 On the Creation of An Urban Boundary Layer Product Using The Radar Wind Profiler of the New York City Meteorological Network

The radar wind profiler located on the Liberty Science Center in Jersey City, NJ is a part of the New York City Meteorological Network. An automatic algorithm is developed and implemented to take wind profiler signal data and create an urban boundary layer height product. Time series of urban boundary layer heights from clear and cloudy days are examined and compared to urban boundary layer heights obtained from temperature and virtual potential temperature profiles obtained from a New York City Meteorological Network’s radiometer located on the roof of the Grove School of Engineering at The City College of New York. Comparisons are also made to PBL height time series obtained by MERRA: Modern Era Retrospective Analysis for Research and Applications. A limited seasonal climatology is created from the available wind profiler data for clear and cloudy days and then compared to a limited seasonal climatology produced from PBL data obtained from MERRA. While upper and lower range gates constraints limit observation of the nighttime boundary layer and extreme heat events, daytime boundary layer heights are observed for three clear days and three cloudy days. Signatures native to each instrument / reanalysis can be seen to be repeated in the wind profiler timeseries. Timing of boundary layer evolution and collapse is variable. A limited climatology of clear and cloudy days is constructed. For the whole year for clear days, the convective boundary layer begins its ascent around 7:30am. In the winter the greatest height is achieved at 11am, summertime at 1:30pm, spring at 4:00pm and Fall is characterized by two peaks at 12:30pm and 6:30pm. For cloudy days, in the winter the boundary layer is genenerally higher than any other season and in the summer it is the lower than the rest.