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Geoefficiency of the interplanetary shocks under different IMF conditions

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We have investigated the solar wind-magnetosphere coupling efficiency in response to interplanetary magnetic field. We investigate fast forward shocks by conducting solar wind observations and statistical analysis. Our statistical analysis of a set of fast forward shocks shows that the shock speed in the solar wind and the solar wind dynamic pressure play an important role for the geomagnetic activity. In particular, analysis of shock propagation inside the magnetosphere shows that the events with higher speed are associated with higher ionospheric activity. We complement the observations by results from the GUMICS-4 global magnetohydrodynamic (MHD) simulation according to IMF direction, especially Parker-spiral-like structure and radial IMF. The coupling efficiency depends on the fast forward shock characteristics: it is higher for smaller solar wind E_y and slower solar wind speed v and smaller for higher E_y and faster solar wind speed v, it is higher for radial IMF than for Parker-spiral-like structure of IMF.