

The long-period geomagnetic pulsation observed simultaneously at the dayside equatorial magnetometer and the SuperDARN HF-radar

Tetsuo Motoba[1], Takashi Kikuchi[2], Hiroshi Tachihara[3], Takashi Okuzawa[4]

[1] CRL, [2] Communications Res. Lab., [3] Earth and Planetary Sci., Kyushu University, [4] Dept. Info.& Commun.Eng., Univ. Electro-commun.

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We report a global geomagnetic pulsation event (period of about 14 min) associated with fluctuations in the solar wind dynamic pressure by using the geosynchronous satellite, HF-radar and ground magnetometer observations. The geomagnetic pulsation took place coherently at the dayside auroral and equatorial latitudes, and showed an equatorial enhancement at the dayside dip equator (Pohnpei, gmlat = 0.1 deg, MLT = UT-14) during an interval of 2214 to 2309 UT on February 28, 1998. Most signatures for global magnetic variations were consistent with a DP2 type ionospheric current pattern produced by dawn-to-dusk electric field, which extended to the dayside equator. Although the event occurred exactly during an interval of the southward IMF Bz (about -10 nT), the amplitude peaks in the dayside equatorial pulsation corresponded to those of the solar wind dynamic pressure rather than the IMF changes. The geomagnetic response to dynamic pressure changes can be seen not only in the H-component at the dayside and nightside low-latitudes, but also in the magnetic strength at the geosynchronous satellite in the postnoon. In the evening high latitude, the SuperDARN radar at Stokkseyri (MLT = UT-3) detected the electric field in the polar ionosphere intensified by the southward IMF Bz, especially the intensified echo power of beam 9 changed periodically corresponding to variations in the solar wind dynamic pressure and equatorial geomagnetic field. Therefore, we suggest that the equatorial geomagnetic pulsation is caused by an instantaneous penetration of the polar electric field, which is intensified by the southward IMF Bz and simultaneously modulated by fluctuations in the solar wind dynamic pressure.