Ionspheric Conductivity Dependence of the Subauroral Polarization Streams Observed by the SuperDARN Hokkaido East HF Radar

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We investigate the characteristics of the subauroral polarization stream (SAPS), with a main focus on the solar zenith angle(SZA) dependence using the Super Dual Auroral Radar Network (SuperDARN) Hokkaido East radar and NOAA POES spacecraft data. In this study, we checked over 2830 days from 2008/1/10 to 2015/12/31 and found 29 SAPS events where the line-of-sight velocity is larger than 150m/s, magnetic local time is 13 to 19 hours and the flow regions are identified to be equatorward of the auroral precipitation region. For each event we examined the SZA using the geographic latitude, longitude and the UT span of SAPS. We identified the lowest possible SZA and lowest illuminated ionospheric altitude for SAPS to be generated, which have not been discussed in detail before. As a result of the statistical analysis, it is found that the SAPS tends to appear when the SZA is larger than 100 degrees, and that the lowest illuminated ionospheric altitude should be higher than about 100km for SAPS to appear. The minimal threshold of the illuminated ionospheric altitude is near the altitude of the peak of Pedersen conductivity. This result suggests that the Pedersen conductivity plays an important role for the generation of SAPS, which is consistent with the previous studies. Results of detailed discussion will be presented.

Keywords: solar zenith angle, magnetosphere-ionosphere coupling, Pedersen conductivity, sub-auroral polarization stream, SuperDARN Hokkaido East radar

