Geophysical Research Abstracts
Vol. 18, EGU2016-15050, 2016
EGU General Assembly 2016

Long term observations of polar mesospheric echoes at Andøya

Ralph Latteck, Irina Strelnikova, Toralf Renkwitz, and Svenja Sommer

Leibniz-Institute of Atmospheric Physics, Radar sounding and sounding rockets, Kühlungsborn, Germany (latteck@iap-kborn.de)

Polar mesosphere summer echoes (PMSE) are strong enhancements of received signal power at very high radar frequencies occurring at altitudes between about 80 and 95 km at polar latitudes during summer. These echoes are caused by inhomogeneities in the electron density of the radar Bragg scale within the plasma of the cold summer mesopause region in the presence of negatively charged ice particles. Thus the occurrence of PMSE contains information about mesospheric temperature and water vapour content but also depends on the ionisation due to solar electromagnetic radiation and precipitating high energetic particles. Continuous observations of PMSE have been done on the North-Norwegian island Andøya (69.3°N, 16.0°E) since 1994 using different VHF radars. The PMSE occurrence rate is positively correlated with the geomagnetic Ap index, however not correlated with the solar Lyman α radiation and shows a significant positive trend during the time interval from 1994 until 2012. VHF radar echoes have been observed also during winter times but in the mid mesosphere from about 55 to 85 km altitude. These so called polar mesosphere winter echoes (PMWE) have been observed continuously at Andøya since 2004 using the ALWIN VHF radar (until 2008) and the Middle Atmosphere Alomar Radar System MAARSY (since 2011). Using the more sensitive MAARSY compared to the previous VHF radar systems operated at the site, results in more detections characterized by smaller volume reflectivity values down to $4 \cdot 10^{-18}\mathrm{m}^{-1}$. The end of the winter season is now hard to determine since mesospheric echoes have also been observed below altitudes of 80 km during non winter months, particularly around the end of May, i.e. the beginning of the polar mesospheric summer echo season. These observations indicate that the physical mechanism for creating the lower mesospheric echoes is present during the early summer months as well. We present results from long term observations of polar mesospheric echoes at Andøya during summer and winter time and discuss the observations with respect to the radar systems used at the location but with a focus on the results recently obtained with MAARSY.