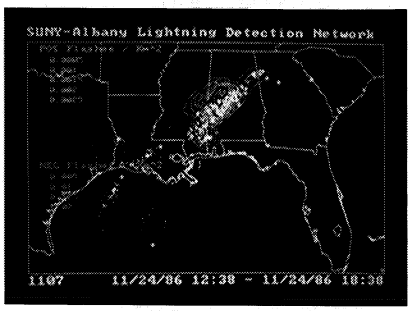
Lightning Detection



Lightning causes an estimated $50 million a year in damage to power lines, transformers and other electric utility equipment. Much of the damage could be prevented or more quickly repaired if utility companies had a better understanding of lightning's characteristics and where it may strike.

Lightning strikes are not yet predictable, but a U.S. East Coast Lightning Detection Network (LDN) operated by the State University of New York (SUNY) at Albany is providing utilities and other clients data on lightning characteristics, flash frequency and location, and the general direction in which lightning-associated storms are heading. The system, which began as a purely scientific endeavor and evolved into a practical application, has grown into a network that covers virtually the whole East Coast and extends beyond the Mississippi River. It includes 30 lightning monitoring stations, each with a strike coverage of about 250 miles.

The network is jointly funded by NASA, the National Science Foundation, the State of New York and the Electric Power Research Institute. There are two similar networks in the west and midwest, but NASA has no involvement with them.

The monitoring stations are equipped with direction finding antennas that detect lightning strikes reaching the ground by measuring fluctuations in the magnetic field. The stations relay strike information to the SUNY-Albany LDN operations center (above), which is manned round the clock. The center's computers process the data, count the strikes and spots their locations, and note other characteristics of the lightning, such as flash density. LDN's processed data is then beamed to a satellite for broadcast to clients' receiving stations. At top right is a representative computer graphics display showing the location and flash density contours of 1,107 ground strikes recorded during a six-hour period in the southeastern United States.

The National Weather Service uses SUNY-LDN data to determine the intensity of thunderstorms. But the major users are 25 utilities, including the big North Carolina Duke Power Company, which uses the information as a management tool. Duke scientist Nick Keener explains how the data is employed:

"Since lightning is one of the major causes of electricity interruption to both residential and industrial customers during the summer months, advance knowledge of approaching thunderstorm activity is extremely useful in scheduling field crews in anticipation of power outages. By utilizing real-time lighting strike information, managers are now more able to effectively manage their resources. This reduces outage time for customers."

The information is also valuable to a special Duke Power working group that is looking for methods and technology to improve transmission system reliability. It allows matching customer problems with specific strikes to determine cause and effect; it enables study of the operating records of each transmission facility with detailed knowledge of lightning activity; line maintenance can be directed at actual problem areas; and the design of new transmission lines can be better tailored to the actual lightning activity of a geographical area. ▲