EFFECT OF THE TAIL PLASMA SHEET CONDITIONS ON THE PENETRATION OF THE CONVECTION ELECTRIC FIELD IN THE INNER MAGNETOSPHERE: THE RCM SIMULATIONS

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Transport of plasma sheet particles into the inner magnetosphere is an important source for the ring current. This transport is strongly affected by the large-scale electromagnetic coupling between the magnetosphere and ionosphere. In this study we focus on how the penetration of the plasma sheet particles into the inner magnetosphere, in response to a convection enhancement, depends on the state of the plasma sheet at the time of the enhancement. We have run simulations with the Rice Convection Model (RCM) using the Tsyganenko 96 magnetic field model. Outer proton and electron sources at r ~20 RE, are based on 11 years of Geotail data, and realistically represent the mixture of cold and hot plasma sheet population as a function of MLT and interplanetary conditions. We found that shielding is more efficient for a colder and denser plasma sheet, which is found following northward IMF, than for the hotter and more tenuous plasma sheet found following southward IMF. Although in both cases the pressures and the associated field aligned currents (FAC) in the plasma sheet are similar, the lower auroral conductance, which is computed from the simulated precipitating electron energy flux in these RCM runs, in the colder and denser plasma sheet requires enhanced shielding of the penetration electric field. Therefore, our simulation results indicate that the plasma sheet can penetrate further inside the ring current region in response to enhanced convection if the preceding IMF is southward, which leads to higher auroral conductance and weaker shielding.

Shieling, plasma sheet transport, Region 2 field aligned currents

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