

A GLOBAL PI3 PULSATION CAUSED BY VARIATION OF THE SOLAR WIND NUMBER DENSITY

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A typical Pi3 pulsation was examined by vector magnetic field measurements from multiple satellites and ground stations. Ground observation in azimuthal direction at low latitudes indicates that the amplitude of the Pi3 pulsation decreases from day- to night-side and the phase on the dayside leads than that on the night-side, which implies that the source of the Pi3 lies in dayside. The variation of the solar wind number density observed by Geotail satellite just outside of the magnetosphere is highly correlated with the magnetic field variation on the ground and both of them have the dominant frequency at 3.4mHz. Therefore, we argue that the global Pi3 pulsation is directly driven by impulsive variation of the solar wind dynamic pressure. The Pi3 pulsation observed along meridian chain at 1000LT shows significant equatorial enhancement and the phase at station near the dip equator lags behind than those at low-latitude stations about 1 min. The observation along meridian chain at 1430LT shows that the phase of the Pi3 pulsation at high latitude lags behind than those at low latitudes about 50s. We proposed that the Pi3 pulsation at low and high latitudes is generated by different mechanisms. The pulsation near the dip equator on dayside results from the ionospheric electric field variation instantly transmitted from the polar area to the dayside ionosphere. Low-orbit satellite Oersted also observed this pulsation on the dayside above the ionosphere. The B// (Northward) component observed by Oersted has phase difference with the X/H component at low latitudes but is strictly out of phase with the X/H component near the dip equator, which implies that the Pi3 pulsation both observed by Oersted and on the ground near the dip equator is dominantly caused by the oscillation of the ionospheric current. According to these observations, a physical process from variation of the solar wind number density to globally occurrence of the Pi3 pulsation on the ground is proposed in this study.