THE PHYSICS OF GEOMAGNETIC STORMS: ORIGIN AND MECHANISMS

ABSTRACT

A geomagnetic storm is defined as an extraordinary decrease in the magnitude of the horizontal component of the geomagnetic field in low and mid latitudes forming a depression followed subsequently by its decay. This work presents the origin and mechanisms responsible for this phenomenon. They reside in the intricate solar-interplanetary-magnetospheric coupling that provides the necessary condition (one of which is the north-south component of the interplanetary magnetic field oriented towards south) for its occurrence. In addition, there is also a magnetospheric-ionospheric coupling that results in the energization of the ring current during intense substorm activities. The enhanced ring current generates a magnetic field whose orientation is opposite to that of the geomagnetic field, and this explains the depression found in the *Dst* index.