

The ionospheric convection response to different modes of geomagnetic activity

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The dynamics of the coupled magnetosphere-ionosphere (M-I) system are predominantly driven by reconnection between the terrestrial magnetic field and upstream interplanetary magnetic field (IMF). The nature of the M-I response to this driving depends largely on the strength and orientation of the IMF and the speed and density of the solar wind in which it is embedded. In the ionosphere, the most immediate response to a change in interplanetary conditions is usually observed on the dayside, where convection can be excited by changes in the topology of newly reconnected magnetic flux. On the nightside convection can also be excited by reconnection occurring within the magnetotail. The nature of this nightside convection is, however, greatly varied and dependent on the magnetospheric conditions under which the reconnection occurs. One process often associated with magnetotail reconnection is the substorm, which has been shown to excite strong convection in the coupled M-I system. However, recent studies have also shown that substorms occurring under different magnetospheric conditions can exhibit starkly different characteristics. In addition, reconnection occurring in the magnetotail during intervals of no substorm activity has also been shown to drive characteristic convection patterns in the ionosphere. I will discuss these different modes of magnetospheric activity and what can be learned about their underlying physics from their associated ionospheric convection signatures.

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