

Storm-Time Injections Associated with External Triggers

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Understanding the fundamental aspects of substorm injections during storm times is important for the storm-substorm relation issue. To what extent the storm-time injections can be triggered by solar wind variations is of interest in this work. The types of solar wind variations include a variation in either IMF or dynamic pressure or simultaneous variations in both. We find that a substorm injection is triggered only by a variation or combination of variations that results in a convection reduction within the inner plasma sheet. A northward turning of the IMF B_z and a reduction of the IMF B_y magnitude are well-known triggers. We suggest that a pressure increase can also cause substorm injections as well as the typical compression effect. This is however more likely under a strongly southward IMF, the condition that can normally lead to major storms. We will present the statistical significance of dynamic pressure enhancement events during storm times. These basic features are useful for understanding sawtooth-type injections which are usually seen during storm times. We will present examples of sawtooth injections where the majority of the teeth are associated with external triggers.