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Observations of three-dimensional structures of MLT wind fields based on meteor echo measurements using the PANSY radar

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In this study we will develop a high quality meteor echo observation technique using the PANSY (Program of the Antarctic Syowa MST/IS Radar) system (47MHz) located at Syowa station (69S,39E), Antarctica. The radar started its initial observations in early 2011 and is currently operated for troposphere, stratosphere and mesosphere studies as one quarter system, being already the largest atmospheric radar in the Antarctic. The final configuration is to be an active phased array system with 1045 crossed-Yagi antennas, a peak transmitting power over 500kW and 55 digital receivers. By fully utilizing the versatility of the radar an unprecedented number of meteor echoes, that is, a few tens of times more echoes than that of conventional meteor radars, are expected. This will widen the possibility of meteor echo observation technique, which has been mostly limited to wind observations on a height profile basis, and enable the direct measurement of time-evolving three dimensional structures of wind and temperature fields in the polar mesosphere and lower thermosphere within a large horizontal area of about 500 km wide.

Keywords: MST/IS radar, Antarctic atmosphere, mesosphere, lower thermosphere, meteor echoes