Observations of polar mesosphere summer echoes at 69° in the Arctic and Antarctica

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Polar Mesosphere Summer Echoes (PMSE) have been observed with 50-MHz VHF radars at various locations in the Northern Hemisphere for more than 20 years. PMSE have been observed continuously at the North-Norwegian island Andøya (69.3°N) from 2004 until 2008 using the ALWIN MST radar and from 2010 onward using MAARSY, the Middle Atmosphere Alomar Radar SYstem. Since both the ALWIN radar and MAARSY are calibrated, the received echo strength of PMSE from 12 years of mesospheric observations could be converted into absolute signal power. Appropriate measurements of PMSE in the Southern Hemisphere started in 2004 using the calibrated VHF radar of the Australian Antarctic Division at Davis Station, Antarctica (68.6°S), which is located at a southern latitude geographically comparable to Andøya. We present a comparison of PMSE observations obtained at both radar sites during a period of 12 boreal summers (Andøya, NH) and 8 austral summers (Davis, SH) and discuss similarities and differences of seasonal and diurnal variations of PMSE occurrence frequencies and echo intensity. We furthermore present common volume measurements of the Davis VHF radar with a resonance Fe-Lidar operated at the same site in the years 2010–2012. These measurements provide unique insights into the temperature dependence of PMSE occurrence as well as the interaction of PMSE with meteoric metal layers in the MLT region.

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