

January 31, 1986
David Hoadley, Editor
3415 Slade Court
Falls Church, Va. 22042

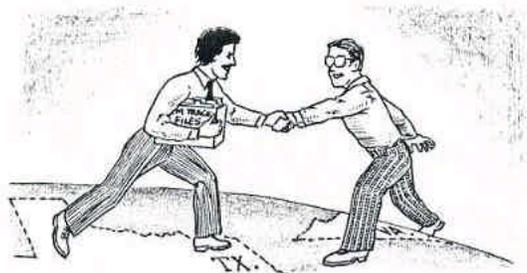
STORM TRACK
\$6.00/year

Vol. 9, No. 2
Bi-monthly
(Checks payable to
David Hoadley)

I. COMMENTARY

This is the 50th issue of Storm Track and an appropriate turning point in the history of this newsletter. With this copy, I am announcing a change in management. After the March 31 issue, the new Editor will be Timothy P. Marshall, 1336 Brazos, Lewisville, Texas 75067.

For the first time, Storm Track will be prepared by an accredited meteorologist. Tim received his B.A. in Meteorology from Northern Illinois University at De Kalb (1978), as well as an M.A. in Atmospheric Science (1980) and a second M.A. in Civil Engineering (1983) from Texas Tech University. He began chasing in 1977, continuing a lifelong interest since seeing his first tornado at age 11 -one of several deadly twisters that struck northern Illinois and his home town of Oak Lawn on April 21, 1967 (Doing F0 damage locally, except for an F5 wipeout of his "tree fort"). Since then, he has seen and photographed 30, including a very rare mile wide tornado. Tim occasionally chases with his wife, Kay, who is also a professional in quite a different but interesting line of work -as a "Vertebrate Preparator." With a degree in museum science, she prepares specimens for exhibits in museum display cases -including rare animals, small mammals and birds. Also, as a qualified ornithologist, she spends part of each storm chase spotting and recording Texas bird- life. Tim has published 15 technical and general interest articles (including photography) in various journals of the American Meteorological Society (AMS), Storm Data, Weatherwise, Storm Track, etc. His principal academic research was in developing a methodology for measuring the threshold wind speeds for various kinds of structural failure. He is currently utilizing this knowledge in his job with Haag Engineering Company, as he studies damage claims brought to the firm by insurance companies, trying to determine whether and to what extent weather was a cause for specific claims (i. e. A rotten wind or dry rot?). Tim is a member of various professional organizations, including:



The National Weather Association, AMS (President of the Local Chapter), American Society of Civil Engineers, American Concrete Institute, and the International Committee on Building Officials. Consequently, Tim Marshall brings to Storm Track a rich and varied background of professional training, extensive chase experience and a keen native interest in all severe storms, including hurricanes. Storm Track is certainly fortunate in acquiring such an editor and will be in very capable hands, beginning with the May 31 issue.

For my part, the time and work involved in writing, illustrating, publishing and mailing over 160 copies every two months is beginning to wear. Although I receive willing help from the family in certain of the more mundane tasks, it still remains largely a one man job -a week to ten days every two months. The illustrations alone take as much time as the writing and editing. Another concern is that it has been a little awkward for an east-coaster to collect and edit stories/accounts about mid-western and plains storms. While others have been very supportive in providing material, it is sometimes difficult -owing to distance and costs involved--to verify certain articles or to fill out partial accounts with more complete data. Also, I sense that the newsletter is becoming a little too faded, too much of one style and point of view. Turning it over to different hands may give it a new shot of vigor and imagination, perhaps with new Sections, perspectives and articles. I have encouraged Tim to put "his own stamp" on the newsletter and to try out different approaches. Making this change now, while it is still a strong and popular publication, is the right time. It affords new management more leeway to try out new ideas and formats. I will continue to contribute both articles and illustrations, even as the rest of you have been doing for me. The difference will be that--without the added burden of overall editing, assembly and publishing- I'll be less pressured and have more leisure time to be reflective, write and illustrate. In any case, after March 31, I shall join the rest of you in sending in articles and -then-eagerly awaiting each issue to see what new stories there are. I'm looking forward to it and to just becoming like everyone else.

I certainly encourage everyone to continue subscribing. Over the years, Storm Track has grown to fill a real need for chasers -to communicate with each other, share chase experiences and learn more about storm photography and severe storms. Your loyal and articulate support has helped shape it into a quality periodical, hopefully reflective of the best in chasing and portraying ourselves accurately and insightfully to the rest of the world. It's the only written medium that brings chasers together from across the country.

However, if you don't want to continue your subscription beyond the March 31 issue, please send me a written notice to that effect by March 15 ("The Ides of March"), and I'll return the unused balance of your subscription -plus reimbursement for your postage. If no such notice is received by then, your subscription will be continued under the new Editor.

After the March 31 issue, I'll pack up all current subscriber addresses, unpublished materials, some of the correspondence and a check for the balance of the remaining subscriptions and send these to Tim Marshall. I shall do what I can to support and encourage Tim in this ambitious new undertaking. It is a time for new ideas and vision. If you continue to support him with articles and comments, as you did for me, then Storm Track will continue to be creative, educational, entertaining and thought provoking - serving the needs of storm chasers everywhere.

Please note the increased subscription price with this issue -from \$4.60 to \$6.00. With the recent change in my copying source, expenses are again close to overtaking income. It also coincides closely with Tim's estimated requirement, when he takes over, so this increase is both appropriate and timely.

II. ROSTER

The Roster lists names, addresses and brief biographies of those interested in or willing to correspond with others about storms. Normally, only recent entries since the last issue are included.

Name	Address	Chase country - range
Joel Ewing	14112 N. Como Drive Tucson, Arizona 85741	Northern-central-southern plains (Wherever it occurs)

(Biography: "Age 31, raised in Nebraska and Arizona; am an auto dealer. Family branded me a nut, 'When everybody was diving for the cellar, I was grabbing my camera.' I would very much like to chase with a real pro and learn about both storms and chasing. Can provide car or 4X4, camera, etc. I am willing to put forth a serious 'banzai' effort and would like a partner or team who feels the same. All correspondence answered"(Phone: 602-297-2628/evenings).

Dave Gallahe (Address change)	4104 B. S. Memorial Parkway Huntsville, Alabama 35802 (Phone: 205-881-5990)	Alabama, Mississippi, Tennessee, North Florida, Georgia (early spring and fall) and Texas/Oklahoma/Kansas in the late spring.
----------------------------------	---	--

(Biography: "Age 39, professional musician -now working with the Thrasher Brothers out of Nashville. Have been chasing 'informally' for eight years, 'Formally' for one. Life long interest in tornadoes. Am also very interested in purchasing good VHS copies of other chaser's successes - and I will respect copyrights.")

Mark L. Paran	84 Gainsborough St., #106 Boston, Massachusetts 02115	Plains states (plans to chase this May from 9-26, from and back to Boston)
---------------	--	---

(Biography: "Age 32, single, attorney; veteran weather watcher and lone wolf tornado hunter for several years with good instinct and sharp eye for storms. Drives a 280ZX 2+2 5-speed Turbo, that is a proven chase car under all conditions. Flawless driving record (over 250,000 miles without an accident or moving violation), including numerous long-haul shifts. In person, down to earth and friendly--if sometimes reserved, intellectual, candid (with respect) and seeking like minded person as a chase partner. Must be someone who is hopelessly addicted to catching the great storms and of proven ability to take charge of the Turbo. Prior actual hunting experience helpful but not strictly necessary, so long as interest and enthusiasm -along with some basic knowledge of' severe storms- are present. Expect to cover at least 9,000 miles, including extensive night driving as well as direct charges through all manner of heavy weather. The first night out will probably end about 1,200 miles out, near St. Louis. The final return May 25-26 will probably be similar. Helpful if partner can contribute video capability; I have a good camera kit but no video. All responses will be answered. Aspire to have plans set by the end of March.")

III. LETTERS/PHONE CALLS TO THE EDITOR

David Keller, a new subscriber from Wisconsin, writes: "I first began chasing a few years ago, while operating the 'McIDAS' computer at NASA's Marshall Space Flight Center in Huntsville, Alabama. A tornado report caused everybody and their friend down the hall to rush in and ask me to display the latest satellite loop for them. Hell, I had work to do! I had not been spending government money collecting volumes of high resolution satellite data just so a lot of curious visitors could come crowding in to gawk idly at the cloud images. In disgust, I got up and jumped in my car to have a look myself (Of course, I saw very little that first day). - - I chased perhaps 10 more times and a couple of thousand miles (I was a solo act and long trips were OK with me) in Alabama and then in my home state of Wisconsin. In May-June of 1985, I went to Oklahoma University to chase. - - - What a sobering experience! I chased with Marty Feely. He is not a meteorologist, but he sure knows the sky. After we saw a tornado near Anadarko (50 miles west of Norman), I wanted to stop for a Cola on the return trip home. It was dark by then, and I personally couldn't see a thing. But, Marty would look out, look around and say 'Keep going.' Later that evening, we learned that one of our colleagues--about 20 miles or twenty minutes behind us--had approximately \$1,500 worth of damage done to his car by 3" hail! I know that Storm Track emphasizes safety tips. My advice is: Go out with an expert. I am a meteorologist, but I might as well never have seen clouds -compared with what I learned and saw that trip to Oklahoma."

Dave Gallaher, from Alabama, writes about his "first organized chase! I was able to set aside June 3-9 and drove straight into a magnificent Cb southwest of Oklahoma City on the 4th (I think), which dropped a vortex for a few minutes. Even though I had driven all the way from Alabama, I couldn't resist pursuing this storm. I got some good video of the north and northwest structure, however, the RFB was gone by the time I reached the 'business end.' I spent the next several days working a front that became stationary over Texas and Oklahoma and correctly picked a tornadic Cb west of Enid. However, all I was able to video were towers that appeared case-hardened and drop forged. Once again, rotation had ceased by the time I got near. - - - I was especially taken by the friendly and encouraging staff that I encountered at the Oklahoma City, Wichita Falls and Abilene weather service offices. All the personnel were helpful and showed interest in my endeavors, even though I'm an amateur. I was even able to bounce some theoretical thinking off of patient ears at each location. Although I failed to intercept a tornado this trip, the experience alone was worth the endless hours of driving, ... and I'll do better in '86."

IV. BULLETIN BOARD/COMMERCIAL MARKET - \$- FOR PICTURES

V. CAMERA TIPS

VI. TRAVEL TIPS

VII. FEATURE

1986 Hurricanes

(Editor: The following documentary is based on seven (7) different hurricane reports. Of necessity, I have had to edit these substantially to fit available space. Unfortunately, they can't be continued to the next issue, since I still have 5-6 pages of copy to wind up tornado-chase '85 and have to do this before the May 31 issue - to make space for now accounts from Chase-'86. I hope that the authors will understand. So, bring in the cat, board up the windows and here we go.)

ELENA, August 28 - September 4 (Account by the team of Jim Leonard, Michael Laca and Richard J. Pasch - from Florida) (Illustration based on Jim's video tape)

Anticipating nearby landfall five days before this meandering storm reached Biloxi, Mississippi, the Leonard chase team initially flew to New Orleans on August 29--only 40 miles from Biloxi-- and secured a rental car. Over the next five days, they proceeded to Biloxi (8-29); Apalachicola (8-30); Tallahassee and Cedar Key (8-31); back to Pensacola (9-1); and an early morning return to Biloxi (9-2) for a rare daylight intercept of a well organized hurricane eyewall--passing directly overhead!! How did team leader Jim Leonard know exactly where to go, hours before any of the Miami forecasters

could fix a point for landfall? Jim reported that he closely watched the satellite photos, radar reports and synoptic maps--and then said something to the Editor about "Hurricanes have their little tricks." (or) "Friction with the land tends to pull these storms inward.' The Editor dutifully nodded in agreement and wrote it all down but later decided that these notes were well beyond his depth. Therefore, Jim Leonard's impressive ability will not be explained here. The following highlights are excerpts from a detailed, nine page chase log over these five days (All times are local CDT or EDT; winds are estimated surface values in MPH):



Thursday, 29 August, 1985

2025 Arrived in New Orleans. Weather: thin cirrostratus, winds light and variable, temperature 80 deg F... Moon (almost full) shining brightly through cirrostratus and some scattered cirrocumulus. Winds nearly calm between New Orleans and Biloxi.

2150 Arrived in Biloxi. Stayed overnight at the Broadwater Beach Hotel (lobby roughly 100 yards from the Gulf). This was the only hotel in the area receiving customers (mostly media representatives)."
(Editor: The Leonard chase team returned here on the last day for their fateful encounter.)

Friday, 30 August, 1985

0740 Still at the Biloxi hotel. Mostly clear skies overhead, with a few stratocumulus scud racing by from ENE. Impressive looking curved boundary of cirrus ... S through ENE. Winds ENE 10-12. Gulf seas (near shore) 1-2 feet. Tide some above normal.

1118 In Theodore, Alabama, we can see...the first band of the storm, SE of Mobile. It consists of multiple layers of altocumulus, cirrostratus and towering cumulus.

- 1407 On the coast at Pensacola Beach. Wind ENE 25, gusting a little higher. Gulf near shore is very rough. Waves approximately 12 ft. high are moving towards shore and the wind is blowing spray off of them in a direction parallel to the coast. Fishing pier is...starting to collapse. We can see a solid wall of clouds with a few embedded Cb, basically parallel to the coast, less than 10 mi. offshore. Sky is cloudy with cirrostratus and altocumulus overhead--but mainly clear to the N and W.
- 2100 Arrive in Apalachicola...experiencing our first significant squall.. winds gusting to about 40...we noted flashes from electrical transformer blowouts just to the left of the highway...followed by power outages over that area.
- 2130 Staying at the Rainbow Marina and Hotel (on the Gulf) in Apalachicola.
- 2300 Squalls more violent; winds NE, gusting to near 70; heavy rain.

Saturday, 31 August, 1985

- 1130-43 Between Perry and Shamrock, Florida. Winds have been veering as we drove southward; now 100 deg at 20, gusting to 30. Rain almost completely ceased beyond this point.
- 1237 At a point on Highway 24 about 2 mi. NE of Cedar Key, winds SE gusting to 50 with light rain. Waves breaking across road and impossible to proceed further...

Sunday, 1 September, 1985

- 1200-1210 On Highway 24 between Cedar Key and the coast. Again estimating wind gusts to 60 with torrential rain. Spiral rain bands (as evidenced by obvious darkening of the sky) are passing through this area quite frequently, at roughly 10 min. intervals.
- 1845 Main road northbound from Fort Walton Beach is jammed with evacuees.

Monday, 2 September, 1985

- 0200 In Biloxi, Mississippi (back at the Broadwater Beach Hotel)...overcast is now solid altostratus with NNE wind at 20-25. Moon faintly shining through the cloud deck No rain. We remained at this location until 1400.
- 0330-50 Radar shows the first weak precipitation band only a few miles away (ESE). Weather still not severe, although the hurricane center is roughly 75 miles ESE. Overcast, no rain, wind NE 25 to occasionally 30.
- 0420 Bluish flash ESE. Increasing number of these flashes during the next 90 minutes...
- 0600-0615 Dramatic increase in wind velocity (gusts above 50) and rainfall rate; winds backing somewhat.
- 0700-0707 Believe we are in the eyewall...observed the strongest winds overall. Winds have a freight train-like roar. Substantial pine trees are being snapped off. Air filled with debris, rainfall still phenomenally heavy...Sustained winds are well above hurricane force, and gusts are probably reaching the 110-120 range from NNE.
- 0707-0711 Brighter sky, rainfall rate reduced but winds still well above hurricane force, gravel from rooftops being propelled through the air like buckshot.
- 0713 Brighter sky appearing to the SE and SSE.
- 0733 Sky is definitely brighter, winds have slackened off--now gusting to 40 or 50. Sea gulls flying overhead.
- 0735 Edge of the eye apparently moving over our location. Cloud motions have slowed considerably. Light drizzle or mist observed. Surface winds have already shifted and now generally SE. Smoke (from a fire to our east) in the air.
- 0741 It appears that the center of the eye is nearly overhead. We note a curved cirro- stratus edge to the south and (a few minutes later) to the north, with some blue sky overhead. The SW portion of the apparent eyewall shows embedded Cb activity.
- 0747 The northern view of the curved cirrostratus edge, with mostly blue sky overhead, is most distinct at this time (oriented about 30 deg from the zenith). A full panoramic view of this edge (which would seemingly form a complete circle) is obscured by scud clouds. We estimate the diameter of the clear zone to be roughly 5 miles. Only a few brief periods of calm in the eye. Winds (at treetop level) generally SE 15-20. No direct sunlight. Birds (seagulls and hawk-like species) observed flying overhead in the center and NW edge of the eye.
- 0800 Eastern eyewall moving over. Rainfall rate generally increasing; rains have a showery character at this time. Wind SSE, highly variable in speed. Sky remains bright to the NW until 0805.
- 0810 Hurricane force winds have again set in.
- 0822-23 SSE or S winds...around 95 to 100.
- 0846-0847 Conditions less severe; winds S, 45, gusts to 60 (gust to around 70 at 0848). Very low scud cloud fragments are moving from SSW at incredible speeds."

(Jim Leonard got one chuckle from a report that the Weather Channel's Glen Schwartz, out filming Elena, ran out of gas between Tallahassee and Pensacola -while in the heat of the chase, Says Jim, "I always top off when I'm down to half a tank and never let it get below that." With frequently closed service stations in the path of a hurricane, take a note, Glen, from the Expert.)

After Elena, the storm gods turned their attention toward the east coast.

GLORIA, September 16 - 27 (Accounts by Jack "Thunderhead" Corso of Harrison, New York; Joseph R. Jacques of Blackstone, Massachusetts; Richard (Rick) Schwartz of Rockville, Maryland; and Robert (Bob) Welch of Virginia Beach, Virginia.)

Joseph R. Jacques watched it develop on cable TV "in the vicinity of the Cape Verde Islands. This was when I first became attuned to that small and insignificant disturbance hundreds of miles from here. Of course, that was all I needed to catch my attention. For the next several days, twice a day, I checked out the tropical forecast updates -- following the storm's movement on my magnetic plotting chart as it tracked due west."

Bob Welch also intently watched and waited. "Gloria was a classic Cape Verde hurricane, which formed near that island on September 16. It remained a weak tropical storm for four days but reached hurricane strength on the 22nd. It intensified rapidly as it passed north of Puerto Rico on the 24th, with maximum winds of 135 MPH. At 10PM (EDT) that night, Gloria had the highest winds of 150 MPH and a central barometric pressure of 27.14 inches (919 millibars), making it the fourth strongest Atlantic hurricane EVER- -and THE strongest hurricane EVER to threaten the U.S. Atlantic coast!"

Jack "Thunderhead" Corso speculated on the possibility of a mainland strike. Little did I realize that I would soon have my first real encounter with a Cat 4 monster, let alone getting the chance to go into the eye (another first)! I usually refrain from wondering about situations like that, because they are (always) 'too good to be true.' To top that off, I had to travel less than 60 miles from my home in Harrison, New York. - - - By the time she reached her peak off the Bahamas, with winds around 150 MPH, I dropped Jim Leonard (veteran hurricane chaser from Florida) a line, mentioning Cape Hatteras as a possible 'Doomsday' mark, while everyone was projecting a northward turn."

Welch: "At noon (EDT) on the 25th, the storm had turned northward and a Hurricane Watch went up for the North Carolina coast. Three hours later, it was extended to include southeastern Virginia. At 6AM on the 26th, the whole area came under a Hurricane Warning - the first for southeastern Virginia since Doria threatened in October, 1967."

Jacques: "My pulse began to pick up - but its present NW course indicated landfall around Georgia or South Carolina. Well, I'll probably miss out again. Either it makes landfall or will probably start bucking; its zone of maximum winds shifting from the NE quadrant to N - thus blocking its own forward motion and taking it out on an erratic course to Bermuda. - - - At this point, quite a few possibilities existed. But, having tracked and studied these disturbances for some 30 years, I was not 100% fired-up just yet."

Corso: "On the 25th, fellow chaser Scott Gruyan of Bronxville, New York and I went, on 'Yellow Standby,' just in case Gloria should turn north up the Chesapeake Bay,"

Jacques: "Advisories say that Gloria would probably make landfall in South Carolina, although the NWS mentioned possible northward curvature still likely, due to high altitude steering currents - running parallel to the east coast. However, many media forecasters now seemed quite certain that landfall would occur in S. Carolina. The Atlantic seaboard up to Plymouth, Massachusetts was now under a Hurricane Warning, with a Hurricane Watch on northward to Eastport, Maine. During the early evening, the storm increased its forward speed to 21 MPH, but maximum winds diminished somewhat to 135 MPH -- still the strongest and largest this century to come up the coast. - - - My wife, Lucille, and I drove over to the adjacent town of Woonsocket, Rhode Island to see the preparations. Stores, banks, homes - all windows being reinforced with all types of supporting tape, giving the appearance that Halloween was just around the corner. In stores, batteries were a sellout; flashlights, lanterns, propane camping stoves, ice cubes, milk, bread--all selling like hotcakes. Meanwhile, the storm continued advancing; a bit late to pull a surprise & veer eastward to open waters."

Corso: "On the 26th, it became very apparent that I would be right and Cape Hatteras would score a direct hit. During the day, reconnaissance aircraft reported a more northerly turn. With this information, we went to 'Red Alert,' now expecting an encounter with a killer storm - - - 'With light rain and muggy air that night, I went to work at 12 AM - with headphones on to monitor the storm's path. Everyone I talked to that night was very, very nervous. It was extremely hard for me to hold in my excitement, as I was now wondering on my course of action."

Meanwhile, Rick Schwartz had already set his course and was driving east to the Delmarva peninsula for a possible intercept. "I left the Washington, D.C. area shortly after noon on the 26th, when Gloria was located about 500 miles to the south and all forecasts had it near the Washington/Delmarva area by evening. I drove towards Rehobeth, Delaware and planned to take the coastal highway to Ocean City, before deciding where I would spend the night. - - - About 15 miles from Rehobeth, the rain began - lightly at first, but within half an hour picking up to a steady downpour. I arrived at Rehobeth Beach shortly after 4PM, with Gloria still 450 miles to the south. Nevertheless, the seas were getting rough, rain was increasing in intensity, and a stiff 15-20 MPH wind was blowing in from the ESE. Driving through the streets of Rehobeth gave me a bit of a chill. Shop after shop had windows boarded or taped up. Some of the boarding/taping was still going on. On some of the shops were signs that tended to be

either humorous or almost prayerful. 'Gloria, be gentle,' stated one. 'Hurricane sale on Saturday (If we are still around),' said another. The boardwalk (which would be heavily damaged in the storm) was almost deserted, except for a few shop owners making last minute preparations, a few curiosity seekers, and a few crazies--some surfers and swimmers, who were challenging Old Man Neptune. A man, who might have been the local Postmaster, wrapped plastic around the lone mailbox on the boardwalk (The mail must go through, you know). - - - I began to head south toward Ocean City, a distance of about 25 miles. The driving rain, which was beginning to flood the highway, made it seem much longer. I debated whether to stay near the coast or head back to Washington. At 6PM, the storm had moved a bit further to the west than it had been at 3PM, and that made me believe Gloria might track up the Chesapeake Bay rather than stay out at sea. Perhaps home would be the best place to observe the hurricane after all. The rain, often overwhelming my windshield wipers, gave encouragement to that growing belief. - - Just outside Ocean City, I was halted at a police roadblock. The lone officer asked me what business I had in Ocean City and cautioned that a decision had been made to evacuate the area. Everyone had to be out by 11PM. That would give me about five hours, if I chose to visit the town. At a shopping mall along the coastal highway, a sign flashed a message seldom seen -- 'The Mayor and Council have put into effect Phase III of the emergency plan... Everyone must leave by 11PM' I made the decision to go inland about 30 miles to Salisbury. Even if I could find a way to stay for the storm, it was obvious that--long before the winds and waves grew impressive--the poorly drained roads would likely be impassable. If I wanted to make a last minute evacuation, I would be unable to. Ocean City is on an island, and that made conditions even riskier. Safety comes first. - - - Traffic was almost bumper-to-bumper on the road leading to Salisbury. Many cars were towing boats. The traffic was not unlike that on any summer Sunday night, when weekend vacationers head back home. How ironic the situation was now! - - - When I arrived in Salisbury, I found the motels had 'No Vacancy' signs. I passed an evacuation shelter, where people were just beginning to arrive. Having no place to stay, I decided to drive the 100 miles back to Washington. At some point, I hoped to escape the incessant rain, but it never let up--the whole way back."

Jacques: "The situation was critical--this now being the evening of' the 26th--special bulletins and storm precautions were being issued on all media. I stayed up until 1:30AM (morning of the 27th) to check out the latest. No change. Collision course with New England a certainty! Oddly, the previous Friday (Sept. 20th), I had attended a lecture by Everett S. Allen--author of 'A Mind to Shake the World.' That was a history of the great 1938 hurricane, and it was sponsored by the Blue Hill Observatory Weather Club--of which I am a member. Now, a week later, we awaited Gloria. Meanwhile, I went to bed, wondering what kind of a day this would be; what lay ahead ... after all, it was being booked as the most violent tropical disturbance of the 20th century to come up the coast. I didn't sleep well. Kept thinking of the storm."

Welch: "At 3 AM on the 27th, Gloria passed directly over Cape Hatteras, bringing 100+ MPH winds and a minimum barometric pressure of 27.98 inches. By this time, Gloria had weakened slightly to 130 MPH--with the eye passing 40 miles offshore. This was the weaker west side of the hurricane, and southeastern Virginia was spared the worst. Rainfall from the storm averaged between 5 and 7 inches over the area (Cape Hatteras got only 2.10 inches). Sustained winds reached only minimal hurricane strength (75 MPH), with some gusts to 90 MPH--and then only for about half an hour. Some occasional distant lightning/thunder was encountered, but there were no tornadoes, their watches or any other severe weather. All in all, southeastern Virginia got off the hook again."

Jacques: "Up at 6AM to take my regular observations, which I reported to WBZ-TV in Boston. But the 6 o'clock obs are far from indicating a monstrous storm to our south: Cloudy skies, fair visibilities in fog, and NE winds averaging 1 MPH. Meanwhile, Gloria increased her forward speed to 25 MPH, but dropped her maximum winds to 130 MPH. As I noted the distribution of hurricane force winds to gale force winds from the graphics on the 'Weather Channel, I saw one important change. The area of hurricane force winds had increased by 300-400% over the previous display, and there was a corresponding decrease in the area of gale force winds by 200-300%--that area having been mostly taken over by the hurricane force winds! This was an important change, I theorized. This type of phenomenal growth in 6-8 hours at these latitudes led me to believe one of three things: either (1) it would be a killer storm, or (2) it had momentarily converted most of its potential energy to pure kinetic energy--with less potential for maintaining its present size and power, or (3) it would begin receding in area to a more stable circulation. At 10AM, the forward speed increased to 35 MPH, while hurricane winds declined to 120--now positioned off the New Jersey coast."



Panic!

Corso: "With daybreak of the 27th, after hearing of the direct hit over Cape Hatteras and with Gloria still coming at us, I proceeded to Scott's house to gather all of our video equipment. My camera gear was already with me. At 8AM, we were enjoying our 'last meal,' while Gloria was some 80-90 miles due south of Atlantic City. At 9AM, with gusty E winds, sporadic heavy showers and a sky full of low cumulus fractus, we tried to get our gear in order. At this point (to our horror!), we found that Scott's portable battery pack would not work. After a couple of minutes of filming and operating, it went totally dead. PANIC!!

We worked on it for an hour but to no avail. Nothing would work, and there was little time left. I felt sick, knowing that THE video (probably of my life) would forever pass me by! Also, I would let people like Jim Leonard down, without having anything to show. Still, I had my 35 mm camera and--having dealt with strong winds before--felt some consolation that all was not lost.

Having a hard time with erroneous radio forecasts and statements that Gloria would take a path east of New London, Connecticut, we decided that her path would take a course through Fire Island, Long Island, over Long Island Sound and then over Bridgeport, Conn. . 'With I-95 at our doorstep, Scott and I decided to head towards Connecticut, east of Bridgeport, to be in position for any eastward shift in the storm's track. - - - At 11AM, we were well on the way, having given up on our video prospects and making sure my wife, Joan, was not about to go into premature labor. Whew! What pressure! - - -



Scott braving hurricane force winds

We were ready! The wind was becoming unbearable now, and we could no longer open the car doors. It was obvious that we were now inside the eyewall, with winds over 100 MPH and veering more southerly--so we braved our vehicle to the west, slowly and on a completely deserted I-95. - - - As the torrential rains let up, skies became suddenly lighter. We picked up speed until we finally broke into sunlight and bright blue skies" (Editor: Unfortunately, Jack's print at this time did not photocopy well and is not shown here). "The time was 1:10PM on I-95, and we were inside the eye! This was a real breath-taking experience to know that -surrounding us- there was hell going on, while here we wore--in calm, beautiful weather. An outrageous feeling!! - - - Most of the wind damage from Hurricane Gloria seemed to be on the east side of the eye. On the west side of this storm, the main problem was flooding due to torrential rains -a real 'one-two punch.!"

Jacques: "Here in Blackstone, I recorded gusts to 30 MPH. with an occasional tropical downpour. I was bracing for winds up to the 100 mark, as Blackstone was in the zone of maximum winds. As the hours passed, however, I realized that such extreme winds would not materialize. 'While outdoors with my German Shepherd, LeBoy, and my son, Charles, I clocked winds of 20-25 MPH on my hand held anemometer. However, at treetop level (60 feet and above), the tops were being lashed and whipped around at estimated speeds of 65-70 MPH' " (Editor: A classic description of hurricane wind shear, where low level winds are slowed by surface friction while upper level winds continue unabated -- a good breeding ground for hurricane tornadoes, if other conditions are also present.) "Advance warning of

oncoming gusts was heard in the distance, as a rumbling or freight like noise, as the wind was being funneled through the Blackstone valley -in venturi like fashion. In seconds, one particular gust was overhead, and we heard the thump of trees 1-2 feet in diameter crashing in the forest. We watched all this overhead action, while winds of minimal force played about us. In this area, there were no sustained winds--gusts quickly built and then subsided into interims of calm. These SSE winds prevailed for about 2 hours, before the backlash winds from the NW struck.



Although there was significant tree loss, no ground level damage was in evidence, such as shattered window panes, toppled signs, etc. Observations here at the station indicated maximum winds of 45 MPH, minimum barometric pressure of 29.14 inches and storm precipitation total of 0.91 inches. "

Corso: Heading back towards New York, we started to realize how worn out two hours of high winds can make us feel. We were now ready for Part II -- the backside. The winds picked up fast at Stamford, Connecticut from the NW--but were not as fierce as anticipated. The chase ended back in Rye, New York, with a small rainbow at 3PM as Hurricane Gloria increased her forward speed and bid farewell on her way to Canada ... and history."

A final word from Joseph Jacques: "And now the aftermath--thawed freezers, no street or house lighting, no TV; just a few lanterns aglow here and there. The following morning-- cleanup time. For many, picking up of twigs and branches, For others not so fortunate, the task of clearing large limbs from lawns or the clearing of 2-3 foot diameter trees on rooftops. And when will the forces of nature again spin a similar merry-go-round of wind and rain for New Englanders--we'll 'wait and see.'"

KATE, November 19 - 21 (Account by Jim Leonard)

Jim and a friend, Michael Laca (also on the Elena chase), intercepted the season's last hurricane, Kate, to strike the mainland -in what Jim described as "the most hair raising chase I've ever been on!" Starting at Key West in a rented Pontiac Grand Prix, they tracked the storm up the west coast-- eventually winding up on US 98, just northwest of Apalachicola, Florida between 1-2PM There, they drove slowly back and forth along the highway, dodging limbs and occasional falling trunks from the scattered trees that lined both sides of the road. Estimating the storm surge of this "level 3" hurricane a few hours later than it actually occurred (a serious miscalculation!), Jim and Mike began getting in trouble while driving eastbound. Jim's VHS video tape records a view through the front windshield of a road gradually disappearing in the ocean, as trees bend with violently shaking branches and a constant staccato of rain bullets peppers the car-- occasionally blurring even what little they can see through the overwhelmed windshield wipers. The small, dry enclosure of their car seems more like a fortress-- isolated, alone and precarious, as an ocean surges around them--pulling at their tires, their car, themselves.



Continuing to drive and record, the tone of their voices begins to change -between the silences- from one of exultation and fascination to doubt, concern and then anxiety. At this point, the centerline disappeared under 2 1/2 feet of rising water, as waves swept around them -where the highway used to be. Their only guide then was the uneven tree line and the felt tire-pavement contact to stay on the road. Later, Jim said that the howling wind, pounding rain and constantly moving water surface were very distracting as he struggled to find and stay on the highway--slowly moving at 5-10 MPH and leaving behind a wake like a boat. The car actually stalled out two or three times and did become a "boat," as Jim occasionally felt it lift and float a few feet! Now, their only concern was a way out. They knew that a storm surge was approaching that could put their location under 4-5 more feet of water. The following excerpts from Jim's video tape recount those tense moments, as they peered intently over the hood -at a sea of waves passing between a few trees on both sides, marking the unseen boundary of the road, continued traction and the possibility of escape:

Jim (Driving): S--t! Talk about treacherous. This is unreal. God. This is why I'm glad I'm not driving my own car. (Visibility briefly down to 100-200 feet)

Mike: We can't even see if a tree falls in front of us (Chuckle).

Jim: I know. (Car lurches)

Mike; I don't think that's part of the road.

Jim: I don't like this.

Mike: Well, all we can do is go slow and hope we don't flood out. If we stay here, the water will get higher and higher and higher ...I wonder if the other way would be better?

Jim: Oh, no! We're stuck now!! ...oh ..ah (Engine starts again)

Mike: (Quietly but with conviction) "Get to the highest ground. I don't care where it is, just get to the highest ground. ...backwards ...forwards Please, not here, not here.

Mike: Try pulling a little more to the ... Which way is the roads? Is it on the right side of that palm?

Jim: I think that palm is on the left side. ...Don't stall now.

Mike: This has never happened before to you, huh?

Jim: No! Nothing near this. It's a very stupid thing to do.

Mike: Very.

Jim: I'm surprised this car is still going. ... Come on ... come on ..."

Finally, finding a slight rise in the road (additional 10 feet elevation), they took refuge and stopped

to survey their only escape routes--closed by eroding chunks of concrete or fallen trees--at either end of the highway. Eventually, at 11PM, the lights of another vehicle broke the long darkness, as a local power company utility truck came down a dirt road from the north and showed them a way out. Although the crew called to them through open windows, "You'll never make it," Jim fell in behind their truck and deftly drove the big Pontiac back north over that soaked utility road--slipping, squishing, sliding ..eventually to a higher road and the way home.

(One final note: A friend, Terry Nixon, was also out chasing in his truck in that same area, when he drove off a water covered road into mud at Cape San Blas--and stalled out in rising water and 100 MPH winds. When the swiftly flowing current began eroding earth from under the truck, he abandoned it in a life preserver and took refuge in a nearby house (oh yes, he also survived).

- - -

One final storm account is from the first of the season, Hurricane Danny. Eugene W. McCaul, Jr., a student at the Oklahoma University School of Meteorology, has done an outstanding job in writing up his chase experience and has included the best (largest) hurricane tornado pictures I have seen. Also contributing to this account is Dave Gallaher, who was watching at the same time.

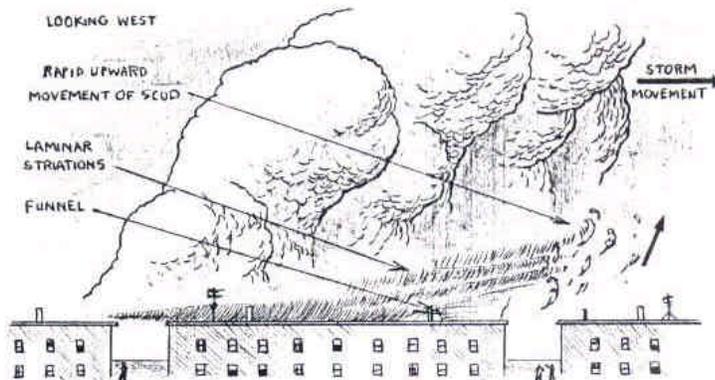
Danny, April 12 - 20 (Account by Eugene W. McCaul, Jr. and Dave Gallaher)

"Eugene W. McCaul, Jr.: "It was the 16th of August, another hazy, humid Tennessee Valley day. In Huntsville, Alabama, the place of my summer job at NASA's Marshall Space Flight Center, it was even more humid than normal. When I left my apartment for work, it was in the mid 70s -with low 70s dewpoints- and the sky was overcast, with occasional light rain. Hurricane Danny had come ashore in western Louisiana the previous morning, and its remnants were crossing the Mississippi near Greenwood - promising a wet day across northern Alabama. It looked like Danny would pass close to Huntsville later in the day, so I expected moderate to heavy rains and a few embedded thundershowers. But since there were only three small tornadoes in Louisiana the previous day--and Danny was already just a depression and getting weaker--it didn't seem like an especially favorable situation for further tornado activity. I was giving a seminar at Marshall that day on some research I had been doing for them and had to decide whether to carry my camera or my umbrella, in addition to my lecture materials. I hesitated for a moment, recalling that hurricane tornadoes had never been documented photographically--at least in a journal--but finally 'reason' won out. I took my umbrella.

It was at 11AM CDT, right during my seminar, that the first Alabama tornado (an F2) struck Parrish, a small town about 80 miles southwest of Huntsville. Shortly thereafter, the town of Jasper was hit by an F2, and before the day was over some 53 other communities had reported tornado damage in Alabama, Tennessee and Mississippi. The radio station I listened to on my way to and from lunch didn't say anything (!) about the storms, at least while I was tuned in, so I didn't know anything about the remarkable goings-on to my southwest. In fact, I was beginning to wonder whether Huntsville would even get a decent rain that day.

After lunch, the rain finally got cranked up to moderate, with big drops of the kind you see in thundershowers; but there wasn't any thunder or lightning. I was working in my windowless, interior office in one of the huge NASA warehouse-type labs at 3:30, when I heard a gust of wind on the roof above me. Still, there was no thunder, so I didn't give it a second thought."

At this point, Dave Gallaher was watching a just formed tornadic storm, from 4-5 miles to its east. Dave had a great view of the upper cloud striations but not the funnel itself (blocked by buildings). This one came out of a cluster with the vortex descending from the leading edge (from my moving storm with clear air all around (no rain) and obvious upward movement of scud off the front of the funnel. There were laminar striations on the side of the cloud base, very smooth in relation to the ragged appearance of the rest of the storm (Unfortunately, like Bill, Dave also did not have his camera with him). Overall, it looked like a small cluster of towers -none appearing very tall (Bill McCaul reported 31,000 foot tops). There was no anvil, no RFB and no rainshaft! In all, there were no traditional thunderstorm characteristics at my location. In fact, it looked more like the clumps of low cumulus off the Florida coast, which produce water spouts."



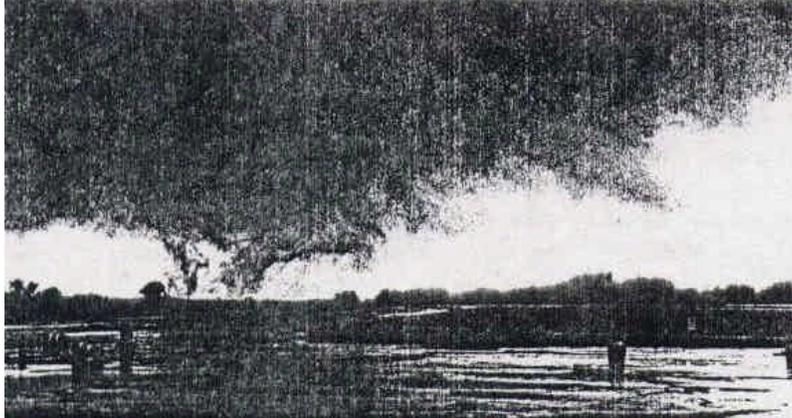
Returning to Bill McCaul's account, a few minutes have passed since the wind gust on the roof -- "so I didn't give it a second thought."

McCaul: "A few minutes later, the guy in the next office looks in the door and says, 'Hey, have you seen the big show outside?'

'What show?'

'There's a tornado out there! I'm calling my wife to make sure she knows what's happening.'

"Several micro-seconds later, I wedged my way through the crowd of 30 coworkers, standing at the North Entrance of our building to get a look at a magnificent wall cloud with a multiple vortex tornado just about three miles northwest, moving north. To the north, there was a very ominous band

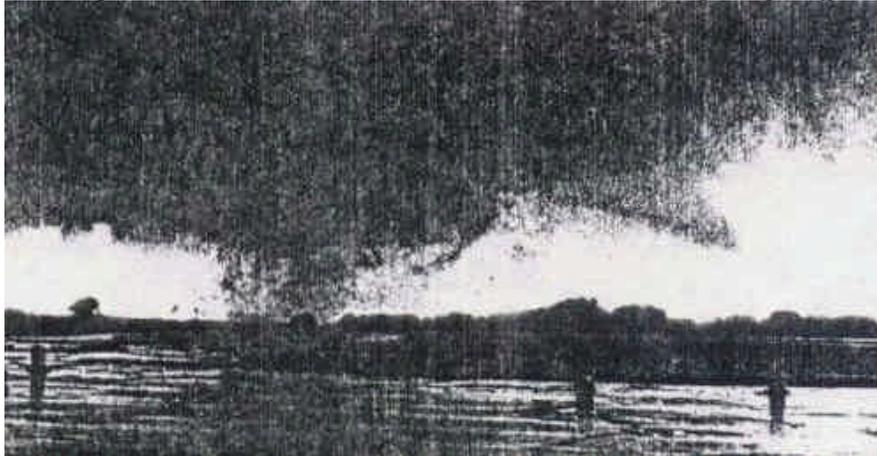


of low clouds extending east from the wall cloud, but at first, I couldn't tell if the band represented the mesocyclone's pseudo-warm front or gust front. Since the storms were moving north and there was no evidence of a gust front to the west, I surmised that the low cloud band was probably the gust front--and that it had caused the winds I had heard a few minutes earlier. Cloud bases under this band were ragged, almost blurry looking and very low, perhaps only 300 feet above the ground while to the

Multiple vortex at 2037 GMT, azimuth 232 deg

south was about 1,500 feet. A moderate shower of large raindrops continued to fall, accompanied by a 10-15 knot south-southwest wind, but there was still no thunder or lightning. 'Does anyone have a camera?' I pleaded, but nobody was listening.

I noted the time on my watch, 3:42PM CDT, rushed back to my office, put up the 'gone fishin' ' (i.e. chasin') sign, and took off for my apartment to get a camera. As I tore out of the building, the loudspeakers in the halls declared: 'Warning! A tornado has been sighted on Redstone Arsenal. All personnel take cover in designated areas until further notice.' Of course, at that point, there was no longer any danger from this particular storm--at least not to the Arsenal. - - - It was early rush hour as I departed, and rush hour in Huntsville is not a pretty sight--even on a dry day. I made



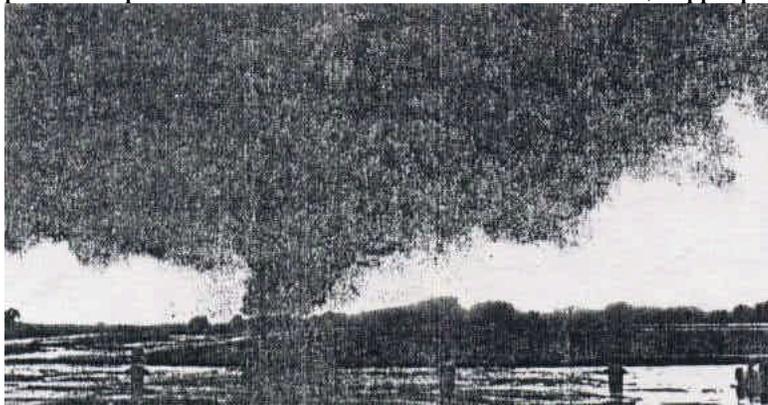
Tornado at 2037:06 GMT, azimuth 237 deg with tail cloud at right center of picture

several unauthorized U-turns in order to get home 'efficiently,' and the native Alabamans seemed to be impressed; a couple of them even honked their horns at me. When I got to my apartment, the other tenants were all outside, looking to the northeast at the departing storm. The radio crackled with tornado warnings for Madison and Limestone Counties. I grabbed my camera and headed west.

Now away from the traffic, the radio was starting to issue tornado warnings on another round of storms, moving up from Cullman and Morgan Counties --and there was a report of a tornado on the ground south of Decatur, which is about 20 miles southwest of Huntsville. I headed northwest on Route 72 toward Athens, hoping to intercept the mesocyclone, which I figured was moving through Decatur at that time. The radio was remarkably free of static.

After a few miles, I encountered a very heavy rainshower -with visibility down to a quarter-mile and figured the storms were already on me. I found a spot on the side of the road, where there was an open view to the south, and waited for the rain to stop. A bright line appeared on the southern horizon and another band of low clouds swept over, but behind this gust front there was no evidence of a wall cloud to the west. However, now the view to the east, back towards Huntsville, looked promising, so I headed back towards town.

To the east, there were several purplish bands of north-south ragged low bases, with one especially dark base behind Rainbow Mountain a 400 foot hill that was scraping the cloud bases just to my southwest. There was rotation almost everywhere in the low clouds, and I noted on my tape recorder that I expected to see a tornado any minute. As I continued to race east toward the presumed well cloud, a small break appeared in the stratiform deck above me, giving me a brief glimpse of big gray towers -leaning sharply to the north and penetrating the mid-level clouds higher up. In hopes of catching e tornado, I blew off picture options and headed north on a road named, appropriately, Wall Highway.



Tornado at 2037:11 GMT, azimuth 240 deg

The dark base to my southeast emerged from behind Rainbow Mountain, but to my disappointment I could see no tornado; and the wall cloud was losing its shape as it elongated along a north-south axis. Comparing notes the next day with the obs taken by NWS observers at Huntsville Airport, which was about seven miles south of me, I found that they had observed a tornado for eight minutes from this particular base at the very same time that Rainbow Mountain was blocking my view!

Undaunted by the absence of the expected tornado, I continued to follow the storm north. The visibility was pretty good, but there were streams of water pouring across the road, which made the going slow. Eventually, the interesting cloud bases pulled away, and a steady, light rain moved in, signaling a return to the stratiform regime and the end of the fun.

The next day, I inspected the damage path on Redstone Arsenal and visited the NWS offices at Huntsville Airport. Damage consisted mainly of splintered trees, flipped trailers, flattened signs and some roof and window damage, but this tornado track was mostly across open fields. The worst damage occurred in the towns of Ripley and Gold Ridge, Alabama and in Waco, Tennessee from separate storms rated F3. The Waco storm was reported to be a third of a mile wide, which makes it one of the



Tornado at 2038:58 GMT, azimuth 316 deg with entire wall cloud in view and apparent microburst in progress

biggest hurricane tornadoes on record. One man, who had just finished repairing his brick home in Cullman County after sustaining tornado damage on April 5, 1985, had his new home virtually destroyed this time by one of Danny's F3 storms. Another man claimed he saw three separate tornadoes pass through during the afternoon, and he didn't even go chasing!

Of special interest, the radar observations made with the 5 cm local warning radar at HSV showed clearly that some of the tornadic storms had hook echoes, which lasted for as long as three hours! Nevertheless, maximum cloud tops were only 25,000 to 31,000 feet, a fact which helps explain why there was little or no thunder end lightning in the storms.

(Note: If anyone wants to inquire about these photos of the Redstone Arsenal tornado, the man to contact is: Andrew D. Junkins, Chief of Avionics, Management Services Incorporated, P.O. Box 1409, Huntsville, Alabama 35807. He has 27 prints, a complete sequence covering about five minutes from an excellent vantage point. These photos are obviously superior to anything else I have seen regarding hurricane spawned tornadoes. They show the tornado alternating rapidly from laminar to multiple vortex, with treetops flying around at cloud base and a small but very well formed wall cloud about a half mile in

diameter. These photos were shown in the Film-Slide show at the recent Severe Storms Conference in Indianapolis, and some will be included in a paper which I plan to submit to the Monthly Weather Review).

The Danny outbreak observations confirm what had been suspected, ever since the big tornadoes spawned by Hurricane Allen in Texas in 1980' Dying hurricanes can produce supercell storms under the right circumstances. These storms are chaseable, in principal, but as my story shows, hills, low clouds, trees and traffic can make it difficult. Furthermore, very few dying hurricanes seem capable of producing supercell storms. As far as I know, Danny's storms are the first clearly documented example of hurricane supercells, although, along with Allen, Audrey (1957) and possibly Beulah (1967) may also have spawned some.

I believe the key to the potency of the Danny outbreak was the development of a narrow dry intrusion, which showed up clearly in Danny's southwest quadrant in the satellite photos. This is something to look for in preparing for a hurricane tornado chase, if you can get access to the latest satellite photos without interfering with anyone who is busy issuing warnings. Don't call or visit the radar operators while an outbreak is in progress, unless you have carefully cultivated an acquaintance. The radar operators at HSV said that several aviation types, who kept hanging around the radar room during the Danny outbreak, were really starting to get in the way. Don't forget, they have a hurricane as well as its tornadoes on their minds - and may have to issue a variety of special statements and warnings in addition to those involving tornadoes.

Most importantly, don't leave your camera at home in favor of an umbrella. That way, if you get lucky, you'll have something of your own to show for it!"

- - -

Storm Track winds up this issue with space available for two reflective comments by contributors elsewhere in this submission.

Joseph R. Jacques comments that "from what I can surmise, tornado chasing has a different emotional fervor as against hurricane tracking from a permanent station. Tornado chasing seems to be action loaded from the onset, fast paced and with swiftly changing decisions, coverage of extreme road distances in a few days, very kinetic in nature; go, go all the way. The storm itself is relatively quick in its development potential. It moves from potency to act in a short span of time; one moment you see it and - poof- the next you don't. Diametrically opposed, hurricane tracking involves -on the first hand- a strictly observational perspective -a 'let's wait and see' attitude covering days and sometimes weeks. Initially, it is low profile, a small area of disturbed weather -an easterly wave. Potential exists and, as one tracks the slowly growing cyclonic disturbance, one wonders what direction it will take and to what magnitude it will develop. And if all the proper conditions and proportions materialize, in a few days you may witness the passage of a great weather phenomenon."

Rick Schwartz closes with these thoughts: "For those interested in hurricane chasing, I have the following suggestions:

- One should decide on a specific region he is willing to travel to, and have main routes and alternates ready. It also helps to have some knowledge of the topography.
- One should decide on specific locations and alternates, where he could take refuge as the storm presses in. This might include locating motels or friends/relatives, who would take you in. I'll tell you, one's sense of adventure fades when stuck in some forsaken place after dark, in a driving rain trying to figure out where to go or even where one is at. When dealing with a hurricane, an observer almost must commit himself to a certain location at some point.
- One should know the areas likely to be put under an evacuation order. It is a bit unnerving to set up in a location and then be told to leave.
- Of course, an observer must have a good flashlight, road maps and a car in good shape. Also, one should carry a transistor radio as an alternate to a car radio. And bring towels.
- Finally, one should weigh the value of being home with his weather equipment, a telephone and other communication equipment with the value of being on the road. Long before a hurricane arrives, torrential rains can make driving difficult and dangerous, if not impossible.

This was not the first hurricane I've chased, and -on each trip- I've learned new things about storms and chasing. In hurricane chasing, just as in tornado chasing, gaining knowledge and developing intuition is a great part of the value."

- - -

(Editor: That's all for this issue. The next ST will finally wrap up the remaining accounts of Chase '85, still some great stories to come, and the Editor's commentary on 30 years of chasing, with this spring's westward trek.)