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Title: Convective Cloud-base Updradft Measurements

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Abstract: Updraft velocities are an important parameter for convective storm research. Theoretically, updraft velocities can provide the maximum supersaturation rates at the base of developing convective clouds. Frequently airborne research operations use pilot estimates to acquire updraft measurements and thereby infer the supersaturation. However, the methods pilots use to asses updraft velocities are subjective and potentially inconsistent. Furthermore, to our knowledge there has not been any comparison of pilot estimates to systematic measurements. An Aircraft Integrated Meteorological Measurements System (AIMMS) was employed during the Polarimetric Cloud Analysis and Seeding Test 2012 (POLCAST-2012) and obtained updraft measurements on five flights. A calibration flight was conducted on July 20, 2012. The ensuing validation flight (July 29, 2012) indicated a successful calibration. Our analysis evaluates 1.0 Hz AIMMS statistical distribution parameters to pilot estimates. Pilot estimates of maximum sustained updrafts are compared to five minute mean distribution and 95^{th} percentile AIMMS values. Comparisons are drawn from six confirmed cases during the Polarimetric Cloud Analysis and Seeding Test 2012 (POLCAST-2012). Five minute mean distribution and 95^{th} percentile AIMMS values are compared to the pilot's maximum sustained updraft estimates. Three cases show pilot estimates agreeing with the mean updraft AIMMS velocities; however, the pilot estimates are high for the remaining three cases. For five cases, the pilot estimates are below the 95^{th} percentile range of AIMMS 1.0 Hz measurements. The evaluation demonstrates that both the pilot estimates and AIMMS gust probe have challenges detecting differences between 1.0 m s^{-1} (~200 ft min^{-1}) and 2.0 m s^{-1} (~400 ft min^{-1}) vertical winds.