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SYMPOSIUM ON TECHNOLOGICAL REQUIREMENTS FOR FUTURE SPACE ASTRONOMY AND SOLAR-SYSTEM SCIENCE MISSIONS (A7)
Technology Needs for Future Scientific Payloads (4)

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INVESTIGATING CORONAL MASS EJECTIONS WHICH CAUSE GEOMAGNETIC STORMS WITH WEAK STORM SUDDEN COMMENCEMENTS USING ACE SATELLITE DATA

Abstract

Electronic and magnetic field surrounds the Earth. When a Coronal Mass ejection (CME) is occurred from the Sun and it is heading to the Earth, plasma in CME cannot reach at the surface of the earth because of geomagnetic field. Instead of this, plasma encircle and rotate the Earth. As a result, they make electric current and magnetic field. It occurs geomagnetic storm. For measure of geomagnetic storms, we use Dst index. Geomagnetic storms usually have 3 phases in Dst index. First, initial phase, Dst index is increasing form approximately 0 Dst index(nT) because magnetopause is contracted by interplanetary shock. Initial phase is also called storm sudden commencement. Second, main phase, Dst index is decreasing rapidly. Usually when Dst index is below -30nT we say geomagnetic storm. Then recovery phase is the last. Dst index is increasing slowly in this phase. Sometimes initial phase is not appeared. we investigate CMEs and their interplanetary shocks that are causing geomagnetic storms without SSC and with very weak SSC. ACE satellite data and Dst indices are used for this work. The Advanced Composition Explorer (ACE) is a mission for explore space. Its orbit is Lagrangian 1 point which is a point of Sun Earth gravitational equilibrium and 1.5 million km form the Earth. Data of Two instruments SWEPAM for solar wind parameters and MAG for magnetic field are mostly used in this study. The bulk of strong SSCs are caused by fast solar wind speed and high proton density. But there are very weak and no SSC cases occasionally even they have high proton density. We have found 15 cases that have weak and no SSC of geomagnetic storms during from 2000 to 2006. 9 cases have high proton density and 6 cases have low proton density. The most interest thing is magnetic field. We analysed /B/, $\mathrm{Bgsm}_z, Bgsm_y, Bgsm_x, B\delta$, B$\lambda$. 13 of 15 cases look like they have 2 or more magnetic field flux rope. 4 cases have magnetic filed ropes and 2 cases have single magnetic field rope in the low proton density group. 9 of 9 cases have plural magnetic field flux rope in the high proton density group with strong storm. This means that we suggest plural magnetic field or shocks or CMEs occur weak or no SSC storms. We are going to check other cases of weak and eccentrically strong SSC storms by more parameters.