

On the relationship between the occurrence of substorm injections and interplanetary parameters during the declining phase of solar cycle 23

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We have examined the relationship between magnetospheric substorms identified by LANL particle injections and daily interplanetary parameters observed by ACE during the second half of 2003, which is the declining phase of solar cycle 23. We found that substorm injection occurrence is very well associated with high-speed stream geomagnetic activity, implying that substorms are a very important component of the activity during high-speed streams. We found a good correlation ($cc=0.71$) between daily substorm injection occurrence and daily median solar wind speed, implying that solar wind speed strongly modulates substorm injection. We found that the average of negative IMF Bz is not responsible for the increase in injections with solar wind speed. We found evidence that IMF Bz fluctuations, which increase in number with increasing solar wind speed, and IMF triggering may be important. However, our results imply that currently known triggering criteria are not sufficient to entirely account for the increase in onsets with increasing solar wind speed. Either the solar wind speed by itself plays a role, independent of IMF triggering, and/or the triggering criteria itself depend on solar wind speed in some way that has not been determined and/or the enhancement in the number of Alfvénic IMF fluctuations plays a role.