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Title: Comparison of Pilot and Aircraft Integrated Meteorological Measurement System (AIMMS) Cloud Base Updrafts

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Abstract: Airborne seeding operations require cloud base updraft (positive vertical wind) velocities from pilot estimates. However, there has not been any comparison of pilot updrafts to systematic measurements. Pilot estimates are subjective and hence potentially inconsistent from case to case, pilot to pilot and from one project to the next. The Aircraft-Integrated Meteorological Measurements System (AIMMS) provides an objective measurement of updraft velocities. AIMMS measurements are compared to pilot estimated updrafts encountered while flying under developing cumulus clouds. Our analysis compares the pilot estimated maximum updraft to statistical distribution parameters of 1 Hz AIMMS measurements. Specifically, five-minute distribution mean and 95th percentile values are compared to the range of maximum sustained updrafts that the pilot estimates. Six confirmed target cases found during the Polarimetric Cloud Analysis and Seeding Test 2012 (POLCAST-2012) field project are analyzed. 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 95th percentile range of AIMMS 1.0 Hz measurements. The POLCAST-2012 cases demonstrate the difficulty for pilots and gust probe instruments, like the AIMMS, to discern the difference between a 1.0 m s^{-1} ($\sim 200 \text{ ft min}^{-1}$) and a 2.0 m s^{-1} ($\sim 400 \text{ ft min}^{-1}$) updraft.