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Ray tracing study of propagation of lower-band whistler-mode emissions in outer radiation belts: A statistical approach

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Lower-band whistler-mode electromagnetic waves play an important role in the dynamics of outer radiation belts. To improve our understanding of ocurrence and behavior of these emissions, we run series of ray tracing simulations in non-relativistic hot plasma for a broad range of initial conditions, analyse the spatial dependence of wave properties and compare our results with long-term experimental data from the Cluster mission. The focus of the study is on the wave vector angle and wave intensity distribution of chorus emissions at higher latitudes. In this region, realistic empirical models of electron density distribution and Earth's magnetic field are employed to obtain reliable data from the simulation. Damping and growth of waves is computed during the propagation, based on an empirical model of electron flux in outer magnetosphere. Other wave properties of importance are ellipticity of polarization and Poynting vector angle, analysed here in dependence on latitude and magnetic field line.