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Long-lasting Pc1 pulsations observed by Swarm satellites

Hyangpyo Kim, Junga Hwang, Jaheung Park, and Jajin Lee
Korea Astronomy and Space science Institute, Solar and Space Weather Group, Korea, Republic Of (khp@kasi.re.kr)

We analyzed two long-lasting Pc1 pulsations observed by Swarm satellites on 25 June and 3 September 2015, which were associated with halo CME event (992km/s) on 21 June 2015 and arrival of CIR (corotating interaction region) on 3 September 2015 each. These extraordinary large scale pulsations were distributed with latitudinal size of ∼10,000 km (extending from southern trough to northern trough) and had unexpected long duration. The 25 June pulsation was observed during a substorm period that took place at huge geomagnetic storm's recovery phase (Dst minimum = -200 nT). Interestingly there are two separated frequency bands with ∼3.2 Hz and 2.2 Hz. They are continuously observed for ∼3 hours on the both noon and midnight sectors. The wave properties in two regions are somewhat different. Pulsations in noon sector show that the wave normal angle changes from perpendicular to oblique and the ellipticity changes from linear to right-handed. On the other hand, pulsations in midnight sector show only right-handed polarization. The second Pc1 pulsation on 3 September was observed on the dawn sector and lasted for ∼4 hours. Contrary to the first event, this second event was observed independent of the geomagnetic disturbance, and the wave propertied are not changed.