Ionospheric Conductivity Dependence of the Subauroral Polarization Streams Observed by the SuperDARN HF Radars

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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) HF radars and NOAA POES spacecraft data. In this study, we used 3 SuperDARN radars (HOK / CVE / ADW), and checked data from 2008 to 2017 and found 124 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 found that the results of CVE radar are different from the result of HOK and ADW radar, the SAPS observed by CVE radar can happen in high conductivity occasion when both hemispheres are illuminated. However, we found that these illuminated SAPS could only occur under geomagnetically disturbed condition and mostly in spring and fall. In addition, when the geomagnetic activity is low, SAPS tends to appear when the minimum threshold of illuminated ionospheric altitude is 130 km or more, which is near and slightly above the altitude of the peak of Pedersen conductivity. These results suggest that the generation mechanism of SAPS is affected by both geomagnetic activity and the Pedersen conductivity. Results of detailed discussion will be presented.

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

