

Multi-instrument observations of periodic poleward moving polar arcs

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We report results based on a study of periodic poleward moving arcs observed by multi ground-based and space-based instruments on January 3, 2014. The instruments include the all-sky imagers at Resolute Bay (RSB), the spaced-based SSUSI imager onboard DMSP spacecraft, GPS receivers at RSB, Resolute Bay Incoherent Scatter Radar-North (RISR-N) and SuperDARN radars. The observation periodic features of polar arcs from individual instruments are consistent with each other. The ASI imagers showed the polar arcs were repeatedly detached from the dawnside auroral oval and then moved poleward under positive IMF B_y conditions. Furthermore, some periodic spatial arcs are observed from the DMSP SSUSI imagers, and some periodic structured significant E-region plasmas are observed from the RISR-N data, together with periodic TEC variations observed from GPS receivers. We also observed strong flow shears around these arcs with boundary layers precipitating particles. Based on these observational results, we suggest that these periodic poleward moving arcs may be triggered by local processes associated with flow shears at the boundary layer regions.

Keywords: Polar arcs, Periodic poleward moving, flow shears