Comments on "Hail in the Vicinity of Organized Updrafts"

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In what appeared to be a fairly comprehensive treatment of the subject, albeit with tongue in cheek, Rogers (1970) considered various overlooked aspects of echo-free regions in and around thunderstorms.

These aspects, however, did not include the possibility of the phenomenon now reported by Auer and Marwitz (1972), namely echo-free hail. In Fig. 1 of the latter paper all the hail encounters are seen to occur in areas several kilometers outside the radar echo even though the measured distributions given in their Fig. 2 should produce reflectivities of the order of the peaks generally found in the cores of thunderstorms, i.e., $Z_e \approx 50$ dBZ or greater. Further, in the text the authors state explicitly that "the hail encounters normally appeared to occur in an echo-free area or just at the edge of the strong horizontal reflectivity gradients (echo wall)." Now, it is generally accepted that there is often a more or less steady flow up and in over the cold outflow resulting from the downdrafts of thunderstorms. If one chooses to call this an "organized updraft," that is perfectly fine with me. But the finding of hailstones in this region, in the sizes and concentrations reported in this paper, without any radar echo, would seem to require some sort of explanation. I recognize that echo-free (or weak) regions hold a certain fascination for many meteorologists, but I submit that the subject paper, with the obvious inconsistencies in the measurements presented, is not so much a proof of the existence and importance of these regions as it is an exercise in bad measurementship.

REFERENCES

Auer, A. H., Jr., and J. D. Marwitz, 1972: Hail in the vicinity of organized updrafts. *J. Appl. Meteor.*, **11**, 748–752.

Rogers, R. R., 1970: Some overlooked aspects of echo-free regions. *Preprints 14th Radar Meteor. Conf.*, Tucson, Amer. Meteor. Soc., 464–465.