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TITLE: ATMOSPHERIC ELECTRICITY/METEOROLOGY ANALYSIS

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1. BACKGROUND:

        This activity focuses on Lightning Imaging Sensor (LIS)/Lightning Mapper Sensor (LMS) algorithm development and applied research. Specifically we are exploring the relationships between 1) global and regional lightning activity and rainfall, and 2) storm electrical development, physics, and the role of the environment. U.S. composite radar-rainfall maps and ground strike lightning maps are used to understand lightning-rainfall relationships at the regional scale. These observations are then compared to SSM/I brightness temperatures to simulate LIS/TRMM multi-sensor algorithm data sets. These data sets are supplied to the WETNET project archive. WSR88-D (NEXRAD) data are also used as it becomes available. The results of this study allow us to examine the information content from lightning imaging sensors in low-earth and geostationary orbits.

2. SIGNIFICANT ACCOMPLISHMENTS IN PAST YEAR:

        Analysis of tropical and U.S. data sets continues. A neural network/sensor fusion algorithm is being refined for objectively associating lightning and rainfall with their parent storm systems. Total lightning data from interferometers are being used in conjunction with data from the national lightning network. A 6-year lightning/rainfall climatology has been assembled for LIS sampling studies.

3. FOCUS OF CURRENT RESEARCH AND PLANS:

        The LIS/LMS neural network clustering algorithm development will continue using satellite/radar/lightning data acquired and examined from different climatological regions including TRMM ground truth sites (primarily Central Florida and Solomon Islands). Intercomparisons with other rainfall estimates (VIS, IR, SSM/I) will continue. Collaborative efforts are planned with 1) the cloud modeling group at UMIST to better understand the relationship between precipitation and lightning, and 2) the USDA Forest Service to better understand the role of the environment and lightning occurrence in the ignition of forest fires in Boreal forests.

4. PUBLICATIONS:

Goodman, S. J., and K. R. Knupp, 1992. Tornadogenesis via squall line and supercell interaction: The 15 November 1989 Huntsville, AL tornado. To appear in the AGU Monograph concerning the results of Tornado Symposium III, Norman, OK April 2-5.

Buechler, D. E., and R. J. Blakeslee, 1992. Cloud-to-ground lightning observations used to simulate observations from a low-earth orbiting lightning sensor, Preprints, 9th Int. Conf. on Atmos. Elec., St. Petersburg, Russia, June 15-19.