Long-term observations of the 3-D wind field by using CLOVAR VHF wind-profiler radar.

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In the past three decades, VHF/UHF radars were used extensively for studying the structure and dynamics of lower and middle atmosphere. Wind-profiler radars offer the capability for measuring atmospheric wind motions with excellent temporal resolution and moderate height resolution. The CLOVAR VHF radar is located at 43°04.44' N, 81°20.20'W, operates at a frequency of 40.08 MHz, peak power of 10 kW (average power of 800 W) and is owned and operated by the University of Western Ontario, London, Ontario, Canada. The VHF MST radars have provided a new tool for continuously monitoring of all three components of the air velocity vector over a single location, and they are relatively unique in their ability to measure and monitor the vertical and horizontal wind velocity components.

The important influence of dissipating and interactions of gravity waves on the circulation of many regions of lower and middle atmosphere is now widely acknowledged. Gravity waves generated by various sources, throughout the atmosphere play an important role to the shaping and structure of atmospheric circulation. The can transport significant momentum and energy from the regions, where they are generated to the other parts of the atmosphere. Analyzing the generation, propagation, and climatology of these waves is important to the understanding of middle and upper atmosphere dynamics. Long-term radar measurements of the tropospheric wind velocities provide considerable insight into gravity wave processes, making it possible to study temporal and spatial variability of these waves. MST radars have proven to be a key tool in providing high-resolution measurements of the wave-induced velocity fields, which in turn have led to advances in our theoretical description of these processes. The seasonal variation of wind velocity and momentum fluxes induced by gravity waves in the troposphere have been studied using wind observations by the CLOVAR VHF radar at London, Ontario, Canada from January 1996 to December 1997. Our wind velocity variance and momentum flux estimates were correlated with information about weather systems taken from daily weather maps. The CLOVAR wind-profiler is located in a flat region of Eastern Canada, so that the gravity wave generation is not affected by orography.