

Equatorial plasma depletions-related electromagnetic energy flux: A revisit using the Swarm constellation mission

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Topside Spread F is a well-established phenomenon of the post-sunset low latitude ionosphere. Its disruption of the plasma density equilibrium in the order of 10s to 100s kilometers is commonly referred to as equatorial plasma depletions (EPDs). These depleted vertical plasma channels present strong electric fields and large vertical drift velocities. EPDs can be easily observed by radars, airglow imaging, and low earth-orbiting satellites. The latter's in situ measurements are crucial for studying the EPDs associated electric current system [1] and electromagnetic energy flux [2]. A previous study has shown a preference for the EPDs electromagnetic energy to flow from one magnetic hemisphere to the other by computing the Poynting vector from a Swarm data set limited to a few months [2]. Different than expected, this finding suggested EPDs might be mostly generated off the equator. In this paper, we use an extended Swarm data set of about six years to analyze this phenomenon climatologically. We assess the dependence on longitude, season, and magnetic local time of the electromagnetic energy flux. It includes both the direction and magnitude of the Poynting vector.

References

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