

A DIFFERENT LOOK AT HURRICANE ANDREW—LIGHTNING AROUND THE EYEWALL

Randy Lascody

National Weather Service Office
Melbourne, FL

The track of hurricane Andrew in August 1992, was followed closely by millions of people through satellite and radar observations. In fact, it was the first hurricane tracked by a WSR-88D operated by the National Weather Service. But is it possible that Andrew's track could have been followed through lightning detection equipment? This is precisely what the National Weather Service Office in Melbourne was able to do as Hurricane Andrew neared the southeast Florida coast. A circular pattern in the lightning was evident as Andrew moved across the warm Gulf Stream waters clearly defining the eye of the hurricane!

Lightning data available at Melbourne are supplied by Atmospheric Research Systems, Inc. (ARSI) through a dial-in port. The data are obtained through the Lightning Position and Tracking System (LPATS). This system uses a time-of-arrival technique to position cloud-to-surface strokes. ARSI's software package, Video Information System (VIS), allows display and manipulation of the lightning data.

Figure 1 shows the circular nature of the lightning pattern as the hurricane moved across the Gulf Stream just east of Miami. About 15 cloud-to-water strokes were detected around the eye in a ten-minute period ending at 0743 UTC 24 August 1992. If we assume the lightning pattern is concentric around the eye, the approximate eye position determined from the lightning data is 25.5° N, 79.9° W. The composite reflectivity (in gray scale) from the Melbourne WSR-88D at about the same time is shown in Fig. 2. Again, the eye position is approximately 25.5° N, 79.9° W. (This is easily determined with the WSR-88D by positioning a cursor in the center of the eye and reading the cursor location from the information display as shown in Fig. 2 [CUR. L/L].)

Figure 3 is a composite of all cloud-to-surface lightning strokes for the period 0149 UTC to 0849 UTC. Lightning strokes associated with spiral bands were most numerous in Andrew's south quadrant, and in time lapse they can be seen rotating cyclonically inward toward the eyewall. Note that far more lightning strokes were measured in spiral bands away from the hurricane center as compared to the eyewall region. Another feature that persisted as Andrew was nearing Miami was that most of the cloud-to-surface lightning strokes occurred over the water. There was one band well to the north between Grand Bahama Island and West Palm Beach that produced lightning over interior sections of Palm Beach County.

Enhanced infrared satellite imagery indicated the convection around the center of Andrew increased considerably just before landfall. According to *NWS Southern Region Forecaster Notes No. 3* (1992), if a tropical cyclone passes over warmer water while other environmental conditions remain the same, the warmer water may play a role in cyclone intensification. Therefore, it seems possible that the increase in convection around Andrew's center at landfall may have been aided by warm Gulf Stream water. This is supported by the extensive lightning associated with Andrew's spiral bands and especially by the fact that lightning increased around the *eyewall* as it moved over the Gulf Stream. On the other hand, surface friction asymmetries may also have played a role in thunderstorm (and lightning) generation as the storm felt the effects of landfall.

This brief analysis of Andrew's lightning activity illustrates a phenomena that much of the meteorological community has not yet seen. In conversations with National Hurricane Center and WSFO personnel, I learned that extensive lightning in hurricanes has *not* often been documented. Given that Andrew is the most costly hurricane on record, I am sure that more in-depth studies of this and other aspects of the hurricane will be forthcoming.

Reference

NWS Southern Region Forecaster Notes No. 3, July 1992: Do The Strongest Tropical Cyclones Occur Over The Warmest Waters? Scientific Services Division, NWS Southern Region Headquarters, Fort Worth, Texas.

Author

Randy Lascody entered the National Weather Service in 1986 at the Weather Service Forecast Office in Miami, Florida. He is currently at the National Weather Service Office in Melbourne, Florida and has been there since 1990. Randy received his Bachelor of Science degree in meteorology from Northern Illinois University in December 1981. His special interests include all aspects of operational forecasting, from the synoptic scale to the unique Florida mesoscale environment.

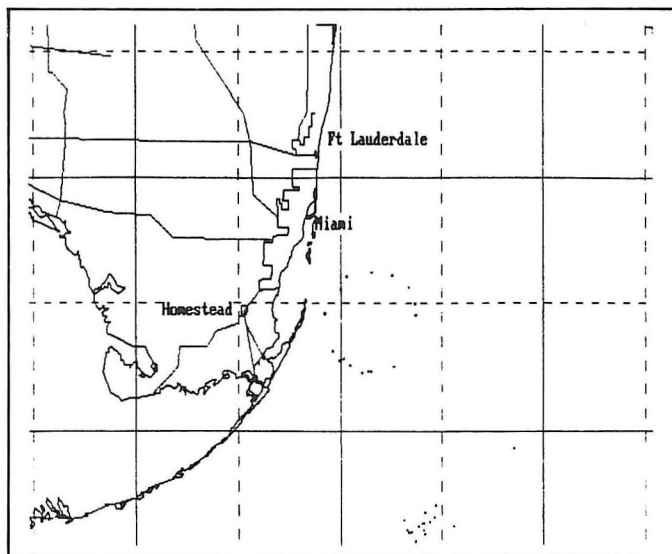


Fig. 1. 10 minute composite of cloud-to-water lightning strokes ending at 0743 UTC 24 AUG 1992.

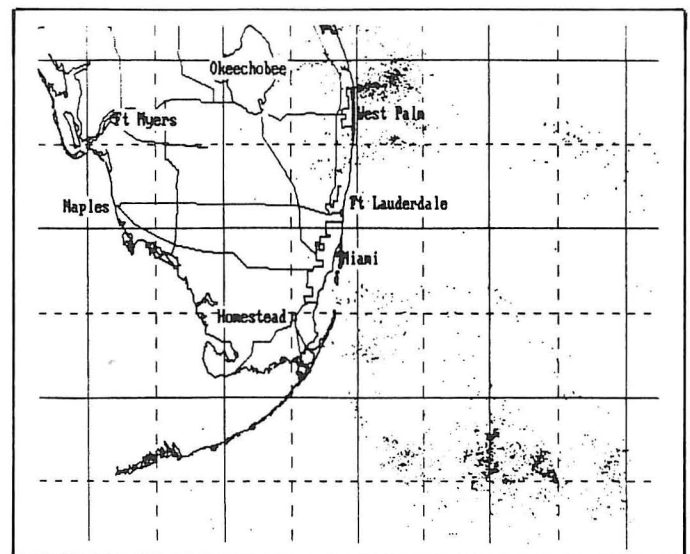
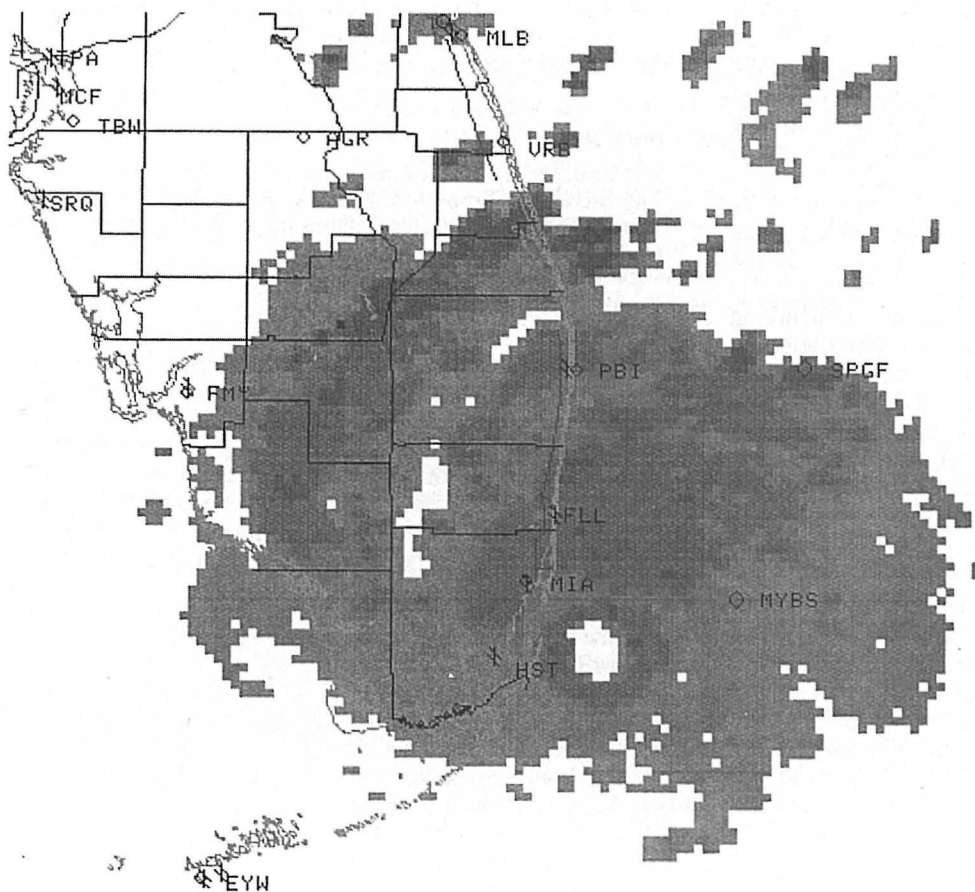


Fig. 3. Composite of cloud-to-surface lightning strokes for period 0149 to 0849 UTC, 24 AUG 1992.



10/15/92 07:20
CMP REF 38 CR
248 NM 2.2 NM RES
08/24/92 07:50
RDA:KMLB 28/06/46N
116 FT 80/39/14W

MODE A / 21
CNTR 166DEG 124NM
MAX= 63 DBZ

ND DBZ
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75

MAG=2X FL= 3 COM=1
OVL:AT

OVL U/A:ST M TV

MAPS U/A: CN

CUR. L/L 25/27/36N
79/56/13W

QUEUE EMPTY
7 RPS PRODUCTS
OVERDUE
15/0702 ARCHIVE
UNIT 1 READ DONE
HARDCOPY

HARDCOPY REQUEST
ACCEPTED

Fig. 2. Composite reflectivity from Melbourne WSR 88D. 0750 UTC, 24 AUG 1992.