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Enhancement/Suppression of the Auroral Electrojets by Changes of the North-South Component of the Interplanetary Magnetic Field

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The development of the auroral electrojets is known to be mainly controlled by changes in the north-south component (Bz) of interplanetary magnetic fields (IMF). Using events in which only the IMF Bz varied significantly, we estimated the rates of change of the auroral electrojets per unit IMF Bz value. It is found that the rates of change for both eastward and westward electrojets are small for low disturbance levels, but as the disturbance level becomes higher, the distribution of the rates against the electrojet intensity levels bifurcates, one branch extending to positive rates of change and the other extending to negative rates of changes. It is suggested that the positive rates of change represent the direct-driven process of the solar wind-magnetosphere coupling, increasing (decreasing) of the auroral electrojets with increasing (decreasing) magnitude of southward IMF. We contend that the negative rates of change represent a triggering by a northward IMF turning and a suppression by increasing magnitude of southward IMF. It is surprisingly noted that the auroral electrojets can even be suppressed by a southward IMF turning.