STORMTRACK

MAY 31, 1988 VOLUME 11, NO. 4

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COVER: Tornadic storm approaching Emporia, KS on May 18, 1987. View looking northeast on US 50. Photograph by David Hoadley.

STORM TRACK

Stormtrack is a non-profit publication intended for the scientist and amateur alike who share an avid interest in the acquisition and advancement of knowledge concerning severe or unusual weather phenomena.

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DAVID HOADLEY, FOUNDER, 1977

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TORNADO DROUGHT: TWO YEARS IN A ROW

I. COMMENTARY

I thought last year was the worst year for chasing tornadoes. There were only a few decent chase days. This year was even worse. No tornadoes again in Oklahoma during April! After a ridge building episode in April, storm systems ground to a halt in early May. A stalled low pressure system on the east coast blocked a ridge over the center of the country during the heart of the chase season. Once again, chasers around the country were forced to see other attractions like museums, amusement parks, etc. Those stubborn enough to wait in west Oklahoma or Texas for a storm received a suntan instead.

A few chasers were lucky this year and salvaged a few tornadoes from the sky. You were among the few. But this goes to show that the more people out there watching the sky, the better the chances that someone will see a tornado. It's hard not to be discouraged in the lean years.

It is definitely a drought. Not only has there been a lack of severe storms, there has been a lack of storms. In Lewisville, the May average rainfall is about 4.5 inches. This May, we've had .20 of an inch. Some believe the climate is changing. However, I still believe that these two years are just a small perturbation in our climate. A couple of dry years averages out with those couple of wet years. But, what variability! In May, 1982 there were 65 tornadoes in West Texas. Tornadoes occurred nearly every day. I still dream of another such year.

This year was not without deadly excitement. On May 1st, Gene Rhoden. and myself were driving on a narrow two lane road through desolate Wheeler County after a long and frustrating chase. It was dark; the speed limit was 55 mph. It was time to set the cruise control and relax. Suddenly, a black cow appeared on the road about 30 feet away. I shouted "left, left" and Gene reacted immediately cutting the wheel left into the oncoming lane. Then another black cow appeared in front of us. Gene swerved right, going between both cows. That was close! Thanks Gene for saving the car and our lives.

II. CHASER NEWS

The postal rate increase has caused an increase in the STORM TRACK subscription rate. As of this issue, ST is now $8 per year.

John Skare has published a pamphlet entitled: "Tornadic Storm Information for the Weather Enthusiast". For more information, you can write him at 807 North Garfield, Junction City, KS, 66441.

Hurricane Almanacs are available from Mike Ellis, 1234 Nile, #44, Corpus Christi, TX 78412, ph: 512-992-7451. The almanacs are packed full with excellent information. The 1987 almanac had 177 pages on standard size paper. Each Almanac is $4.95 plus $1 postage.

The new 1988-1989 Repeater Directories are just published. The directory enables you to find active spotter frequencies anywhere in the country. Write to the American Radio Relay League, 225 Main St., Newington, CT 06111. Cost is $5.

The following are brief accounts received by storm chasers this spring. If your account is not listed, please send it in.

MARCH 1 -- Isolated storms produce large hail in Wichita Falls and Iowa Park, Texas. Heavy roof and car damage were reported --David Dudley.

MARCH 24 -- A squall line occurred through the center of the country. Phil Sherman, Tim Marshall and Sam Barricklow chased the tail end storm and ended up near Atoka, OK. Hail and high winds were reported.

MARCH 28 -- Tornadic storm near Oklahoma City filmed by Tim Marshall from the southwest flank and Chuck Robertson from the east. The tornado was wrapped in heavy precipitation and obscured from our view. Later, large hail fell in Midwest City, Duncan, and Comanche, OK. Gene Rhoden and Phil Sherman caught a vivid lightning show on the southernmost storm.

APRIL 16 -- Southeast New Mexico lights up with several severe storms. Jeff Piotrowski films two tornadoes near Jal, NM.

APRIL 19 -- Tornado struck Madison, Florida killing four people. It traveled northeastward for about 11 miles cutting through the North Florida Junior College Campus. Two buildings at the college were destroyed.

MAY 2 -- Two tornadoes occur from a multi-cell storm near Ardmore. Phil Sherman and Lou Wicker photograph them.

MAY 8 -- Tornado outbreak in Illinois, Iowa, and Wisconsin. Up to 81 tornadoes were reported. Many may be declassified as straight line wind reports. Strong winds occurred in St. Louis, MO and Chicago, IL. A person was killed when their mobile home flipped over in Middlesboro, KY.

MAY 9 -- Randy Zipser and Gene Rhoden film giant hail east of Waco, Texas.

MAY 15 -- The annual chase picnic was held in Yukon, OK. Fun was had by all. Frisbee, softball, VCR show and tell, and story telling were accompanied by barbequed chicken. Later that evening, Jim Leonard and Chuck Robertson filmed an incredible "hailburst" in Oklahoma City. They also captured a 70 mph windshift of 180 degrees on video.

MAY 17 -- SELS log reports Dave Hoadley saw a tornado near Scottsbluff, NE.

MAY 19 -- Al Moller and Chuck Doswell film a tornado near Eads, Colorado.

MAY 20 -- Sam Barricklow and Carson Eads photograph a tornado near Big Spring, Texas. A multi-vortex moved southeast across I-20, leaving spiral swaths of mud packed on the pavement.

MAY 30 -- Tornadic storm ahead of a line in West Texas. Phil and Tim saw one tornado after dusk illuminated by lightning. There were several known chasers on this storm. Who saw what?

JUNE 2 -- Severe multi-cell storm hits Abilene, Texas. Hail up to softball- size and strong downburst winds were reported.

III. LETTERS/PHONE CALLS TO THE EDITOR

ST welcomes our farthest subscriber at the United States Embassy in Antananarivo, Madagascar: He's Corporal Andrew Gepp of the USMC. Other subscribers are in Spain, Canada and Guam.

Robert Denard said he had a wild night in Duncan on the 28th of March, 1988. "Between 4:30 and midnight, we had separate cells move through Stephens County. All cells produced torrential rain and hail. The largest hail was produced by Cell #3 and Cell #6. This hail ranged from pea to golfball-size in Duncan to baseball-size in Meridian and Comanche to the south. Wall clouds were reported with Cells #3 and #6. The wall cloud reported with Cell #3 had vertical movement and was very close to the ground at times. Cell #6 was reported to have a very pronounced circulation signature on KSWO radar. Spotter reports confirmed a funnel cloud five miles northeast of Comanche with this cell. We also received unconfirmed funnel cloud reports of funnels north of Velma and near Temple. The Velma report would have been associated with Cell #3 and the Temple report was associated with Cell #6. Much of the golfball-size hail was flat and all had the appearance of sliced carrots. Do you know the thunderstorm dynamics which would cause the formation of this type of hail? I have seen many other shapes of hail and understand their formation, but the flat hail stumps me."

Jennifer Bankier writes: "Please publish a bibliography of recent books or articles on tornadoes". The editors favorites are listed below. If ST subscribers have additional favorites, please let me know.

a. Symposium on Tornadoes, 1976, 696 pp. Write to: Institute for Disaster Research, Texas Tech University, P.O. Box 4089, Lubbock, TX 79409. It costs around $25.

b. The Operational Meteorology of Convective Weather. Vol II. "Storm Scale Analysis" by Charles A. Doswell III, 1982, 240 pp. Available from the National Technical Information Service, Sills Building, 5285 Port Royal Road, Springfield, VA 22161. Price unknown.

c. The Tornado: An Engineering-Oriented Perspective, by Joseph Minor, 1977, 196 pp. Also available from NTIS at Springfield, VA.

d. The Tornado, by John Snow, Scientific American, April, 1984, p. 86-105.

e. Thunderstorms, Vol 2: Thunderstorm Morphology and Dynamics, 1982, 603 pp Superintendent of Documents, U.S. Printing Office, Washington, D.C. 20402.

Bill Crouch, MIC, Slidell writes: "At about 6 am, April 2, 1988, near the WSFO in Slidell, we had a prototypical Gulf Coast tornado. After a night of heavy rain and flooding in metropolitan New Orleans (8-10 inches over a large area of the suburbs) a synoptic scale trough moved through. The major trough remained well to the west. A line of thunderstorms developed in Central Louisiana about midnight and moved east-southeast at 20 knots with cell motion NE at 30 knots.

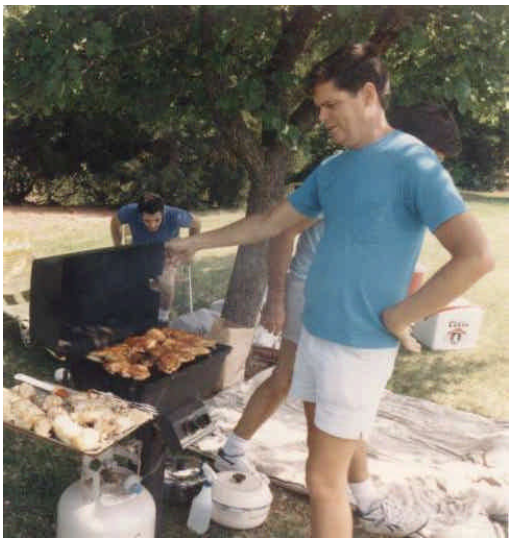
The tornado path was one mile long and 20-30 yards wide with a sharp damage gradient on the left side and a swath of minor damage 50-100 yards wide on the right side. We rated it F1, Pl, P1. Isolated wind damage was noted in other sections of Slidell and served to confuse the uninitiated about the actual track. There were no deaths or injuries. As to being prototypical:

1) It was a F1, P1, P1 rating, 2) that occurred during the early morning, 3) and the system produced no other severe weather, 4) with the primary concern being heavy rain/flooding. The heavy rain was much more interesting, did more damage, and caused one fatality.'

Warren Faidley says more and more rent car agencies are only allowing 100 free miles per day. However, American International Rent Car has an all inclusive rate of $37 per day for unlimited miles AND CDW Insurance. Reservations are at 1-800-527-0202. Airport pickup is 1-800-IAM-HERE.

Brian Peters sent in some tornado statistics for 1987. There were 341 weather related deaths last year. No surprise, lightning was the #1 killer with 88 fatalities, then floods at 70 deaths. Tornadoes ranked third with 59 deaths. May 22nd was the single deadliest day when 30 people died from a tornado which struck Saragosa, Texas. Most people were killed in mobile homes and auditoriums.

Dave Hoadley explains the days weather to Chuck Robertson.



Chef Jim Leonard grills those chickies.

Story telling session.

CHASERS PICNIC

Carson Eads writes about the tornado he saw on May 20th. "The metroplex ham chasers lead by veteran Sam Barricklow (K5KJ) and Dennis Cobb (WA8ZBT/5) and myself (N5LTN) tracked down the only Texas tornado of the day. We traveled west from the Fort Worth Weather Service on I-20. That evening, around 5:00 pm, we came upon a wall cloud just north of Highway 350, northwest of Big Springs, Texas. A severe thunderstorm warning had just been issued by the NWS as the storm top exploded to 65,000 feet.

This was quickly changed to a tornado warning as a single vortex crossed Highway 350 one mile ahead of us. Sam began recording video as the storm was being shoved south-southeastward by outflow. I took photographs (some below). The tornado was about 50 yards wide at the base and intensified to about 250 yards wide as it broke down into multiple-vortices. It was on the ground for at least 15 minutes. We eventually lost sight of it due to heavy rain and nickel size hail. The storm went east of Coahoma and lined out."

IV. ROSTER

The ST Roster lists names, addresses, and brief biographies of those persons interested in or willing to correspond with others about storms or storm chasing.

Name	Address	Range
Ken Nakamura	1167 N. East Ave. Reedley, CA 93654	

Biography: "I'm 25, single, employed as a full time data transcriber, and have been fascinated with hailstorms, tornadoes, and lightning since my childhood days. I've collected lots of information and photographs on these subjects. I chase storms in the area and have been a great help to our local NWS in reporting and spotting severe weather. My chase range is local so far. I'd like to spring chase in the Texas panhandle and summer chase in the Phoenix-Tucson area. Please write."

Jonathan Slemmer	1234 N.W. Troost Roseburg, OR 97470	

Biography: "I am 16 years old, and I am in Junior High School. I love meteorology and have been interested in the field since I was 8. I keep my own recordings. I hope that I will be able to go tornado chasing in the very near future. I plan on making meteorology my career. (phone: 503-673-1378)."

Jim Stroika	4817 N. Elkhart Milwaukee, WI 53217	

Biography: "I have always been interested in thunderstorms. I am a observer for the NWS and a local T.V. station here in Milwaukee. During a severe weather event, I report to WISN-TV where I assist the meteorologists with: radar monitoring, receiving, and plotting severe weather reports, monitoring the ham radio severe weather net, and help to get the watches and warnings on the air. I'm looking to purchase video and other books and publications on severe weather."

Tom Willett	2234 E. 5th Tucson, AZ 85719	Nationwide

Biography: "I'm 24 years old, single, and work for a stock photo agency in New York. Started chasing in 1981.

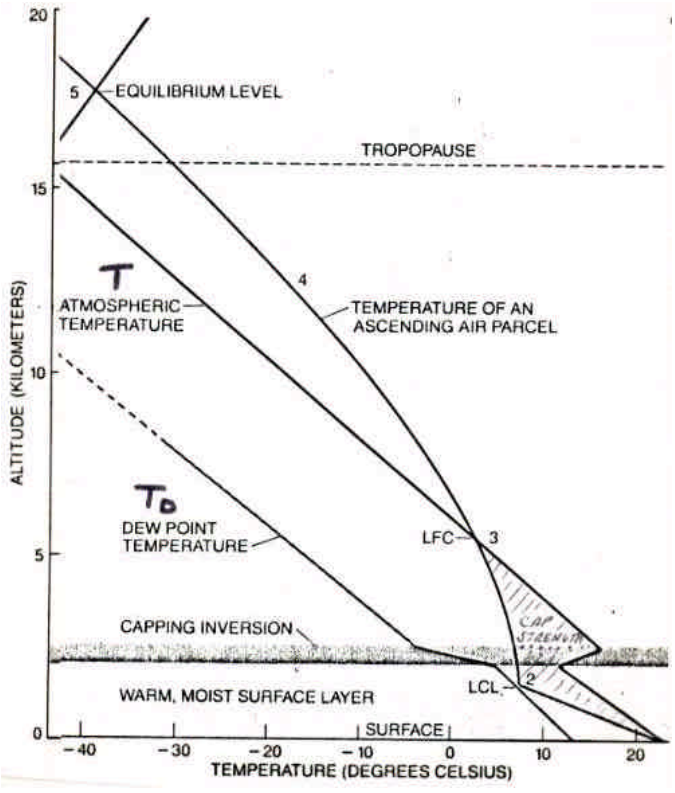
THE CAP: IT'S BOOM OR BUST!

By Tim Marshall

Traditional methods of forecasting severe thunderstorms and tornadoes can be found in several publications including Col. Robert C. Miller, 1972, Notes and Analysis of Severe Thunderstorm Forecasting. Other publications are in the National Weather Service Technical Memorandums and Severe Storm Conference volumes. Most forecast methods rely on a combination of instability, moisture, and the position of large synoptic scale features such as troughs, cold pools, and jet maxima. But, all of these are secondary features in their importance to severe weather forecasting.

Take this true situation: The surface temperature is 95 degrees, the dewpoint 70 degrees. There are strong southeast winds at 25 gusting to 35 mph in your area. The dryline is approaching with strong west winds behind it. All the jets are in place; the lifted index is -14 degrees C. Your at the triple point just as a tornado watch is issued for the area! Are you ready to sit back for a show?? In intense anticipation you wait patiently, eat lunch, then dinner. Just before the sun sets, you watch boiling cumulus along the dryline foam and froth then suddenly dissipate. At dusk, you find out there were no storms within three states! The tornado watch box is cancelled. It was a bust! What happened?

Blame it on the "cap". The cap is a thermal inversion filled with dry air that suppresses deep convection. In the morning, it lies just above the ground and may be several thousand feet thick. Sometimes you can see it where air pollution stagnates in stable stratiform layers.



The strength of the cap can be determined by using sounding data taken from weather balloons. The sounding data includes temperature and dewpoint profiles. If you plot the data with height, it may look like the adjacent figure.

The temperature profile appears as a nose as the temperature increases through the inversion. Note the moist layer below the capping inversion and the dry air just above it.

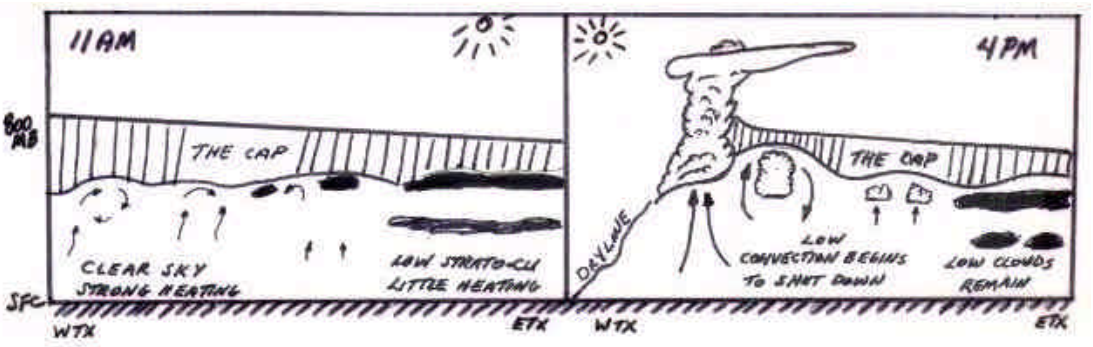
The strength of the capping inversion changes throughout the day as daytime heating erodes the cap from below. Also, the approach of cold air aloft with maybe a jet maximum can enhance vertical motion enough to lift and weaken the cap. In contrast, subsiding air and warming aloft can strengthen the cap throughout the day.

Diagram from Snow, 1984, Scientific American article on "The Tornado."

The behavior of the cap definitely makes or breaks a chase day. No matter how unstable the air is, no matter how much low level moisture there is, if the cap is too strong, storms are not going to develop. Consequently, most of my "bust" days can be blamed on the cap.

As you can see, outguessing the strength of the cap is tricky. Temperature and dewpoint soundings are taken only twice a day in locations about 500 miles apart. Subtle changes in the cap strength (i.e. localized forcing) can and do go unnoticed. It's easy to be lulled into chasing on a day when the cap is too strong. But when all other parameters are there, you MUST take that risk. If a storm makes it through the cap, it could be a field day. For example, the cap was very strong on May 22, 1981. But an isolated storm developed and produced numerous tornadoes in west Oklahoma.

The bottom line is, when you're dealing with the "cap", there is little difference between thunderstorm BOOM or BUST. If the cap is too weak, the atmosphere can overturn early in the day and you are left with a squall line at 11 am. If the cap is too strong, you get a brilliant blue sky and maybe a sunburn. But if the cap burns off at just the right time of day (say 2 to 4 pm, the time of maximum heating) you may be left with isolated severe storms that can be possibly tornadic. Sounds like a goldilocks and the three bears story, doesn't it? If everything is just right, here is how I depict the evolution of storm development.



Cross section, 11 am and 4 pm

MORNING- The day begins with low clouds in east Texas which remain all day. Some light drizzle occurs there, even a few imbedded thunderstorms are possible. Farther west, the air is drier, the moist layer is not as deep. The sky remains clear throughout west Texas allowing for strong surface heating to begin mixing the moist layer with the dry air above. The capping inversion begins to erode from below.

AFTERNOON- By mid-afternoon, the dryline has pushed into the moist air increasing the low level wind and moisture convergence and enhancing vertical motion along the boundary. A line of boiling cumulus may be seen along the dryline. They appear ragged and torn, evidence of strong mixing. The mixing layer is deeper, extending higher, lifting and eroding the cap more quickly. With luck, the cap will break allowing one or more storms to develop just about the time of maximum surface heating. Slowly, the small cumulus will dissipate as mixing begins to shut down leaving the few surviving storms to feed on the buoyant warm, moist air from below. Of course, the right timing of upper short waves, jet maxima, instability, and moisture are important parameters needed for severe storm development.

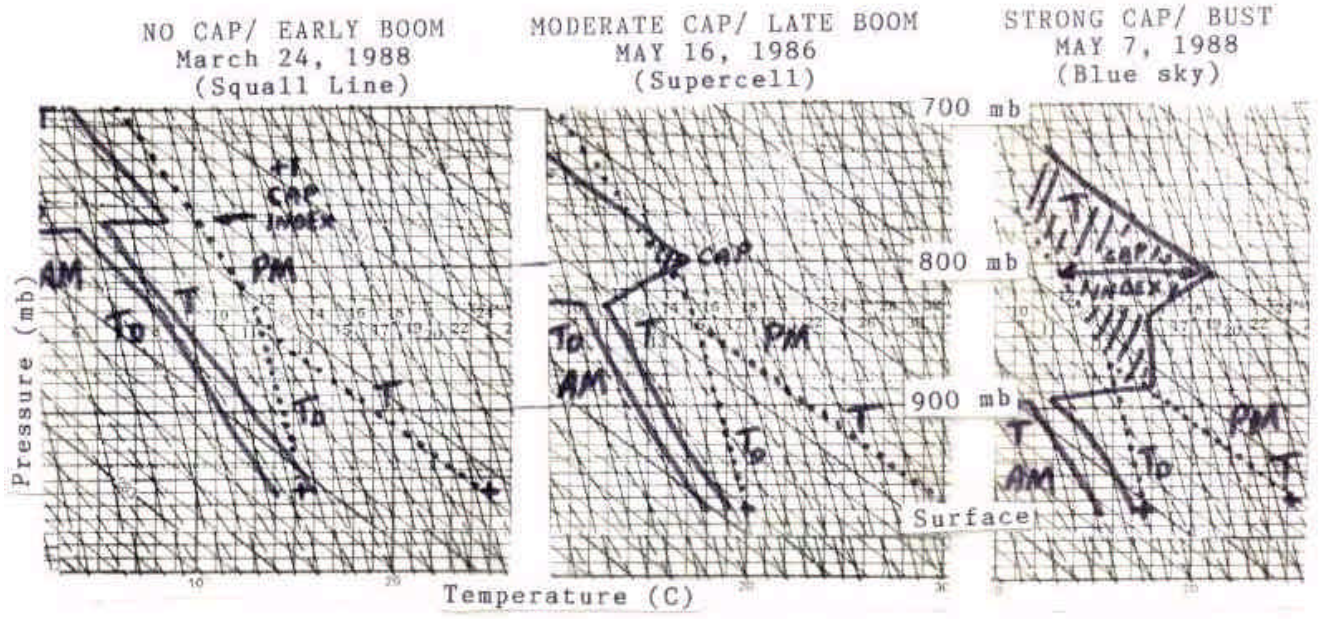
But, it is the cap strength which determines whether this instability can be released upward in the form of deep convection. To calculate the cap strength, you need to know how to read a sounding. The cap strength is computed from the moist adiabat along the temperature profile. Use the following equation: CAP STRENGTH = SWB of cap -- WB of surface, where SWB is the maximum saturation wet bulb potential temperature of the cap, and WB wet-bulb potential temperature of the surface.

When the cap strength is plus three or higher, the chances for severe storm development are minimized. Negative values suggest easy overturning of the atmosphere. The best values for severe storms are when the cap strength is plus one or two says Bill Read, NWS forecaster. The presence of the cap can enhance severe storm development by delaying over-turning until the lower layers of the atmosphere can heat up. Keep in mind the surface temperature changes throughout the day, and therefore, the cap strength values should be updated. Here are some boom/bust examples.

LITTLE/NO CAP -- EARLY BOOM: On March 24, 1988, a squall line developed through the center of the U.S. The morning sounding (solid lines) at Monett, MO indicates a weak capping inversion of 3 degrees C at 770 mb. The moist layer was thick, about 180 mb. By mid-afternoon, the surface temperature rose considerably, the dewpoint remained nearly the same (dotted lines). At this time, the cap index was now -1, no cap existed. Air rising from the surface would not be restricted, and thus, early boom.

MODERATE CAP -- LATE BOOM: On May 16, 1986, an storms developed in north central Texas producing several tornadoes. The morning sounding is similar to the first case, only the cap is stronger, about five degrees C at 800 mb. Deep convection was suppressed all day. By mid-afternoon, the cap index was +1. An upper short wave approached and one area of the cap broke sending a storm explosively into the sky.

STRONG CAP -- BUST: On May 7, 1988, a very strong cap existed. Note the shallow layer of moisture, about 80 mb. Strong increases in surface temperature and dewpoint throughout the day were futile in breaking the cap. By mid-afternoon, the cap index was still +8. It was blue sky, no storms would develop.



Differing cap strengths

FAIDLEY'S FOTO TIPS #2
by Warren Faidley

A. FILTER WRENCHES AND RUBBER BANDS

If you have ever had a filter stuck on a lens, you know how hard it can be to remove. Temperature changes, dirt, and stripped threads can cause a filter to jam. Filter wrenches are basically a smaller version of the ever popular jar opener. They cost about $2 for a set of two sizes. Rubber bands are also handy for improving the grip while trying to remove stuck filters. Simply place the rubber band around the filter and twist it off. The rubber bands can also be used for securing the plastic ends of make-shift rain protectors around lens barrels.

B. SMALL TOOL SET

Warren's rule of thumb says "Shoot a thousand wimpy funnels and your equipment works fine. See an F-5 tornado and something goes wrong". Even if you own the best equipment money can buy, things do come loose, fall apart, jam, or break. However, I recommend having enough equipment (such as a spare camera) to cover such an unplanned breakdown. There are many instances where a small screwdriver or needle nose pliers would do the trick. I recommend carrying a set of jewelers tools including a tweezers, super glue, and small voltage meter. On the other hand, I do not advise fixing a camera unless you know what your doing.

C. GAFFERS OR DUCT TAPE

I once used duct tape to reattach the louvers of my Honda car after encountering some hostile winds. The uses for strong tape are almost unlimited. Tripod legs can be steadied to solid objects, minor repairs can be made to windshields if destroyed by hail, and there are many more creative uses.

D. PLASTIC BAGS

Large plastic bags make excellent emergency rain coats by cutting a hole through the bottom for your head. Smaller bags can be custom designed to protect cameras, etc. For specific questions, please write me at 2901 E. Ft. Lowell, #628, Tucson, AZ 85716.

Editor's note: I now use small plastic bags to contain most of my equipment. One sunny day I had the unfortunate circumstance of driving down a West Texas farm road with all the car windows down. I was too busy watching the sky and not paying attention to the road ahead which happened to be submerged by a raging torrent of water and red mud from a recent rain. Without time to hit the brakes (or close the windows) I proceeded to bathe myself and all my camera equipment laying out on the back seat with red muck. So film, cotton swabs, lens cleaning tissues, filters, and batteries are now bagged!

STORM CHASING IN WEST TEXAS
by Sam Barricklow

It was May 22, 1987. My wife and I started out in Roswell, NM. Upper air charts revealed we were in an area of upper level difluence between the diverging subtropical and polar jets, and an upper level short wave approaching from the west. What luck! Around 12:30 pm, a north-south line of towering cumulus exploded over east Roswell. Two cells approximately 30 or so miles apart became dominant and developed overshooting tops just east of town. The storms moved northeast and we gave chase up highway 70, expecting the southern storm to cross the highway in front of us, to provide an arm-chair view of the updraft.

The plan did not work. The southern storm slowed down. We passed north of the Forward Flank Downdraft (FFD) and decided to go around the precipitation area and then move southeast. But much to our dismay and peril, the ranch roads in New Mexico are not as they seem on the state highway map. They turn from blacktop to dirt without warning! All I could do was to keep the car from sliding into the ditches on either side of the road. At one point, we moved less than 5 mph in a "power slide" for almost 100 yards.

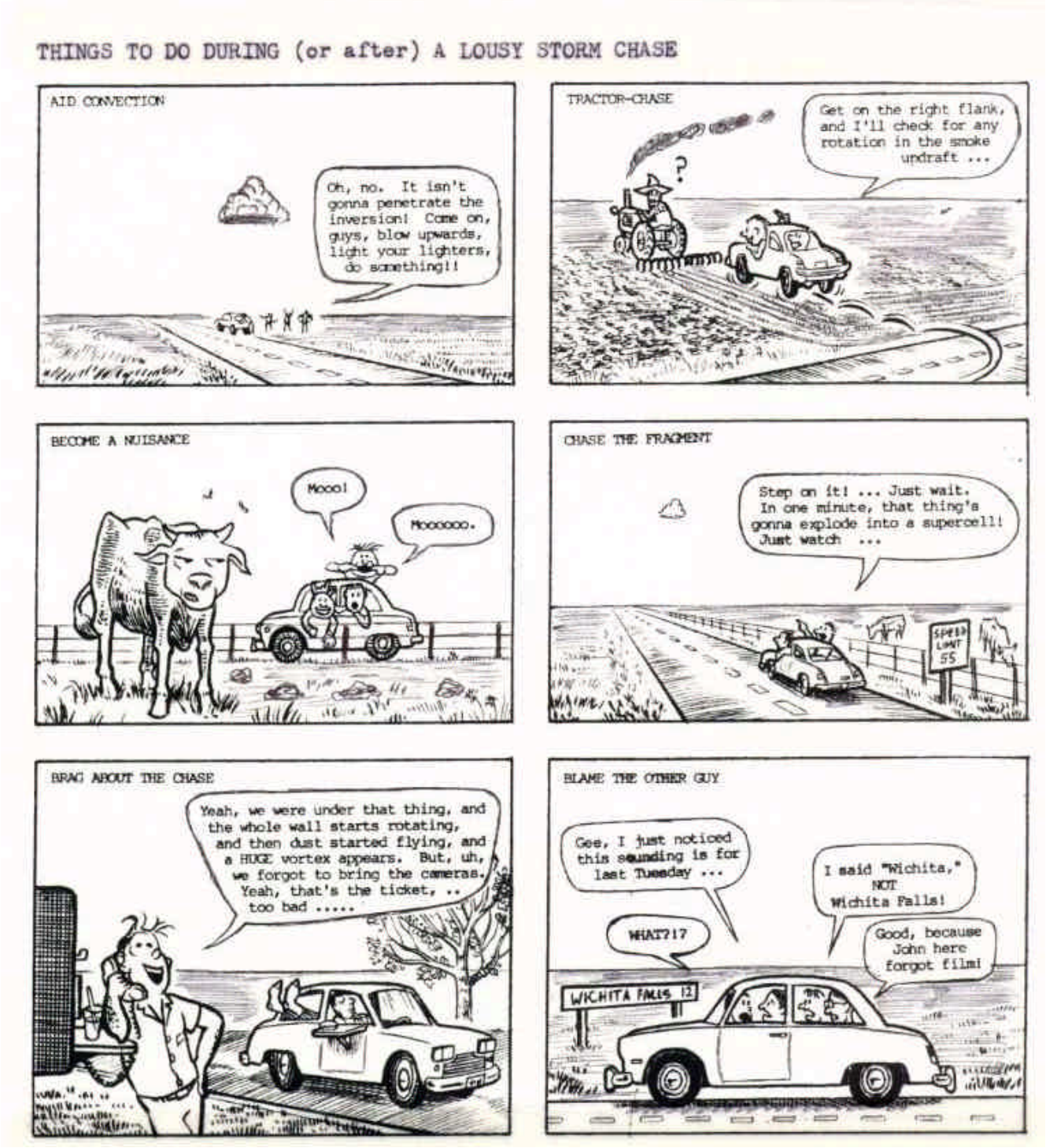
Meanwhile, the southwest storm steadily intensified as the precipitation area had darkened and it's eastern edge was razor sharp. Two inflow bands could be seen feeding into the updraft area which was just out of view behind the rain. A chilling low pitched rumble came from the storm. Staccato lightning bolts cracked towards ground from the anvil. These discharges were preceded by a gradual buildup of periodic noise pulses on the broadcast radio. The pulse rate began with one or more pulses per second and increased to several hundred before the lightning stroke occurs. It was probably due to discharges of static electricity.

After miles of gnashing my teeth, we intersected a concrete road near Milnesand, NM and flanked the storm to the east. The inflow was howling and blowing dust reduced visibility to about five center stripes down the highway. We later learned that a large cone shaped tornado was produced as we were fighting the back roads. Enough of chasing in New Mexico!
We crossed the border back into Texas (Yeah!). We had finally moved out ahead of the storms. Severe thunderstorm warnings were issued for the counties north and west of us. Based on information from the Lubbock Ham Radio Skywarn Net, we drove north through the dust to near Whiteface, TX. Out of a wall of blowing sand, we could see a collapsed supercell storm with long inflow bands wrapping cyclonically towards the updraft to the east of a dark rain curtain. We parked off the highway under a single wire power line, for some hopeful lightning protection. Cloud-to-ground bolts were being thrown to the ground like spears all along the length of the gust front.

At the focus of the inflow bands, small wall clouds formed where the inflow gushed vertically into the mouth of the storm. Cloud tags formed beneath the frantically rushed upward. Rain curtains eventually enveloped each of the wall clouds, wrapping and hastening their demise. How strange. The storm seems to be its own worst enemy. But as the old updraft died, a new one was born on the leading edge of the outflow. The storm continued to produce a series of wall clouds toward Levelland. We saw a few brief needle-like funnels, but none touched down.

FUNNEL FUNNY: Chasers Must Do Something to Relieve the Frustration (Fact 5/6th, Fiction 1/6th)

Storm chasers in a desperate attempt to salvage a lousy chase year must do something to relieve the frustration.



- ideas from Tim Vasquez, resketched by David Hoadley

Tornado through driver's window on May 18, 1987. Photo by David Hoadley.

Tornado approaching Toledo, KS about 8 miles west of Emporia. Photo by David Hoadley.