

DOES THE EQUATORWARD BOUNDARY OF THE AURORAL OVAL COINCIDE WITH THE OUTER BOUNDARY OF TRAPPING REGION ?

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During magnetic storm, i.e. under increased Dst-variation the auroral oval moves equatorward [Akasofu and Chapman, SOLAR-TERRESTRIAL PHYSICS, Oxford, 1972]. Theoretical explanation of this fact depends essentially on what is the answer to the question which stands in the title of the present work. According to Siscoe [Planet.Space Sci., 1979,27,285] the inner edge of the ring current maps onto the equatorward boundary of the auroral oval. This suggestion allows to interpret the observed equatorward shift of the oval as a result of ring current strengthening during storms. The experimental results [Feldstein and Starkov, Planet.Space Sci., 1970, 18, 501; Sergeev et al., Geomagn.Aeronomy, 1983, 23, 972] however, lead to the conclusion, that the trapped plasma region maps on subauroral latitudes. In this case the ring current doesn't affect significantly the sizes of the auroral oval and some other theory is needed to explain the observations.

In the work by Arykov and Maltsev [Geomagn.Aeronomy, 1993,33,#6,67] the contributions of the ring current and magnetotail currents to the storm-time depression have been compared under assumption that the ring current flows in the subauroral magnetosphere. Using the results of this work one can obtain that under quiet conditions each 5.4 nT in Dst caused by the magnetotail current strengthening correspond to 1 equatorward shift of the auroral oval. Under storm-time conditions the sensibility of the oval equatorward boundary location to the magnetotail current strengthening is about 5 times weaker. Ring current effect in the location of the equatorward boundary of the auroral oval is two orders weaker than that of the magnetotail currents in quiet conditions and factor 4 weaker in storm-time conditions. Since the calculated dependence of the latitude of the equatorward boundary of the auroral oval appeared to be close to the observed one, we can confirm the conclusion that this boundary maps on the outer boundary of stable trapping.