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I. COMMENTARY

Aaah, gray November! But, only three weeks to the REAL New Year for storm chasers; the Winter Solstice, when the sun reaches its southernmost journey and begins returning northward, with longer and warmer days and the promise of a new, untried and perilous spring. - - - A brief comment here to those new readers that may feel a little late or left out in joining the ranks of other storm buffs and chasers who have been at this somewhat longer. Don't let it bother you! One of the nice things about observing or chasing storms is the occasional, interesting one that you encounter, which no other chaser sees. If it was severe or unusual in some respect, being the only one to record it is especially satisfying. On the other hand, if someone else sees and photographs that storm from another angle, and you hear about it, it's nice to exchange pictures and compare notes on what each saw. Every storm is surprisingly different, even for those who have seen and chased hundreds. Each presents some different challenge and must be "read" a little differently to put yourself in the right place and at the right time. Thus, just because others have preceded you, don't despair. This science is still very young. Some very basic things are still going on out there that aren't fully understood. Even veteran chasers are occasionally fooled and miss the big vortex. Sometimes, the alert "amateur" is the only one there. Learn what you can, pace yourself and then enjoy this most fascinating, capricious and powerful part of the natural world. Like the Indian, "... come to see with a trained eye, and read the book that is the sky."

II. ROSTER

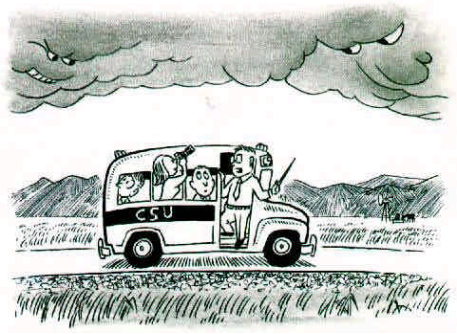
The Roster lists names, addresses and brief biographies of those interested in or willing to correspond with others about storms. Normally, only recent entries since the last, issue are included, but occasionally prior ones are consolidated and reported in one listing. I will plan to do this in the next issue.

Name	Address	Chase country - range
Marty Feely	316 S. University Blvd. Norman, Oklahoma 73069	Oklahoma and adjacent states; to be expanded in 1985

(Biography: Age 31, single; chased since 1984. Although last spring was my first chase season and a relatively unstormy one around Oklahoma, I did photograph some impressive storms and gained valuable experience. I also met, for the first time, others who share this interest. The realization that this is something I was born to do has finally prompted me to move here from my native California to be where the action is!)

III. LETTERS/PHONE CALLS TO THE EDITOR

John Weaver writes that "Colorado State University conducted its first Thunderstorm Forecast Intercept course this past summer. I don't know of any other school, which has offered such a course -- a graduate level class in which the laboratory is beneath the Cb. Prior to the beginning date of the class, Colorado did have a couple of supercell days. However, as in other parts of the country this year, our storm season could be called the year of the multicell/outflow. Nevertheless, the newly christened chasers did manage to intercept the Denver hailstorm (produced 3 1/2" diameter hail...chasers observed 3/4" and saw one large, short-lived funnel), many funnels and gustnadoes, several large wall clouds, and a small tornado in Aurora, Co. on July 6. The class was a resounding success, and we're hoping for a repeat next summer. Meanwhile, several new chasers have been born, and intercepts continued well past the class ending date."



From Iowa, Douglas Beadle suggests "a simple computation, which allows one to determine the dew point mentally, using the temperature and relative humidity (RH). It may be of interest to ST readers. The drawback is that it fails at humidities below 40% and does not always yield the exact dew point, but it is close.

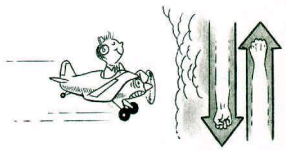
The procedure is as follows: Subtract the RH from 100 and divide that difference by 3. For example, if the RH is 70%, 100-70=30. 30 divided by 3 is 10. Then subtract that result from the temperature. If the temperature is 68 deg F, 68-10=58. The dew point is 58 deg.
This final result is usually within a degree or so at humidities above 60%. At humidities between 40%

and 60%, subtract a 3 deg to 5 deg correction value from the computed result. --I use the mental shortcut of remembering that a 30% difference between 100 and the RH is equal to 10 and round off the remaining difference to a number divisible by 3. - When psychrometric tables or calculators are out of reach, this method is really quite handy."

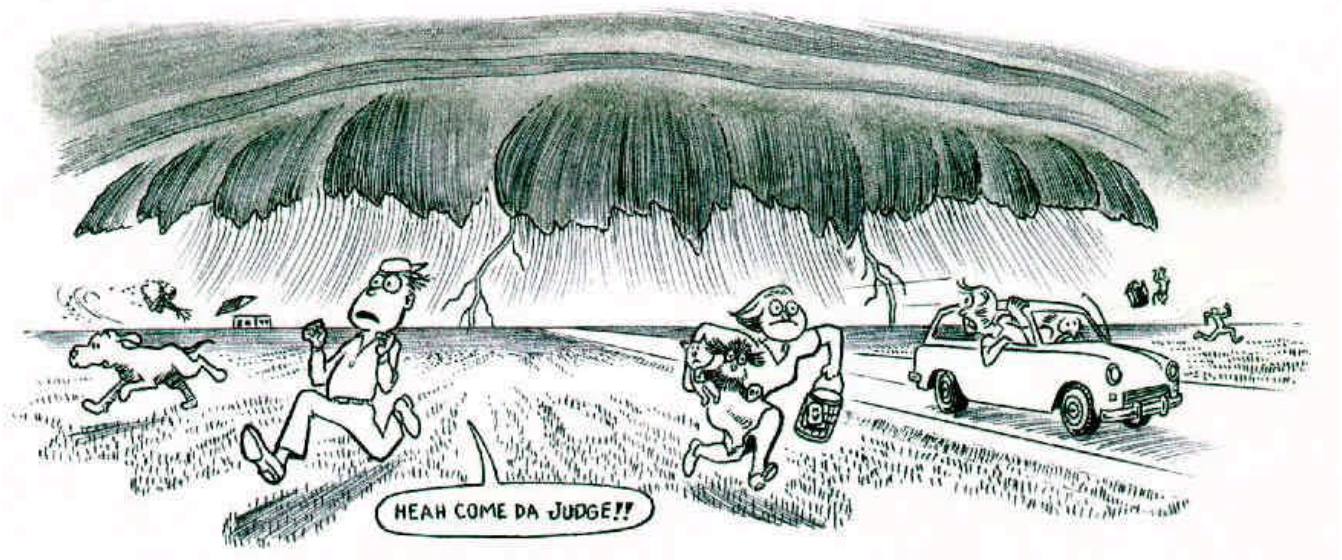
John T. Snow asked if readers were "familiar with the newly formed hobbyist/para-professional organization, the 'Association of American Weather Observers"? They publish a monthly newspaper, which might be a good vehicle for storm chasers to advertise their photos, movies, etc. ... Their address: Association of American Weather Observers, P.O. Box 455, Belvidere, Illinois 61008."

Bruce Boe, a practicing meteorologist in North Dakota, adds another delightful chapter to the authentic lexicon of storm chasers/observers. "In regard to Randy Zipser's OU terminology, there are a few terms he quotes that have equivalent expressions up here. Over the last few years, those of us that actively pursue and seed severe storms have developed a vocabulary of our own, which I think you might enjoy. Remember, that in addition to the observations made by those in the project radar, many reports and sightings come in from the pilots, and hence are slanted toward their viewpoint. Here goes:

"Boom-Ralph" - A storm that develops exp1osive1y, only to collapse just as rapidly.
"Cumulogranitus" - A hard tower, something you DON'T wish to penetrate.
"Ice-Bomb" - Same as Turkey Tower.

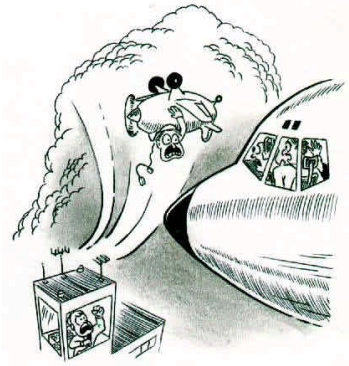


Cumulogranitus



Vast Rudeness

"Vast Rudeness" - A visually impressive squall line at twilight, whose appearance is enhanced by lightning, and whose impressive nature is verified by radar!
"Great White Harvester" - Substantial hail shaft.
"Tuba"- A funnel aloft.
"Tuba Playing" - Tornado.
"Thunderscuzz" - Same as Turkey Tower.
"Scudbomb" - Nocturnal Cb, made unseedable by IFR conditions. Usually accompanied by frequent cloud-to-ground lightning.
"Elevator Up" - Updraft that took you out of, or nearly out of, your block altitude (ATC getsupset).
"Ding-de-ding" - Encounter with a hailshaft when airborne.



Elevator Up

"More than you want" - When aircraft seeding from cloudbase wander too close to the main updraft, and find themselves in 3000 ft/min. updraft or stronger. Akin to getting "sucked in." Neither is desirable.

The list is incomplete, but the best I can do, just sitting here and trying to remember the more popular (and less vulgar) terms. "Vast Rudeness" can also apply to synoptic scale cyclones. Another term that

comes to mind, but I'm sure isn't North Dakota originated, is "Severe Clear." We use it to describe the cloudless sky in a pre-storm environment. I'm surprised Mr. Zipser didn't mention it."

IV. BULLETIN BOARD/COMMERCIAL MARKET -$- FOR PICTURES V. CAMERA TIPS VI. TRAVEL TIPS

VII. FEATURE #1 Storm Research References

As noted in the last ST, here are some specific references for your research and understanding on the nature of severe storms. The principal focus is on tornadic and severe wind storms over land (as opposed to hurricanes over water). In alphabetical order:

1. The American Weather Observer; a newspaper style publication for amateur observers, data recorders and general enthusiasts. The emphasis is a little more technical than Weatherwise but more "newsy," with weather notes, anecdotes and news of clubs and associations around the country. Write: Association of American Weather Observers, P.O. Box 455, Belvidere, Illinois 61008. Price - $15.00 for an annual subscription. Phone: 815-544-9811. Add $5.00 for foreign subscription dues. The price is $7.00 if you're a member of the National Weather Association, Blue Hill Observatory Weather Club, or the North Jersey Weather Observers.

2. The Atlantic; May, 1984. An excellent account of an actual chase by the author, with a research team from the National Severe Storms Lab in Norman, Oklahoma. Page 76+, by William Hauptman (Several of the team members mentioned are ST subscribers). Check your local library for this issue.

3. 12th Conference on Severe Local Storms, 1982; -or-
13th Conference on Severe Local Storms (Extended Abstracts), 1983; each an inch thick (or more) collection of technical papers (about 4-10 pages each) on various aspects of severe storms; some illustrated with charts, schematic sketches and photographs. This is the definitive source and most current thinking on state-of-the-art severe weather knowledge. The Editor considers it his primary reference. Although most material is very technical and beyond the average non-meteorologist reader, enough abstracts, summaries and conceptual conclusions appear to offer real insight into the storm environment. I am unsure whether these can be ordered without membership in the AMS but, for information write: American Meteorological Society, 45 Beacon Street, Boston, Massachusetts 02108. Price - $25.00, plus $2.00 for non-members of the AMS. Phone: 617-222-2420. If membership is required, you will receive a monthly magazine, Bulletin of the American Meteorological Society, which is very technical and includes many ads for technical equipment and professional services. However, it does provide (a) complete listings of recent publications in the field, an excellent source reference and (b) complete listing of forthcoming meetings around the country on various meteorological subjects. AMS members may attend these.

4. Oklahoma Weather; -or-
Texas Weather; a 5 1/2 X 8 1/2" soft cover booklet with color photos of tornadoes and other storms and basic, non-technical text on safety rules, terminology, causes, etc. This is a good primer book for the beginner, with very good pictures. I am unsure if either book is still published, but they were about $2.00 back in 1976. Write: England and May, 2234 N.W. 39th Street, Oklahoma City, Oklahoma 73112. Phone: 405-524-2261.

5. Scientific American; April, 1984. An excellent article on current knowledge about tornadoes and their causes, which summarizes many recent advances in research study. As with most, of the articles in this magazine, it is written for the average non-scientist reader. page 86+, by Dr, John T. Snow. Check your local library.

6. Storm, 1982. One of the Time-Life Books series on the "Planet Earth." This presents a good, basic overview of storms and tornadoes in the typically graphic, colorful and clear Time-Life style. The photography is, of course, super. It may be available in your library or write: Reader Information, Time-Life Books, 541 North Fairbanks Court, Chicago, Illinois 60611.

7. Storm Data; the definitive source of concise, detailed information on daily severe storm occurrences throughout the U.S., including some tornado, hurricane, satellite cloud and damage pictures. Data presented by state, county, day and hour of occurrence. Write: Publications Section (E/CC413), The National Climatic Data Center; National Environmental Satellite, Data, and Information Service; NOAA; Federal Building, Asheville, North Carolina 28801-2696. I don't have current price information.

8. Storm Track; Vol. 7, Issues #1, 2, 3 and 4. Some basic information on storms and safety tips while in their pursuit; prompted by an inquiry from an Iowa meteorologist and an article from a Canadian subscriber. Price: $0.70 each issue. Write: David Hoadley, 3415 Slade Court, Falls Church, Virginia 22042.

9. Weatherwise; a bi-monthly slick cover magazine for the general public, with illustrated articles and interesting letters to the editor on all kinds of weather, including storm cloud photos. Write: Editorial and Circulation Offices; 4000 Albermarle Street, N.W., Washington, D.C. 20016. Phone: 202-362-6445. Price - $16.00 for a one year subscription; add $6.00 for postage outside of the U.S, payable in U.S. dollars. This magazine may also be available in your local library.

FEATURE #2 Storm Track's Short Course on Terminology and Dynamics
By David Hoadley (and several dozen others)

Many of the non-meteorologist readers have asked similar questions over recent months about some of the basic terminology that keeps reappearing in Storm Track. Here is a listing of such terms, which may have given you problems in the past, or which may appear in future references that you read. Some are based on the 'Storm Spotter's Glossary and Supplemental Guide," prepared by Leslie R. Lemon et al for the National Weather Service. In some cases (*), I have added common terms that were not defined here or have substantially modified (#) those that were. Additionally, and in following through on the Storm Research References provided earlier, I have added two schematic sketches on a tornadic storm environment and a cross section of a tornadic thunderstorm. More on these later. Now, in alphabetical order, terms you should become familiar with:

* 1. A lowering - A lowered but smooth bulge beneath an otherwise horizontal cloud base, usually beneath large towering cumulus and within 3 miles of heavy precip.

2. Anvil- The spreading upper portion of a thunderstorm into an anvil shaped plume usually between 20,000 - 50,000 feet high.

* 3. Backshear - That part of the anvil which pushes back against the prevailing upper winds (usually from the west or southwest); indicating a severe storm with updrafts too strong for the prevailing winds to ventilate, or carry, the new condensation downwind in the anvil plume. Thus, the upwind (west or southwest) side of the anvil pushes back against the prevailing wind. The larger the backshear, the more intense the storm. However, in a tropical air-mass situation, upper winds are weak and this rule doesn't apply (the anvil may spread out uniformly in all directions).

* 4. Bounded weak echo region - A radar-weak reflectivity area that indicates a strong updraft on the right flank of an initially non-severe thunderstorm. The "bounded" aspect indicates development of the updraft region into a mesocyclone, with a simultaneous wrapping downdraft, developing on the right rear flank.

5. Cb (Cumulonimbus) - Actually a thunderstorm at such a distance that thunder has not yet been heard. Official Government weather reports cannot record a "thunderstorm" until it's audible at the reporting station. Thunder indicates a heightened level of storm intensity; however, some weak Cbs develop with little or no thunder. Nevertheless, the wary pilot will think twice before flying through any reported "Cb."

* 6. Closed low - An upper low that becomes cut-off from the main upper level wind flow and begins to lose strength as it rotates apart from the energy-source winds that originally formed it.

7. Collar cloud - A generally circular cloud ring, sometimes visible, surrounding the upper portion of a wall cloud.

* 8. Diffluence - Normally refers to diffluence in the upper atmosphere (about four miles up),where prevailing winds spread apart across several hundred miles (sometimes with divergent jet streams). Somewhat lower pressure occurs here, between the divergent flows. This encourages the acceleration of any convection which begins within this area.

* 9. F0, Fl, F2, F3, F4, F5 - A means of measuring tornado strength, developed by Professor T. Theodore Fujita at the University of Chicago, and widely accepted in the meteorological community. F-0 (or F0)= 40-72 mph; light damage to chimneys and sign boards, tree branches broken. F1= 73-112 mph; peels surface off roofs, mobile homes pushed off foundations and moving autos pushed off road. F2 = 113-157 mph; roofs torn off frame houses, mobile homes demolished, boxcars pushed over and large trees snapped or uprooted. F4 = 158-206 mph; roofs and some walls torn off well-constructed houses, trains overturned, most trees in forest uprooted and heavy cars lifted off ground and thrown. F4 = 207-260 mph; well-constructed houses leveled, cars thrown and large missiles generated. F5 = 261-318 mph; strong frame houses lifted from foundation and carried considerable distance to disintegration, auto-sized missiles fly through the air in excess of 300 feet and trees debarked.

10. Flanking line - A line of cumulus towers, merging with the main storm and usually extending to the south or southwest, often associated with a severe storm.

11. Fractus (cumulus fractus or scud) - Low, detached cloud fragments, looking ragged and wind-torn.

12. Gust front - Leading edge of thunderstorm downdraft air, often gusty and cool. Shelf or roll clouds may accompany it and sometimes gustnadoes wrapping up for several seconds at ground level in its turbulence.

* 13. Gustnado - A short lived, small tornado, usually F0 to F1, which sometimes develops along strong gust front boundaries at ground level but rarely extends all the way to cloud base.

14. Hook echo - Radar pattern sometimes seen in the southwest quadrant of a tornadic thunderstorm, looking like the number "6" or like a fish hook. The hook echo is the radar's reflectivity off of the precipitation aloft, wrapping around the periphery of the mesocyclone.

* 15. Inflow bands - Horizontal cloud bands, usually east to south of the main storm base and gradually curving into it, becoming thicker as they approach. Banding indicates increasing organization of the storm, as low level moisture condenses along the increasing inflow winds.

* 16. Inversion (or "cap") - A layer of air between one and two miles above the earth's surface, where temperature rises with height and suppresses deep convection. The longer that this persists during a "severe clear" afternoon, the greater the buildup of accumulated moisture and heat beneath it. If the cap isn't broken until mid or late afternoon (by the first strong tower to go up), then the severe potential is much greater.

* 17. Laminar funnel - A smooth sided funnel or tornadic vortex above ground, as opposed to a ragged, turbulent tornado (often characteristic of the strongest).

18. Mammatus (cumulus mammatus or "CM") - Smoothly rounded pouches hanging on the underside of anvils and often occurring with severe weather.

* 19. Meso-cyclone - A radar detectable circulation within the southwest flank of a severe thunderstorm, that incorporates the main updraft just ahead of a wrapping rear-flank downdraft -- producing a rotating core about 2-4 miles across and 6 miles high (can extend almost to anvil top, or 8 miles, for large tornadoes). The wall cloud is generally located near or a little to the southwest of the mesocyclone, near cloud base.

* 20. Meso-low - (This definition is somewhat speculative, since the Editor has seen some professional papers use this term when referring to the mesocyclone. However, he believes that its alternative use, seen in other professional papers, may be more correct). The localized lower pressure falls associated with approaching thunderstorms (as opposed to the normal continental lows and highs seen on your daily media weather map).

* 21. Microburst - An intense, brief and localized downburst of winds from cloud base, often along the southwest flank of a severe thunderstorm, that are sometimes damaging. Debris traces from such events are usually laid out radially, as opposed to concentrically twisting damage tracks from tornadoes.

* 22. Open low - Opposite of the "closed low," mentioned in term #6; or an upper low that is open to and draws its strength from upper level winds that circulate around it.

* 23. Penetrating top (penetrating dome) - That part of the thunderstorm that protrudes above the generally flat anvil deck, and which indicates the strongest updraft. Tornadoes sometimes occur within 20-30 minutes of the collapse of this top (Of course, if you're where you can see this, you're probably 50-100 miles too far away to see the tornado at cloud base).

* 24. Pedestal cloud - (Again, a somewhat speculative definition, since the Editor has not seen this term used much in recent years) A small, inclined cloud edge (like the "cow catcher" in front of an old steam locomotive), which forms at the edge of a "lowering in the cloud base southwest of the main precip core. It is an intermediate stage, before formation of the wall cloud (However, keep in mind that no one stage in storm development automatically leads to the next. At any time, the storm can lose its dynamic support in the atmosphere and simply begin weakening into an ordinary thundershower or hail storm).

* 25. Positive lightning - An occasional and comparatively rare cloud-ground bolt that's positively charged, much stronger than the average, negatively-charged bolt, and which often reaches anvil height, arcing over a long distance.

26. Rainfree base - A horizontal, dark cumulonimbus base with no visible precip or greatly reduced precip) as compared with the main storm's precip core. This marks the updraft region. Wall clouds often form here, within 1-3 miles of the main rain core.

* 27. Rear flank downdraft - Evaporatively cooled and precip driven downdraft that occurs from northwest to southwest to south of the main updraft. "Rear" flank is the side of the storm cell or thunderstorm opposite to the direction in which it is moving.

* 28. Right turner/left turner - When a thunderstorm becomes severe, it tends to veer or turn to the right from its normal path. Facing the direction it is moving and in line with its path, this turn is to your right. When storms split, the left one may conversely become a left turner.

29. Roll cloud - Relatively rare low-level, horizontal and narrow accessory cloud that is tube shaped, completely detached from the cumulonimbus base. When present, it is located along the gust front and appears to be slowly rolling about its horizontal axis. They do not produce tornadoes.

* 30. Shear- Any boundary between two parallel air streams, that are moving in different directions and/or at different speeds. Shearing tends to produce vorticity between the different air streams, which allows such interfaces to occur. In fact, as Chuck Doswell has pointed out to the Editor, vorticity is the normal way that the atmosphere moves, whether as continent, wide systems or at smaller scales of interaction.

31. Shelf cloud - A low level, horizontal accessory cloud that looks wedge-shaped as it approaches. Its top is usually attached to the thunderstorm base and forms along the gust front.

32. Squall line - Any line or narrow band of active thunderstorms. The term is usually used to describe solid or broken lines of strong or severe thunderstorms.

* 33. Stretching - Refers to stretching of a rotating column of air, as by faster upper level winds, which narrows that column and increases its rotation speed,

* 34. Striations Narrow bands or channels that form just above cloud base, along the low- er, leading side of a cumulus tower, often just above the wall cloud. Their appearance indicates rotation beginning to take place about the updraft.

* 35. Suction vortex - Secondary or sub-vortices that occur within the rotational circulation of the tornado, occasionally visible with larger tornadoes as brief tubes, spinning up from the ground or materializing in the air between the lowering condensation column of the parent tornado and the ground. These produce the maximum damaging winds of 200 - 300 mph.

* 36. Supercell - A thunderstorm that develops in an atmospheric environment that permits it to become and continue being severe for 30 minutes to an hour, or longer, without either (a) the wrapping gust front choking off the moist southerly inflow winds near the surface, feeding the updraft or (b) the overall storm cell moving out of its breeding ground.

37. Tail cloud - A low, tail shaped accessory cloud, extending from the northern quadrant of a wall cloud and often curving back to the east, southeast or south. Motions in the tail cloud are toward the wall cloud, with rapid updraft at the function of the tail and wall cloud.

* 38. Upwind/downwind - Upwind from the thunderstorm is on the side where winds are approaching it. Downwind from the same storm is on the side where winds are moving away from it.

39. Virginate - Refers to an old thunderstorm anvil which has lost its low level convective support and becomes detached from the earlier updraft that fed it. These lower clouds have usually weakened and rained out, leaving an upper level anvil, virginated from its updraft sources, which will drop little further precip and just drift with prevailing winds until it dissipates.

* 40. Vorticity loops - Horizontal vorticity rolls 1-2 thousand feet in diameter) which tend to form at low levels, between different moving layers of air. They are not- continuous loops or tubes but appear and disappear frequently at this level. When strong updrafts develop in building cumulus, these loops, or rather this interface layer is pulled upward, stretching the incipient vorticity and accentuating the rotational component already inherent in the updraft. In this general way, they contribute to the development of tornadic rotation.

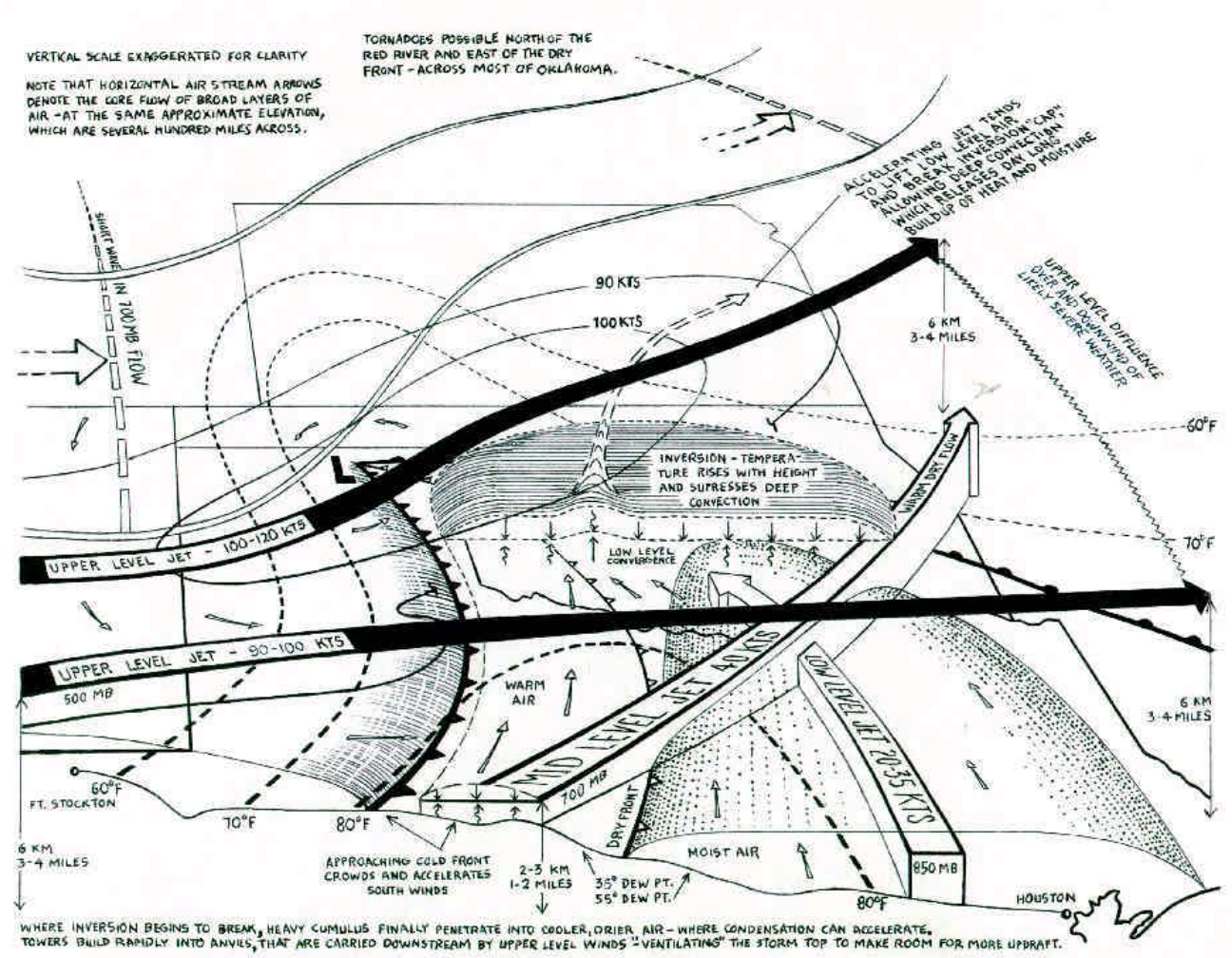
* 41. Weak echo regions (WER) - Similar to the bounded weak echo region (term #4) or BWER, except that the rear flank downdraft has not yet developed.
So much for terminology. I had not intended to go so far, but the theme of this issue seemed to require a somewhat fuller treatment than originally planned. My apologies to Steven Leitch in Canada for not including his fine article on "The ROARING Hailshaft" in this issue as I had planned. It will be included in the January issue. Finally, if any of you wish to modify or add to this list of severe storm terminology, please do so.

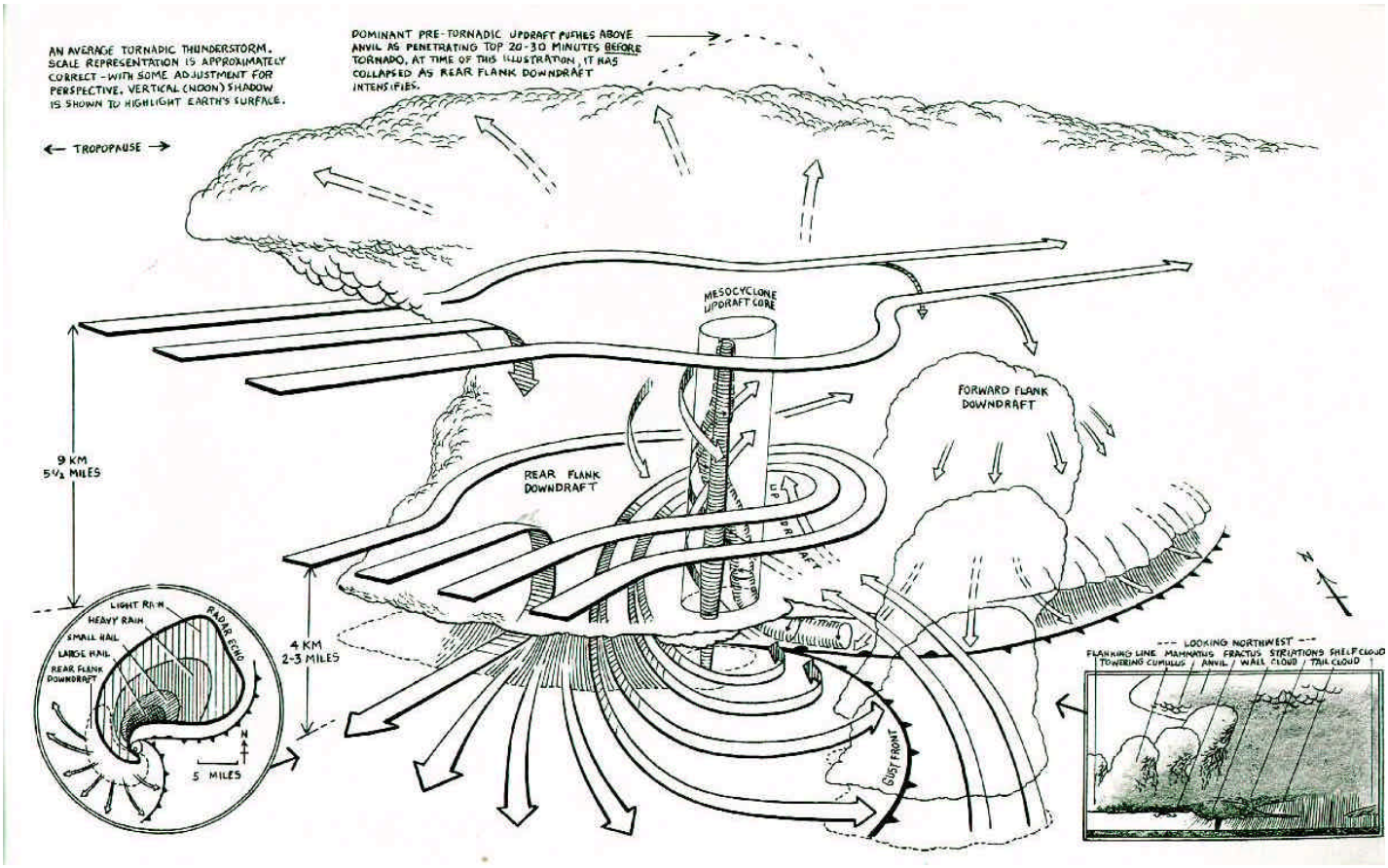
FEATURE #3 Severe Storm Dynamics

Two schematic illustrations follow, showing atmospheric dynamics (a) in an overview of a severe storm environment and (b) in a detailed cross-section of an average tornadic thunderstorm. This was an ambitious project, which tried to consolidate and integrate from many sources the major elements from current knowledge on the subject. Each incorporates explanations and illustrations from dosens of authors. It would be difficult to list them all here and would certainly bust this issue's two ounce postage limit. However, some of the principal sources for these illustrations were: (a) For the severe storm environment -- Toby N. Garison, Pennsylvania State University, 1982; Peter A. Browning and Henry E. Fuelberg, Saint Louis University, 1982; and John T. Snow, Purdue University (Scientific American, April, 1984). (b) For the tornadic storm cross-section -- Leslie R. Lemon and Charles A. Doswell III, National Severe Storms Forecast Center, 1978 and 1979; T. Theodore Fujita, University of Chicago, 1981; and A.B.C. Whipple, Storm (Time-Life Books), 1982.

Prior to this publication, the Editor sent out nine draft copies to storm meteorologists around the country for comment and received one telephoned and seven written replies. My thanks to Don Burgess, Bob Davies-Jones, Chuck Doswell, Tim Marshall, John Weaver, John T. Snow and Howie Bluestein for their thoughtful and detailed (Burgess & Marshall) comments. A common response from several was that my initial efforts were too complicated. In other cases, a few inconsistent comments were received on minor aspects of these sketches. In such instances, a choice was made or else that part of the sketch was dropped. The Editor has tried to clarify each illustration, accordingly, and has simplified some parts. To the best of my knowledge, this is the first time that a single, unified display has been attempted that ties together basic state-of-the-art knowledge on tornadic storms.

Please note that both illustrations portray an ideal setting over the southern plains states. However, there are variables between tornadic storms and between storm environments at the same time of the year, at different times of the year, and/or in different parts of the country. For example, differences can be found between the July-Montana tornado and the April-Alabama twister. In some cases, one or two "textbook" factors will be missing, and still produce a tornado. Later in the spring and early summer months, some storms become tornadic with very weak upper level winds, if low level heating and moisture are abundant. In other cases, the dry front is absent. However, these illustrations do show most of the major ingredients and are, at least, instructive in this respect.




AN AVERAGE TORNADIC THUNDERSTORM. SCALE REPRESENTATION IS APPROXIMATELY CORRECT - WITH SOME ADJUSTMENT FOR PERSPECTIVE. VERTICAL (NOON) SHADOW IS SHOWN TO HIGHLIGHT EARTH'S SURFACE.
DOMINANT PRE-TORNADIC UPDRAFT PUSHES ABOVE ANVIL AS PENETRATING TOP 20-30 MINUTES BEFORE TORNADO. AT TIME OF THIS ILLUSTRATION, IT HAS COLLAPSED AS REAR FLANK DOWNDRAFT INTENSIFIES.
← TROPOPAUSE →
MESOCYCLONE UPDRAFT CORE
FORWARD FLANK DOWNDRAFT
REAR FLANK DOWNDRAFT
9 KM 5½ MILES
4 KM 2-3 MILES
LIGHT RAIN
HEAVY RAIN
SMALL HAIL
LARGE HAIL
REAR FLANK DOWNDRAFT
RADAR ECHO
N
5 MILES
GUST FRONT
--- LOOKING NORTHWEST ---
FLANKING LINE MAMMATUS FRACTUS STRIATIONS SHELF CLOUD
TOWERING CUMULUS / ANVIL / WALL CLOUD / TAIL CLOUD