Florida Institute of Technology

A METHOD FOR ACCURATE LIGHTNING STRIKE PREDICTION

Summary

According to the National Lightning Safety Institute, the total annual cost of lightning damage to the United States is $4 billion to $5 billion. The ever-increasing reliance on microelectronics for critical business and governmental activity amplifies the potential damage that lightning can cause. A new technology developed by researchers at Florida Institute of Technology and the University of Florida can help mitigate that risk: a novel method for accurate lightning strike warning and after-the-fact strike location determination. An on-site instrument provides a 1 millisecond warning of an impending lightning strike to the site and after-the-fact evidence that lightning has struck within 100 meters of the instrument. Better accuracy can be obtained if multiple instruments spaced about 100 meters apart are used. After-the-fact strike location determination is essential in insurance issues such as determining whether a given structure fire was lightning-caused and in searching for potential lightning-caused damage such as on power transmission lines where an instrument could be placed on each transmission-line tower.

Applications

- A trigger for proactive lightning protection
- After-the-fact proof of the occurrence of lightning

Advantages

- Provides a warning signal up to 1 millisecond prior to any lightning strike within a 100-meter radius, enabling protection systems to be proactive
- Provides an improvement over present location determination methods that have an accuracy of 500 meters but detect only 80 to 90 percent of the cloud-to-ground lightning discharges; an accuracy of 100 meters can be achieved with a single instrument, and that accuracy can be further improved with multiple instruments while recording every cloud-to-ground lightning within its range

The Technology

Current lightning forecasting and recording technologies employ sensors that record the electric and magnetic fields radiated by lightning after it has struck the ground, with a location accuracy of about 500 meters and a detection efficiency of 80 to 90 percent. Researchers at Florida Institute of Technology and the University of Florida have found that there are unique and characteristic co-incident x-ray and electromagnetic signals prior to a lightning strike observed at very close range, and that the presence of these signals signifies an imminent strike within 1 millisecond and 100 meters. The effects are only measurable over a range of 100 meters and just before lightning strikes an object on the ground, yielding the capability to pinpoint the lightning strike within a radius of 100 meters of a single instrument. Using the sensors in a networked array can further reduce the location error, increasing the accuracy.

Florida Institute of Technology Contact:
Assistant Vice President for Research
John P. Politano Jr.
321-674-7239 /Jpolitan@fit.edu

Florida Tech Inventor: Dr. Joseph R. Dwyer