Polar mesosphere summer echoes (PMSE) a southern hemisphere perspective

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The existence of Polar Mesosphere Summer Echoes (PMSE) in the Southern Hemisphere (SH) has recently been confirmed using HF radar (Ogawa et al., 2002), MST radar (Morris et al., 2004), and a Dynasonde (Jarvis et al., 2005) following earlier observations using MST radar (Woodman et al., 1999). These studies spanned the geographic latitudes 62.1˚S (Machu Picchu), 68.6˚S (Davis), 69.0˚S (Syowa), and 75.5˚S (Halley Bay). The emerging array of SH SuperDARN radars provide an opportunity to extend the spatial coverage of PMSE observations. An understanding of the occurrence and intensity of PMSE against latitude in the SH is needed to facilitate a comparison with the better spatial coverage of Northern Hemisphere (NH) PMSE observations. Such a comparison will contribute to the ongoing debate as to whether PMSE can provide a proxy for mesosphere temperature, and thus shed light on the existence of any interhemispheric asymmetry or otherwise in the polar mesosphere regions. The argument for different polar mesosphere environments spawned, in part, by the reported lack of SH PMSE observations. Recent PMSE reflectivity and intensity results from Davis (68.6˚S) and Andenes (69.0˚N) are given. The characteristics and morphology of PMSE events above these Antarctic stations are considered in the context of the thermal and dynamical state of the mesosphere, as deduced from satellite (i.e. SABER and AURA) and radar (i.e. MF and MST) observations, respectively. A brief account of recent coincident PMSE MST radar and Polar Mesospheric Cloud (PMC) lidar observations from Davis is presented. The influence of atmospheric tides, gravity and planetary waves, and cosmic noise absorption on PMSE structure and intensity are considered. New SH observations of Polar Mesosphere Winter Echoes (PMWE) are also presented. Finally proposals for future radar facilities in the Antarctic are canvassed.

Jarvis et al. 2005, GRL, 32, L06816, doi:10.1029/2004GL021804

Morris et al. 2004, GRL, 31, L1111, doi:10.1029GL020352

Ogawa et al. 2002, GRL, 29(7), doi:10.1029/2001GL014094

Woodman et al. 1999, JGR, 104, 22,577-22,590