



Dependence of the Spring-Autumnal asymmetry in geomagnetic activity on the solar main dipole magnetic field polarity over last 140 years

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Spring-Autumnal asymmetry (SA asymmetry) from years 1873-2010 in the geomagnetic activity is investigated based on the geomagnetic indices (aa, Ap and Kp). Results have shown that in general the SA asymmetry of the geomagnetic activity appears to be alternation, except for the interval during which the change of dominant solar dipole magnetic field polarity occurs. Our study implies that both the polarity of the main solar dipole field and the north-south asymmetry of the sunspot area in the two solar hemispheres control the strength of the south component (B_s) of the interplanetary magnetic field (IMF) near the Earth and the resulting SA asymmetry of the geomagnetic activity in the corresponding seasons. A simple sector structure model is devised to establish the relationship between the polarity of solar main dipole magnetic field, the IMF B_s component and the corresponding SA asymmetry in the geomagnetic activity. This is confirmed by examining the solar wind parameters from the spacecraft observations during the recent decades.