Isolated subauroral emissions during a magnetic storm obtained with IMAP/VISI

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We report the SAR arc emission and isolated proton auroral event in the sub-auroral region obtained with IMAP/VISI in a big storm during the period from 21 to 26 July 2015. IMAP/VISI is a visible imaging spectrometer which aims to measures nightglow emissions from ISS (~400 km altitude) covering the wide range from +51 deg. to -50 deg. in geographical latitude. Two slits of VISI point to +45 deg. and -45 deg. to nadir with a scan width (mapped to the E-region altitude) of ~600 km to achieve a stereoscopic measurement of the airglow and aurora emission. In the nominal operation mode, VISI continuously measures airglow and auroral emissions at O2 762 nm, OH or N2 1PG 730 nm and O 630 nm simultaneously with a spatial resolution (plate scale) of ~10 km x 14 km and scan width of ~600 km perpendicular to the orbital track.
A big storm started on June 21, 2015 and Dst index decreased to 195 nT at 5UT on June 23. In the expansion and main phase from 1650 UT on July 22 to 1255 UT on July 23, we identified SAR arc emission at the magnetic latitude of ~50 deg. We will try to estimate the emission height of this SAR arc using the triangulation method with IMAP/VISI data. The dominant emission of SAR arc was O 630 nm with intensity of ~200R. On the other hand, during the recovery phase from 1656 UT on July 24 to 0025 UT on July 25, isolated tail-like or spot-shaped emissions occurred the sub-auroral latitudes, separately from the main auroral oval. These auroral structures are seen in all of the emission data at O630 nm, O2 762 nm and also in N2 1PG. This fact suggests that high-energy (more than 10 keV) particles probably produce these auroral emissions. These appeared almost the same magnetic latitude of ~58 deg, and likely to move with a co-rotation speed in the MLT range of 23-3 MLT. In addition, from 15 -19 UT on July 24 magnetic search coil data at Moshiri showed the Pc1 pulsation at ~2 - 3Hz, which is close to the ion cyclotron frequency in the magnetosphere. Further, POES 19 measured proton precipitation with energy of 30-250 keV existed associated with these isolated auroras. Therefore, these isolated auroras are suggested to be generated by high-energy proton precipitation that is produced by the pitch-angle scattering of ring-current protons by EMIC wave at equator.

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