Investigation of High- to Low-Latitude Coupling during Magnetically Disturbed Times along a Meridian – Data Analysis & Modeling

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In this study, we make use of high temporal resolution (3sec) magnetic HDZ data from the Japanese 210° magnetic meridian (MM) chain of the MAGDAS/CPMN magnetometers spanning both hemispheres. Using an improved regional model for computing the sheet currents that flow in the E-region of the ionosphere along the 210°MM, we investigate the electrodynamical coupling between high- and low-latitudes during disturbed times, i.e.; storm, substorm, and transient events that are coherent on a global scale (DP2 and SC). Case studies showing hemispherical asymmetry of the DP fields (currents), main morphological features, and physical characteristics like electric field penetration associated with undershielding and overshielding events will be presented and discussed, in conjunction with IMF B_z and other computed electrodynamic parameters such as cross polar cap potential difference. An effort is also made towards better understanding the effects of FACs and the tail currents on the low-latitude magnetic fields during such events.