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Dependence of the bounce-averaged diffusion coefficients on magnetic field model in the outer radiation belt

K. Orlova (1,2), Y. Shprits (3,2), and B. Ni (2)

(1) Lomonosov Moscow State University, Skobeltsyn Institute of Nuclear Physics, Space physics, Russian Federation (ks13orl@gmail.com), (2) Department of Atmospheric and Oceanic Sciences, University of California, Los Angeles, California, USA, (3) Institute of Geophysics and Planetary Physics, University of California, Los Angeles, California, USA

Bounce-averaged scattering rates computed in the dipole magnetic field are usually used for the diffusive simulations of the radiation belt diffusion codes. We present the results of calculations of the bounce-averaged pitch angle $<D\alpha\alpha>$, mixed $<D\alpha p>$, and momentum $<Dpp>$ diffusion coefficients in two Tsyganenko and dipole field models. We consider resonant interactions of the outer radiation belt electrons with oblique whistler-mode chorus waves. We assume the Gaussian wave frequency distribution and the Gaussian wave normal angle distribution. The bounce-averaged scattering rates are calculated for geomagnetically quiet and disturbed conditions at two MLT locations. We concentrate at distance of 7 Earth radii near the geostationary orbit. We demonstrate that on the day side the effects of taking into account a realistic magnetic field are only considerable for small equatorial pitch angles for energies larger than E=1 MeV. On the night side the differences in the bounce-averaged scattering rates calculated in Tsyganenko and dipole field models can reach several orders of magnitude at various equatorial pitch angles for $E \geq 0.5$ MeV electrons. To explain the differences in $<D\alpha\alpha>$, $<D\alpha p>$, and $<Dpp>$ associated with a change of the magnetic field model on the day and night sides we present the contribution of various resonant harmonics to the diffusion and examine the changes in the resonance condition. We show that with increasing electron energy a larger numbers of resonances can significantly contribute to the bounce-averaged diffusion coefficients up to several tens of resonances in the realistic magnetic fields. Our study shows that it is crucially important for radiation belt modeling to compute the scattering rates in a realistic field model.