Propagation of Pi2 pulsation from nightside to dayside: Observations and modeling of global current system

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Pi2 pulsations are irregular geomagnetic oscillations with a period of 40-150 s that are distributed globally from a source in the nightside magnetosphere. In the presentation, we will address how the nightside Pi2 signal propagates to the dayside region, which is the opposite hemisphere of the source region. A notable feature of the dayside Pi2 is the amplitude enhancement at the magnetic equator, which is associated with ionospheric currents. To clarify effects of ionospheric currents on the dayside Pi2, we examine Pi2 pulsations near the dawn and dusk terminators where the conductivity gradient is large. Following features are found: (1) the *D* (east-west) component reverses its phase near the dawn and dusk terminators, (2) the meridian of the *D* component phase reversal near the dusk terminator is shifted more sunward than that near the dawn terminator, and (3) the amplitude of the *D* component in the morning is larger than that in the early evening. We confirm that longitudinal distributions of phase and amplitude are controlled by the relative location of the terminator rather than by the local time. These terminator effects can be explained by a change of magnetic effects from the nightside field-aligned current to the meridional ionospheric current flowing on the sunlit side of the terminator, and vice versa. The meridional current is expected to be a part of the polar-to-equatorial ionospheric current system. The equivalent current associated with the dayside Pi2 flowed into the equator region from higher-latitude regions via meridional equivalent currents in the prenoon and postnoon sectors. The equivalent current system nearly simultaneously oscillated with a Pi2 period and exhibited a prenoon-postnoon asymmetry that the meridional component was larger in the prenoon sector than in the postnoon sector. Finally, we numerically test the magnetospheric-ionospheric current system for Pi2 consisting of FACs localized in the nightside auroral region, the perpendicular magnetospheric current flowing in the azimuthal direction, and horizontal ionospheric currents driven by the FACs. The calculated magnetic field successfully reproduces the observational features reported by previous studies and present our studies. Based on observations and the model calculation, we conclude that the oscillation of the magnetospheric-ionospheric current system is a plausible explanation of Pi2s on the dayside and near the terminator.