SUPER PLASMA FOUNTAIN AND IONOSPHERIC STORMS

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The relative importance of diffusion, electric field and neutral wind on equatorial plasma fountain and ionospheric storms during strong daytime eastward electric field events are evaluated using SUPIM and the electric fields obtained from the equatorial electrojet during the super geomagnetic storm of 08 November 2004. The plasma fountain rapidly develops into a super fountain during the strong daytime eastward prompt penetration electric field (PPEF) event. The super fountain becomes strong with less poleward turning of the plasma flux vectors in the presence of an equatorward wind that reduces (or stops) the downward velocity component due to diffusion and raises the ionosphere to high altitudes of reduced chemical loss. The equatorial ionization anomaly (EIA) crests in Nmax and TEC shift rapidly to higher than normal latitudes during the PPEF event. However, the crests be- come stronger than normal only in the presence of an equatorward neutral wind. The results suggest that the presence of an equatorward neutral wind is required to produce strong positive ionospheric storms during daytime eastward PPEF events. The model results are supported by the positive ionospheric storms observed in Ne, Nmax, TEC and airglow. The plasma fountain becomes a reverse plasma fountain during a strong westward electric field event.

Super plasma fountain

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