大振幅・周波数上昇を特徴に持つEMIC放射により誘発される相対論的電子の大気圏降り込み現象
Relativistic electron precipitation induced by large amplitude EMIC rising-tone emissions

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We study dynamics of radiation belt electrons interacting with large amplitude EMIC rising-tone emissions by performing test particle simulations. *Engebretson et al.* [JGR, 2015] reported depletion of radiation belt electrons in the distribution took place when EMIC rising-tone emissions peaking above 11 nT were excited outside the plasmapause. In the work of *Omura and Zhao* [JGR, 2012, 2013] and *Kubota et al.* [JGR, 2015], anomalous cyclotron gyroresonance between relativistic electrons and EMIC rising-tone emissions are only tested with plasmaspheric conditions. Therefore, we study both cases; inside and outside the plasmasphere. We set up the EMIC model waves in a localized region in longitude and distribute test electrons all around the Earth corresponding to the radiation belt at L=5.5. The electrons moving eastward encounter the localized EMIC waves and some of the resonant electrons are precipitated into the atmosphere. The wave potential generated by coherent EMIC emissions traps a fraction of the resonant electrons, resulting in efficient decrease of their pitch angles. After the nonlinear wave trapping, some electrons at low pitch angles, however, cannot enter into the loss cone. Based on theoretical and numerical analyses, we find another phenomenon named SLPA (Scatter at Low Pitch Angle). Some of the electrons at low pitch angles are further transported into the loss cone rapidly through SLPA. We obtain time evolution of the electron distribution as functions of equatorial pitch angle and kinetic energy. For comparison with observations of relativistic electron precipitation, we monitor fluxes of electrons being lost into the atmosphere in a narrow longitudinal range. Inside the plasmapause, electrons with energy 0.1-8 MeV are precipitated efficiently. Outside the plasmapause, on the other hand, only highly relativistic electrons with energy >2 MeV are precipitated. Furthermore, we find echos of electron depletion in the distribution because of eastward drift around the Earth.

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