COMBINING GROUND-BASED AND SATELLITE MAGNETIC MEASUREMENTS IN INTERPRETATION OF MAGNETIC FIELD DISTURBANCES

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Geomagnetic disturbances are frequently used for diagnosis of particular magnetospheric or ionospheric current systems or of the state of the magnetosphere. This is for example common practice in the use of certain geomagnetic indices such as SYM (Dst), ASYM and AE. Magnetic disturbances measured at the surface of the Earth are, however, the result of the combined effect of several different current systems, and a proper interpretation therefore requires that the effects of the different contributions are estimated.
In this study we analyze a magnetic storm in detail, combining groundbased and satellite measurement, as well as theoretical models of current density. We use global MHD modelling combined with a convection model of the inner magnetosphere as a physics based approach to estimate magnetopause-, tail- and ring-currents. This is a particular useful tool for investigating how these currents vary with the solar wind parameters. Modelling of the long-distance effect of FACs, on the other hand, requires accurate mapping of the high latitude FAC patterns. We estimate FAC patterns from high-latitude ground magnetic stations and low altitude orbiting satellites. Based on this we estimate the associated low- and mid-latitude magnetic disturbances using Biot-Savart integration and compare with observations from ground and satellite. Focus is on the analysis of a storm event from quiet times through ssc, and the storm main phase.

Magnetic storms, current systems, modelling

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