MESO's CAFE
(Computer-Aided Forecasting Exhibition)

An Overview of Tools

Storm chasing is not like '*Twister*". You don't see 5 major tornadoes in one day, you probably don't have a generous aunt who lives in prime chase country, and you don't compete against "bad guys" driving matching black vans. Storm chasing involves hours of forecasting, driving, waiting, waiting, driving, and forecasting. If Nature cooperates, several long days of this could result in witnessing one of the most beautiful (yet potentially devastating), awe-inspiring sites this planet has to offer.



Watching a cumulus cloud grow out of blue sky is one thing, but watching that cloud grow to be 11 miles tall is something else. Single clouds of this size are typically what we call supercells... a single rotating entity that is self-sustaining and capable of producing (among other things) flash floods, frequent lightning, large hail, and tornadoes. This type of storm is what storm chasers seek; it's a lot of action packed into an isolated spot. An advantage of this small size is that it's "easy" to nagivate around it to find the best viewing angle, or angle of attack (assuming the desired roads exist). The disadvantage of hunting a supercell is that the prime viewing area occupies only a few square miles. Kansas and Oklahoma ALONE cover an area of 150,500 square miles. That doesn't count other supercell breeding grounds like Texas, Nebraska, and Colorado. The odds of success are incredibly small.

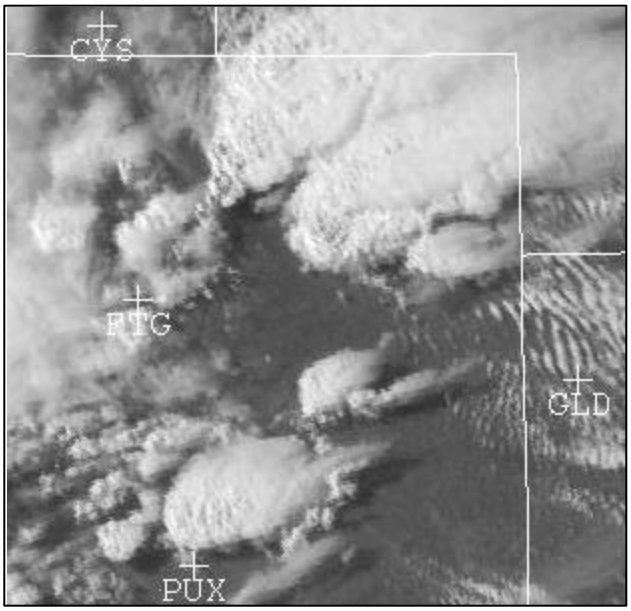
That's where accurate severe weather forecasting comes in. By analyzing the current state of the atmosphere and by carefully checking what models expect the future state of the atmosphere to

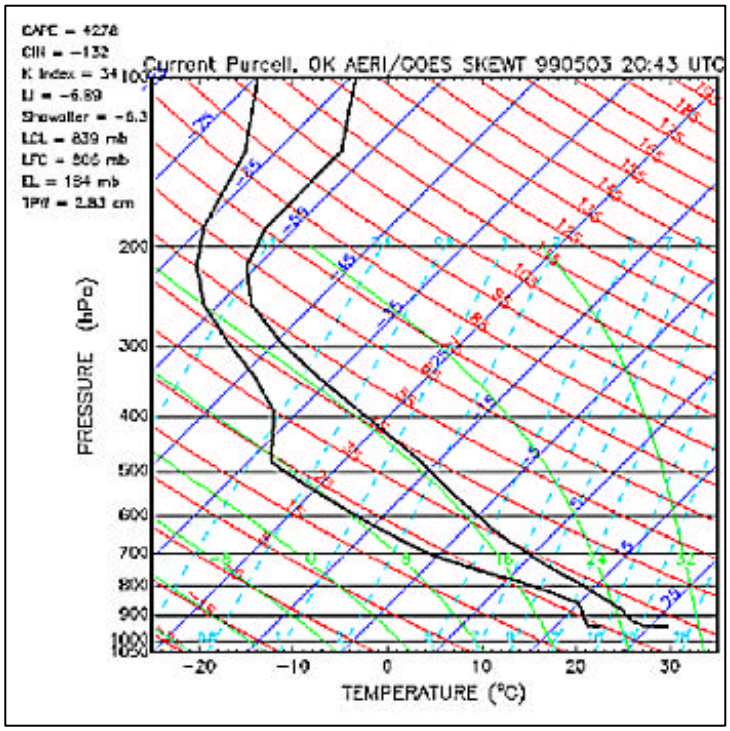
be, we can create our own forecasts, ranging from 5 minutes ("Nowcasting") to several days ("Wishcasting").

How do we do it? What's important to look at when it comes to the development of supercells? Nobody knows for sure. But here we present a VERY brief overview of what we consider to be important tools, indices, and signs.

A basic list of tools you'll want are: satellite loops, observed and forecast soundings, surface maps, upper-air maps, and rapidly-updating radar loops once things get going. We're not going to list the websites we use to get this data... you probably already have your favorite sites.

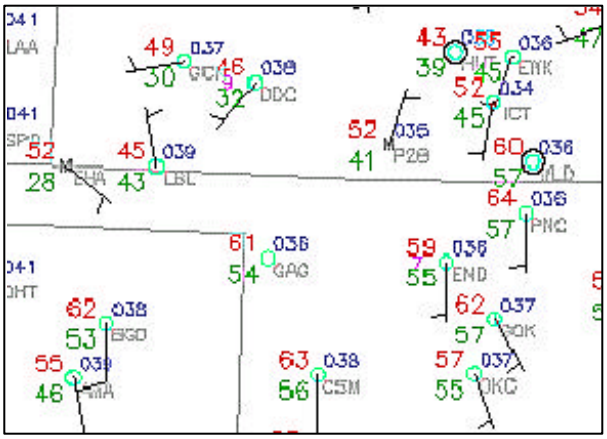
SATELLITE: Access to satellite loops is important in the time frame before convection breaks out and while it's breaking out. High-resolution visible imagery will show you where cumulus clouds are developing, how long they're lasting, and if they are growing. Water vapor imagery is great for the pre-convective time frame, when you just need to see the flow patterns, and where the moisture is. Shortwave (IR) imagery is a great tool day or night once the convection is already going. This channel detects cloud-top temperatures, and thus cloud-top height. The height of a cloud indicates the intensity of the updraft.

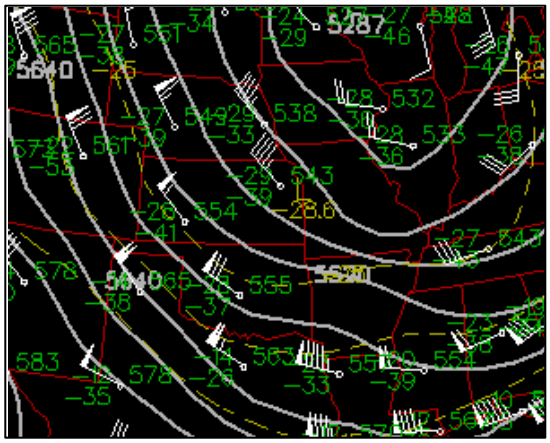




SOUNDINGS: Observed and forecast soundings (Skew-T Log-P Diagrams) are a very valuable tool in forecasting where the most intense convection will break out. From these, you know the moisture content at different levels, the winds (magnitude and direction) at all altitudes, the lapse rate, and last but not least, the various stability indices such as LFC, CAPE, CIN, LI, etc. Perhaps in the near future we will write a short document on what all of these indices are and what they mean. Basically, soundings can tell you where rotating supercells are more likely to occur.

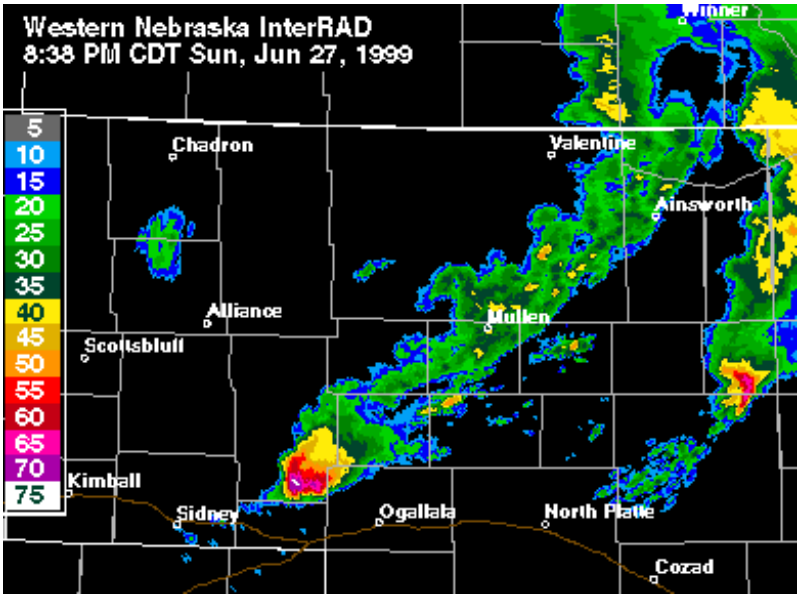
SURFACE: Surface observations are important to see where a dryline is, where the wind converges or diverges, or if the low-level flow is accessing a moisture source.





UPPER-AIR: Upper-air charts (850mb, 500mb, and 200mb) are key in looking for wind shear, vorticity, and pressure heights. These take a bit of experience to use, and we can't take the time here to explain the details. But we assure you that it's worth taking the time to learn how to read them.

RADAR: A good radar loop can be your best friend when the action really picks up. It helps you find the most intense cell, and can help you escape or avoid a dangerous situation (like 3-4" hail). Watch the radar very closely even when the skies are clear in your area (in conjunction with visible satellite imagery). The first significant updraft in the area will typically rob the energy and moisture from other small updrafts. The atmosphere's first attempt at stabilizing itself can sometimes result in the most intense storm.



With these tools at your disposal, you should greatly increase your chances of scoring. Also highly recommended is a set of good road maps, a weather radio, a scanner, and listening to local radio stations. Without reasonable forecasts, your chances of finding a supercell by luck are about as good as finding a grain of sand in a barrel of oatmeal. Good luck and happy chasing!

Brian McNoldy for *MESO, November 1999*

http://www.mcwar.org