

TITLE: SEVERE STORM ELECTRICITY

RESEARCH INVESTIGATORS:

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SIGNIFICANT ACCOMPLISHMENTS FY 83:

We have made significant progress in both our field work and analyses since the last program review. Some of these are:

1. Successful ground truth support of U-2 overflights. Data have been reduced for 4 June 1984 and some of the results have been integrated into some of MSFC's efforts.
2. We continue to find that "staccato" lightning (multiply branched, single stroke flash with no continuing current) is prevalent within the rainfree region around the main storm updraft and believe this to be important, i.e., staccato flashes might be an important indicator of severe storm electrification.
3. Results from our analysis of data from two stations appear to indicate that we can estimate charge center heights from a combination of intercept data with data from the fixed laboratory at NSSL.
4. We have provided an excellent data base for determining the sight errors and efficiency of NSSL's LLP system.
5. We successfully launched Dr. Marshall's (UM) radio sonde and electric field meter from a mobile launch vehicle.
6. We continue to observe cloud structures, observable in a low radar reflectivity region and on a scale smaller than is currently resolved by radar, which appear to be related to electrical activity.

FOCUS OF CURRENT RESEARCH ACTIVITIES:

We are currently preparing the storm electricity van for the Spring 84 research program. We expect to be in Oklahoma from 12 May-10 June to support U-2 overflights. We are continuing our data reduction and analysis. Much of our effort this year was concentrated on 4 June 1984, but we continue our studies of a series of mesocyclones on 17 May 1981.

We shall continue to improve our abilities to launch and track balloon borne instruments from a mobile lab.

## PLANS FOR FY 85:

Our goal remains unchanged; we shall continue our efforts to expand our knowledge of how storm electricity is related to cloud and precipitation structure, dynamics, and thermodynamics.

Each year our electricity measurements from the mobile laboratory become better integrated into the total electricity and dynamics effort. We plan to continue this trend. Storm intercept continues to play a supportive role in the overall severe storms electricity research and our data plays an important part of many analyses.

## PUBLICATIONS SINCE JUNE 1983:

The following papers were presented at the 13th Conference on Severe Local Storms.

1. "Location of Lightning Charge Center near Mesocyclones" by Steven D. Horsburgh, Roy T. Arnold, D. G. MacGorman, and W. David Rust.
2. "Positive Cloud-to-Ground Flashes in Severe Convective Storms" by W. David Rust, D. G. MacGorman, and Roy T. Arnold.

The following papers will be presented at the International Conference on Atmospheric Electricity at Albany in June.

1. "Simultaneous Observations of Cloud-to-Ground Lightning above and Below Cloud Tops," S. J. Goodman, H. J. Christian, W. D. Rust, D. R. MacGorman, and R. T. Arnold.
2. "Some Characteristics of Lightning in Severe Storms on the Great Plains of the United States," D. R. MacGorman, W. L. Taylor, W. D. Rust, and R. T. Arnold.