the current sheet. As an estimate of the stable trapping boundary, they sometimes used the -Λ*s* - *smooth* boundary introduced by McDiarmid and Burrows (1968). This boundary was determined on the basis of measurements of locally trapped electrons as "*the latitude where the 35-keV electron profile shows a marked change in character, this may be a sudden change in slope, a rapid change in intensity, or the onset of rapid intensity variations*." It is absolutely clear that this trapping boundary is not one and the same with the isotropic boundary used in our work, as Feldstein and Galperin (this issue) claim. The latitudinal difference between them can be as large as a few degrees in latitude, depending on the local time, activity phase, etc.

As to presentation in the paper by Yahnin *et al*. (1997) the view advocated by Y. I. Feldstein and Y. I. Galperin, we consider that the main features, which are important in the context of our paper, are reproduced correctly. The reader can simply compare our description with that published, for example, by Galperin and Feldstein (1996) (p 868, Table 2) and by Feldstein and Galperin (1996) (p 242, Table 1).

Reply to Abbendum. In fact, as described on p 945 in the paper by Yahnin *et al*. (1997) (see, also references herein), the energetic particle instrument MEPED on board the NOAA satellites measures the energetic particles in two directions: along the Earth-satellite radial vector and along the direction just perpendicular to this vector. Over the auroral zone the loss cone at altitude 800 km is some 50°. The "*pitch angle*" of the looking upward detector changes between 5 and 20°. The perpendicular detector has a "*pitch angle*" of 70–90°. The half-angle of view of the detectors is some 14°. Thus, at auroral zone latitudes the upward-looking detector measures particles inside the loss cone, and the second detector observes locally trapped population.

References

Feldstein Y. I., and Y. I. Galperin, Structure of the auroral precipitation in the night sector of the magnetosphere, *Cosmic Res*, **34** (3) 227–247, 1996 (in Russian).

Feldstein Y. I. and Y. I. Galperin, Comment on *Magnetospheric source region of discrete auroras inferred from their relationship with isotropy boundaries of energetic particles* by A.G. Yahnin et al., *Ann. Geophysions,* 16, 1998 (this issue).

Galperin Y. I., and Y. I. Feldstein, Mapping of the precipitation regions to the plasma sheet, *J. Geomg. Geoelectr*., **48,** 857–875, 1996.

McDiarmid I. B., and J. R. Burrows, Local time asymmetries in the high-latitude boundary of the outer radiation zone for the different electron energies, *Can. J. Phys.,* **46,** 49–57, 1968.

Yahnin A. G., V. A. Segeev, B. B. Gvozdevsky, and S.Vennerstrom, Magnetospheric source region of discrete auroras inferred from their relationship with isotropy boundaries of energetic particles, *Ann. Geophysions* **15,** 943–958, 1997.