Transpolar Arc Observed by the Wide-Field Auroral Imager Onboard Fengyun Satellite

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Transpolar arcs that occur primarily under northward interplanetary magnetic field (IMF) are a class of auroral features in the polar cap region. Many mechanisms have been proposed to interpret the generation of the arcs, including reconnection and sudden change in the IMF. It is now generally accepted that IMF B_y component plays a key role in the generation and evolution of the arcs. Here we report an interesting long-lasting and moving transpolar arc observed during a geomagnetically quiet period (Dst<10 nT and AE<50 nT) by the wide-field auroral imager (WAI) onboard the Chinese Fengyun satellite. The WAI is a recently launched imager operated in far ultraviolet wavelength (LBH band in 140-180 nm) in a sun-synchronous orbit with a height of ~840 km. It is shown that the arc was initiated at the poleward auroral boundary on dawnside after the IMF turned to be northward and persisted for more than 5 hours. The arc moved toward the noon-midnight line as the IMF B_y component changed its direction and then moved back toward dawnside. An interesting phenomenon was that the arc was accompanied with strong energetic proton (30-80 keV) precipitations with geomagnetic latitude greater than 70° but no significant electron precipitations. However, the origin of these energetic protons is unknown and is worthy study in future.