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Evidence for SuperDARN polar mesosphere summer echoes (PMSE) at SANAE IV, Antarctica: first observation

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Abstract content
   (Max 300 words)

Recently, it has been known that during polar summer time, both charged ice particles and atmospheric turbulence play a major roles in the creation of the electron number density that can result to strong radar echoes in polar mesopause regions. These echoes are known as polar mesosphere summer echoes (PMSE). Understanding causative mechanism of such thermal structure between Antarctic and Arctic mesopause altitude is still ongoing and is partly due to few observations from Antarctica. In this study, we use the near-range measurements of the Super Dual Auroral Radar Network (SuperDARN) from South Africa National Antarctic Expedition (SANAE) IV (71.7 °S 2.9 °W) data. We have manually visualised the radar data for the summer time period from 2010/2011 to 2011/2012 to observe the PMSE occurrence over SANAE radar station. The present automated SuperDARN-PMSE extractor algorithm uses: backscatter power greater than 6 dB, Doppler velocity and spectral width below 50 m/s respectively. This automated algorithm has proved successful in removing meteor trails and E region backscatter echoes but with Field-aligned irregularities (FAI) contamination. SANAE IV riometer provides opportunity for an indirect proxy for anisotropic perturbations of plasma density associated with magnetic fields at mesopause altitudes. This unique opportunity allows isolation of FAI from SuperDARN-PMSE occurrence rate. For the first time, we present initial occurrence rate of SuperDARN-PMSE from SANAE and its conjugate vicinity during the two consecutive Antarctic and Arctic summers. Preliminary result indicates that with the availability of absorption data from riometer, a simple coincidence algorithm (SCA) may be a useful technique to isolate FAI contamination.

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