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The effects of IMF Bz periodic oscillations on the thermosphere meridional winds

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The interplanetary magnetic field (IMF) Bz component is one of the key solar wind parameters that determine the energy and momentum flow from the solar wind to the magnetosphere–ionosphere–thermosphere (MIT) system. In this article, Coupled Magnetosphere Ionosphere Thermosphere (CMIT) model simulations have been used to illustrate the effects of IMF Bz temporal variations on the coupled ionosphere and thermosphere (IT) system. The simulation results showed that the cross polar cap potential and auroral hemispheric power are stronger when the frequency of IMF Bz oscillations is lower. This indicates a low-pass filter nature of the IT system. Furthermore, a high-pass filter nature is presented as saturation occurs at a higher frequency. Thermospheric meridional winds show periodic variations when IMF Bz oscillates at 30 and 60 min. Two different thermospheric wind responses are revealed. One is the instantaneous response and the other shows a delay with respect to latitude at all UTs (i.e. traveling atmospheric disturbances (TADs)). The instantaneous response occurs in the northern daytime, which is induced mainly by ion drag force, whereas the TADs occurring in the northern nighttime, and in the Southern Hemisphere, is controlled mainly by the pressure gradient associated with temperature changes due to IMF Bz temporal variations.