The Response of the Dayside Equatorial Electrojet to Step-like Changes of IMF Bz

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In the present study we examine the initial response of dayside ionospheric currents to step-like changes of the interplanetary magnetic field (IMF) BZ component. The magnetopause can be magnetically traced toward the ionosphere to the dayside auroral region and therefore, it is expected that a change of the IMF Bz component, if it interacts with the magnetosphere, affects the auroral electrojet in the midday sector. However, the associated ground disturbance may be difficult to detect/identify in the auroral zone because (a) the electrojet itself is localized in latitude and it moves as IMF Bz changes, (b) the ionospheric footprint of the (reconnection) site where the IMF interacts with the magnetosphere moves in local time as a function of IMF By, and (c) possibly many other local disturbances take place simultaneously. On the other hand, if the dayside equatorial electrojet (EEJ) responds to IMF Bz changes as a part of a global ionospheric current system, ground magnetic disturbances at the dip equator may serve better for diagnosing IMF Bz changes. In fact, some past studies reported that the intensity of the EEJ changes responding to the DP2 system in the polar region and that the ionosphere electric field at the dip equator is well correlated with the interplanetary electric field. In this study we refer to step-like changes of IMF Bz observed in front of the magnetosphere and examine how the ground horizontal (H) magnetic component changes at the dayside dip equator. We use magnetic field data obtained from the MAGDAS/CPMN ground magnetometer network, which includes several equatorial stations at different longitudes. A preliminary result indicates that in some events the ground H component changes within a few minutes from the changes of IMF Bz in the same sense (increase or decrease) as expected from the response of the EEJ, but in other events the H component does not change as expected or it changes but with a noticeably longer time delay. We discuss the result in terms of various factors that may affect the response of the equatorial ground H component.