

**TITLE: STORM SEVERITY DETECTION (RF)**

**RESEARCH INVESTIGATORS:**

Dr. R. L. Johnson, Electromagnetics Division  
Southwest Research Institute, San Antonio, TX 78284  
Telephone: (512) 684-5111, ext 2765

Mr. G. A. Smith, Electromagnetics Division  
Southwest Research Institute, San Antonio, TX 78284  
Telephone: (512) 684-5111, ext 2768

Mr. S. J. Goodman, Atmospheric Science Division  
NASA/Marshall Space Flight Center, AL 35812  
Telephone: (205) 453-1325

**SIGNIFICANT ACCOMPLISHMENTS TO DATE IN FY-84:**

To provide lightning location data occurring in association with continental thunderstorms and hurricanes, a second phase linear interferometer was deployed at Marshall Space Flight Center during March 1982. Using time correlated directional data obtained at the site in San Antonio, Texas and at MSFC, Alabama, electrical emissions originating from tropical storms in the Gulf of Mexico were monitored. This period of time did not provide as much data as had been expected. In particular, the time span between hurricane ALLEN (10 August 1980) and hurricane ALICIA (18 August 1983) represents the longest period in this century that the United States has gone without hurricane landfall. Both systems were active and were acquiring data, however, during the landfall period of hurricane ALICIA.

In the time period between 2300 GMT, 17 August 1983 and 1000 GMT, 18 August 1983, there resulted 73,000 estimates of location of electrical events in the Gulf of Mexico and Texas coastal region. These data have been processed to remove bearing ambiguities, and this analysis has removed approximately 60,000 spurious points. The resulting data set of location estimates is 14,000.

**FOCUS OF CURRENT RESEARCH ACTIVITIES:**

The collection of atmospheric electrical events is being correlated with the McIDAS data base at Marshall Space Flight Center, and with the radar summary data provided by the Hurricane Research Division using the NWS radar facility at Galveston, Texas.

**PLANS FOR FY-85:**

The location data acquired from hurricane ALICIA will be analyzed to produce a case study of the electrical activity as a function of storm severity and evolution. The large data base resource of electrical

and meteorological information will permit analysis in a composite sense to study basic physical processes of cloud electrification in hurricane ALICIA.

Refurbishment of the phase linear interferometer at MSFC is currently under way and will be completed before the 1984 hurricane season.

#### RECOMMENDATIONS FOR NEW RESEARCH:

Since the data disk buffers of both phase linear interferometers are of limited extent, the storage capacity can be expanded using a communication link between the two sites. This capability would also provide real time location analysis.

Due to daytime ionospheric absorption effects, it has proven necessary to operate at higher frequencies during daylight hours. The mechanism to coordinate this activity at both sites must be introduced.

#### LIST OF PUBLICATIONS PREPARED SINCE JUNE 1983:

Johnson, R. L. and S. J. Goodman, "Atmospheric Electrical Activity Associated with Hurricane ALICIA," VIIth International Conference of Atmospheric Electricity, Albany, NY, June 1984.

Johnson, R. L. and S. J. Goodman, "Measurement of Atmospheric RF Emissions from Tropical Cyclones," Abstract submitted for presentation at XXIst General Assembly of URSI, Florence, Italy, August-September 1984.