



AUVSI's Unmanned Systems North America Conference Washington, DC (August 10-13, 2009)

Satisfying the FAA sense-and-avoid requirement: Ground-based radar compared with visual observers

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To safely operate UAVs in the National Airspace System under Visual Flight Rules, UAV pilots must be able to detect and track air traffic to a level of safety equal to or better than the eyes of a pilot in the cockpit of a manned aircraft. The FAA currently requires that UAVs remain in the visual range of ground observers or chase aircraft. This paper reports on the performance of a ground-based radar system compared with ground observers and a chase plane.

The study involved the Sentinel radar integrated with the Sense-and-Avoid Display System (SAVDS). Sentinel provides 360° surveillance volume coverage of airborne targets, with a detection range of 45 miles, precision tracking of 0.2° angle accuracy and a scan rate of 2 sec. SAVDS presents radar target data and potential air traffic conflicts directly to the UAV pilot.

UAV flights were conducted in California and New Mexico. In California, the ground observers reported <10% of the lower altitude manned aircraft (<10k ft AGL) detected using Sentinel-SAVDS. In New Mexico, where staged airborne conflicts with another manned aircraft were conducted, Sentinel-SAVDS detected midair conflict threats up to 2 minutes before the chase plane even “saw” the intruding aircraft.