The application of UAS towards tornado research and forecasting

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UAS hold significant potential to advance the understanding of tornadoes and, through targeted surveillance, directly improve the skill of storm-scale predictions and tornado forecasts. In this presentation we will summarize the successes using UAS to collect data in the vicinity of supercell thunderstorms and discuss ways that these data, along with additional data collected in future field campaigns can be used answer basic research questions concerning tornado formation.

We will also present results from an examination of strategies for optimal targeting of supercell thunderstorms by UAS. Because UAS can be flown in areas that are bereft of observations but contain processes that greatly influence storm severity, targeted storm-scale data collection by UAS is likely of great value in stormscale numerical weather prediction. While the current regulatory environment places limits on the application of UAS towards these ends, demonstrated success targeting tornadic and non-tornadic supercells proves the general feasibility of this work. Moreover, analysis can be performed using synthetic (simulated) data that enables an examination of targeting strategies and UAS design that would be required for a measurable impact on storm-scale numerical weather prediction. In this presentation we will introduce a method, based on ensemble sensitivity analysis, that we use to estimate the regions around a supercell thunderstorm that should be sampled to provide maximum benefit to forecast skill. We also present results from observing system simulation experiments that quantify the impact on forecasts from observations collected in these regions.