

Experience from one year of operating a boundary-layer profiler in the center of a large city

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Abstract. Since May 1992 a small, 915-MHz profiler has been operated continuously in downtown Montreal. It is a five-beam system employing a microstrip array antenna, located atop a 14-story office building that houses several academic departments of McGill University. The data are used for research on precipitation physics and the clear-air reflectivity in addition to wind profiling. We are especially interested in situations in which the reflectivities of the clear air and the precipitation are comparable. This permits the study of interactions between the precipitation and the clear air, a new area of research made possible by wind profilers. On clear days in the summer, 30-min consensus winds can often be measured to an altitude of 3 km, but ground clutter in the antenna sidelobes interferes with measurements below 600 m. Rain when present often permits wind profiling down to 100 m and up to 6 km or higher. On cold winter days there are some periods when the reflectivity is too weak at all levels to permit wind estimation. Falling snow, however, provides readily detectable echoes and serves as a good tracer of the wind and so allows profiling over its full altitude extent. The best conditions for observing interactions between precipitation and the clear air are when light rain falls through a reflective layer associated with a frontal surface or inversion. Unexpectedly, flocks of migrating birds sometimes completely dominate the signal at night in the spring and fall seasons.

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