Title: Global Lightning Studies
Investigators: Steven J. Goodman, Pat Wright, Hugh Christian, Richard Blakeslee,
Dennis Buechler, Greg Scharfen

Significant Accomplishments in the Past Year:

1. Global Studies

   Focus and Progress

   We are analyzing the global lightning signatures from the DMSP Optical Linescan System
   (OLS) imagery archived at the National Snow and Ice Data Center. Transition to analysis of
   the digital archive as it becomes available and compare annual, interannual, and seasonal variations
   with other global data sets (e.g., precipitation, SSM/I microwave signatures of ice, diabatic heating,
   global and regional synoptic patterns).

   An initial survey of the quality of the existing film archive has been completed and
   lightning signatures have been digitized for the summer months of 1986-1987. Initiation of the
   digital archival process at the AFGWC is still being worked.

   Plans

   The film archive will continue to be digitized to produce the global lightning data base
   from 1973-Present. Plans are underway to archive digital OLS data over Central Florida during
   the CaPE field program, if the AFGWC archive is not yet begun, in order to permit OLS
   validation with ground based total lightning measurements near Cape Canaveral, intercom-
   parisons with other data sets, and to have a developmental data set to build a prototype digital
   data analysis system at NSIDC and MSFC.

2. Process Studies

   Focus and Progress

   This research focuses on the relationships between 1) global and regional lightning ac-
   tivity and rainfall, and 2) storm electrical development and environment. Remote sensing data
   sets obtained from field programs conducted in the tropics and U.S. are used in conjunction
   with satellite/radar/lightning data to develop and improve precipitation estimation algorithms,
   and to provide a better understanding of the co-evolving electrical, microphysical and dynamical
   structure of storms. This knowledge strengthens the utility of NASA's lighting mapper and
   lightning imaging sensors for GOES, EOS-A1, and TRMM.

   Plans

   Analysis of tropical and U.S. data sets continuing. A clustering and sensor fusion algorithm was
   developed for assigning lightning activity to its parent storm/system and has proved useful in
   objectively studying lightning and rainfall production by these storms. A five-year
   lightning/rainfall climatology has been assembled for the Tennessee Valley and is being ex-
   amined. Satellite/radar/lightning data sets are to be acquired and examined from different
   climatological regions. Intercomparisons with other rainfall estimates (VIS, IR, SSM/I) have
   begun. U.S. rainfall estimates from the WSI radar network will be used for algorithm validation
   and intercomparison.
Publications:


