On the Trail

by Ameet Sachdev
Times Staff Writer

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An Arizona company has turned the art of tracking lightning into a business that helps Florida utilities and other companies save money - and possibly lives.

University of Florida professor Martin Uman is writing his fourth book on lightning, a tome he is thinking of naming *Encyclopedia of Lightning*.

It is a fitting title considering Uman is a walking encyclopedia on the subject. Among his discoveries is a lightning sensor that helped firefighters locate forest fires in Alaska in the 1970's.

Today, that invention forms the backbone of Global Atmospherics Inc., a Tucson, Ariz., company that has turned the high-tech art of tracking bolts of electricity into a lucrative business.

In lightning-prone Central Florida, its surveillance system is as vital as Doppler radar for weather watchers. The technology

helps Tampa Electric Co. and Florida Power Corp. respond to power outages faster. And for Salomon Smith Barney in Tampa, it helps protect the investment firm's computers, which clear $150-billion worth of global stock and bond trades each day.

Yet, lightning watching is more than just a money-saving endeavor. Lightning kills an average of 87 people a year in the United States, according to the National Weather Service. Last week, two golfers at a Lakeland course died when lightning struck a tree they were standing under.

Scientists have used location data to study the relationship between lightning and other lethal weather patterns such as tornadoes and hurricanes. The life-saving potential of lightning detection has earned the subject a chapter in Uman's new book.

"The network," he said, "is a national resource."

International Work

National resource or not, this state-of-the-art technology is more a citizen of the world. It is owned by Global Atmospherics, which is part of Sankosha Corp., a Japanese manufacturer that acquired the company in 1995.

Today, Global operates lightning detection systems in more than 20 countries, including Russia, China and Brazil.

In the United States, the company owns a national network of 107 sensors, some located 250 miles apart, that can pinpoint a lightning strike within 500 yards of where it hit the ground. The accuracy has improved with better technology; the first sensors developed by Uman and a University of Arizona scientist were able to locate a lightning strike within 2 to 4 miles.

Here is how the sensors work: When lightning stabs the earth, its energy radiates much like ripples of a pebble striking a calm pond. The lightning monitors pick up the energy waves and transmit information, such as time, polarity and amplitude of the flash, to computers in Tucson. Using triangulation, the company hones in on the location of the strike within seconds.

A bigger trick often is counting the lightning strikes since many things throw off powerful electromagnetic signals, including the transformers on power grids.

Photo courtesy of Global Atmospherics

Mark Malone, who markets Global Atmospherics' data and software to electric utilities, works at the company's Tucson, Arizona, headquarters.

Yet Global's monitors are so sensitive they now pick up individual discharges within a lightning flash. (The word "strike" is no longer part of the vocabulary of scientists who study lightning.)

Early Warnings

The intense lightning activity poses big problems for businesses in the Tampa Bay area. Several rely on Global Atmospherics to detect the bolts. For instance, Salomon's office in Tampa uses real-time data to decide whether to switch on backup generators so its computers don't lose power during a storm.

Busch Gardens has a lightning warning system made by Global Atmospherics that notifies park officials when lightning is within 30 miles. The system gives the theme park enough time to warn visitors to take shelter. At golf courses, the detection equipment is connected to an alarm. "When

AT a glance

Global Atmospherics Inc.
Business: Owns national lightning surveillance system and markets historical lightning data and lightning detection equipment.
Headquarters: Tucson, Ariz.
Owner: Sankosha Corp. of Japan
Employees: 95
Sales: Expected to be $15-million in 1998

the alarm goes off, everybody comes off the course," said John Woodson, staff assistant at the Tara Golf Club in Bradenton. "They don't take chances here."

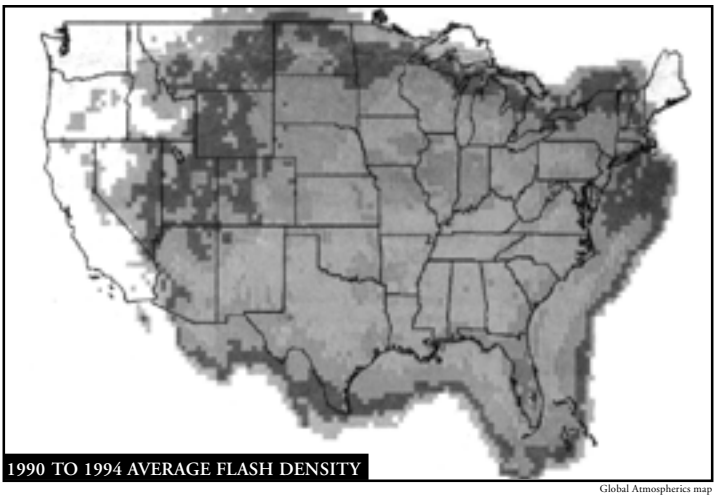
Insurers have turned to the company's historical data to investigate property damage claims. It is estimated that more than a half-million lightning claims are filed each year.

Electric utilities are especially vulnerable during thunderstorms. More than one third of Tampa Electric's service interruptions last year were due to lightning.

That keeps David Stephens, who supervises Tampa Electric's distribution system, up at night. He is on storm watch 24 hours a day. He has as many weather tools in his office as a meteorologist. He has radar on a large TV, hurricane-tracking software on one computer and the lightning detection system on another. He has turned his obsession with weather into a hobby by collecting photos of lightning strikes, which are hung in his office. Some of the photos came care of Global Atmospherics, which sends out snapshots as Christmas cards.

In 1978, Tampa Electric became the first utility in the nation to deploy lightning sensors. At that time, lightning flashes were plotted on a map of the service territory and printed out. "In the beginning, nobody looked at the print-outs," Uman recalled. "By the end of the summer, everyone wanted their hands on them."

Today, a lightning flash appears as a blip on Stephen's computer screen within 30 seconds of the event. The system gives



Global Atmospherics map

Global Atmospherics records on average detect more than 50-million strokes of lightning blasting the continental United States a year, or about 2 every second. The company's density maps, including this one of the 1990-1994 rates, show that Central Florida is the lightning capital of the nation. One part of northern Hillsborough County received 48 to 56 strokes per square kilometer in 1996, which is "a lot of lightning," company spokeswoman Donna Forgie said.

him advance warning of at least an hour on approaching storms. With the head start, he can precisely position repair crews, resulting in shorter power outages.

Stephens doesn't know how much money the company saves using the detection system. But other utilities say they have reduced labor costs by as much as $60,000 a year.

Besides using real-time information, utilities are finding Global Atmospherics' extensive archives of lightning data to be valuable. In particular, the historical data can determine how vulnerable power lines are to lightning hits.

In one instance, Florida Power traced several power outages near Orlando a few years ago to lightning strokes. (A typical stroke produces 100-million volts; by comparison the strongest transmission line carries 500,000 volts.) The company responded by beefing up the lightning protection of a power line in the area, which reduced customer complaints. "Outages don't have to be a mystery any more," says Mark Malone, who markets Global Atmospherics' data and software to electric utilities.

Electric utilities will account for about 20 percent of the company's expected 1998 sales of $15-million, Malone said. The utilities industry is gaining on Global Atmospherics' biggest customer, the federal government.

The company tracks lightning for the National Weather Service. It helps the Federal Aviation Administration steer airplanes away from heavy thunderstorms. It assists NASA with shuttle launches.

The government, in fact, funded the initial research that launched the company. In the 1970s, the U.S. Bureau of Land Management needed help fighting forest fires in Alaska. It called on two scientists, UF professor Uman and E. Philip Krider of the University of Arizona, to devise a sensor that would detect and locate lightning strikes.

The pair had been researching the unique electromagnetic signals produced by lightning.

They patented a sensor and formed a company to manufacture it. The first measurements were made visually. Later, a third researcher developed a computer system that automatically calculated the location of a lightning flash.

While the government began installing sensors in the western United States, a research group funded by electric utilities bought the monitors to deploy in the East.

The systems were later united under Global Atmospherics and became known as the National Lightning Detection Network.

Because Global Atmospherics' technology is hard to duplicate, the company has little competition in the market. "We're the Microsoft of lightning detection," Malone said.

In that analogy, Uman would be the Bill Gates of Global Atmospherics with one exception — he no longer shares in the profits of the company he helped to found. But in true academic fashion, he is satisfied that his research found a home outside his lab. "This is a real sterling example of how basic research has found many practical uses."

- Information from *Times* files was used in this report.

THE EVENT

PETRIFIED LIGHTNING FROM CENTRAL FLORIDA

A PROJECT BY ALLAN MCCOLLUM

CONTEMPORARY ART MUSEUM
UNIVERSITY OF SOUTH FLORIDA

MUSEUM OF SCIENCE AND INDUSTRY
TAMPA, FLORIDA