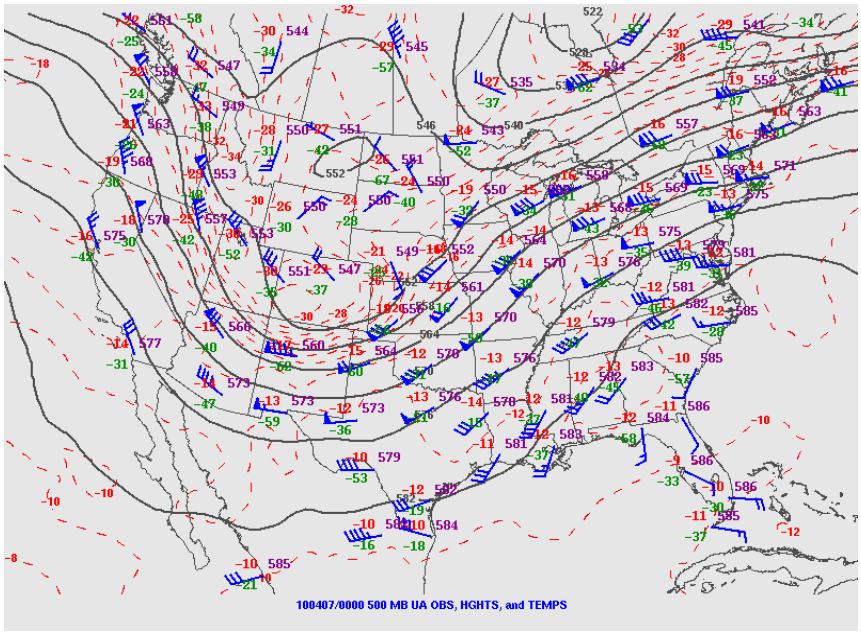
# Chase Summary- April 6th, 2010

This was one of the more special chases I have ever been on, as this was actually part of a class assignment. For meteorology 417 a chase lab assignment is given near the end of the semester. Since a tornado chance was present in Iowa my professor, Dr. Bill Gallus, decided to make the lab a real life chase. The chase itself went very well as I feel we played the setup perfectly and did not get too distracted by the early, lone, and elevated convection. Considering storm motions were pushing near 50kts we hung in there, and even though we did not see a tornado we certainly were on the storm of the day in terms of tornado potential.

## Environment and Setup

### Synoptic Setup

The synoptic setup included a long wave trough centered over central Colorado with a shortwave approaching Iowa. Wind speeds were nearly 80kts at 500mb giving good 0-6km shear that was very favorable for supercell thunderstorms. This however made staying with these storms nearly impossible as storm motions were nearly 50kts throughout the entire chase.

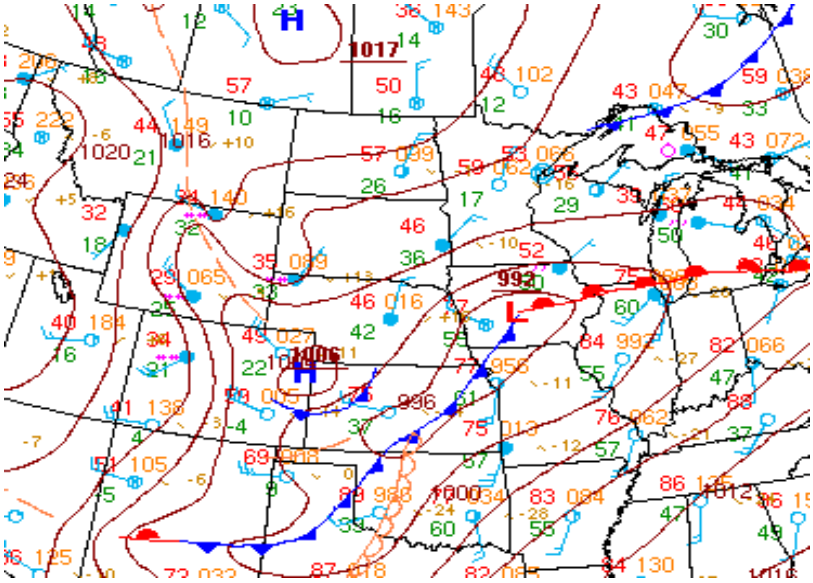



At 700mb temperatures were much cooler than the day before. At 0z 700 temperatures near Cedar Rapids, IA were around 5 degrees Celsius. Temperatures at 850 were increasing over time which may have played a role in lowering the tornado threat. At 0z 850 temperatures increased to around 15 degrees Celsius. Looking at a sounding for Cedar Rapids around 23z shows the cap refilling at 850mb making low level CAPE nearly 0. Without that low level CAPE, stretching may have been suppressed.

### Surface Features

At the surface an area of low pressure was centered in SW Iowa with a warm front extending across to near Dubuque. It was forecast to approach Marshalltown. Winds were out of the SSW making low level storm relative helicity much lower than what we would have liked. Winds were more backed around the Cedar Rapids area and just along the warm front. This accompanied by CAPE values of around 1500 j/kg in the warm sector made the largest tornado threat in a rectangle form Ames to Des

Moines to Cedar Rapids to Iowa City. If a storm could make it closer to the warm front the greater its chance of rotating as the winds became more backed.



As for an initial target, I wanted to go to Newton, IA where it appeared the models would have convection trigger, especially considering that clearing occurred early on in the day and the hourly SPC mesoanalysis showed LFC heights falling off the table. I wanted to be on the storms early as the southwesterly winds were favorable for more of a linear storm type. We needed to find the early storms that were more likely to be discrete and get out and ahead of a line.

The parameters for the day looked fairly marginal. CAPE was forecasted to reach near 2000 J/kg in some parts of Iowa, effective storm relative helicty to about 200 near the warm front, yielding significant tornado values of up to 2, right below the front in more eastern Iowa.

The main problem for this day was the surface winds being from the SW yielding not only lower SRH values but also being much more favorable for a linear system, quickly, along the cold front. This meant that we needed a storm to develop in the warm sector early that could stay away from cell mergers that would not interfere with its own organization.

## The Chase

We all met at 11:00 am in the map room in Agronomy hall to discuss thoughts about the current situation. The one thing that stood out to all of us was that a significant amount of clearing had already started to occur. Temperatures were already skyrocketing and it was clearly evident that high temperatures were going to be much higher than earlier forecasted. Also LFC heights were already beginning to drop below 2000 meters which concerned me that initiation was going to be much earlier than anticipated. It was determined that we would all meet once again at 1:00pm in the classroom for discussion on a final target area.

At 1pm, after getting the mesonet from the ag farm, it was determined that we would meet at the gas station along highway 30 in Ames as the warm front had just passed to our north and it seemed that maybe the threat had shifted towards Ames. While at the gas station the winds shifted back to the north and it got noticeably colder. After looking at surface observations and radar imagery it was determined that some sort of boundary made its way back down towards Ames. Because of this we decided to drive

east towards Nevada, IA to get a better view of the agitated cumulus we had been seeing earlier to see if any vertical development was beginning to develop.

In Nevada we realized that this boundary was taking over the area and really progressing southward and that in this environment only elevated convection was going to be present. Therefore we decided that going back into the warm sector was best. We drove back to Ames and down interstate 35 to Altoona, IA where we waited just outside of Adventureland Park. Again we were waiting for any kind of initiation to occur.

Around 21z the first round of convection formed around Marshalltown, along that unusual boundary. The motion had it going NE into the very cold air as mentioned before. We decided, based solely on it was the only storm around, to head up towards Marshalltown and see if any organization was going to occur. Once we reached Marshalltown, we got out and felt the very cold air. It was clear to me that this storm was going to be elevated. This was a very good example of "chase bait" where a lone storm goes up in a bad environment and one gets distracted by it, not being patient for later storms.

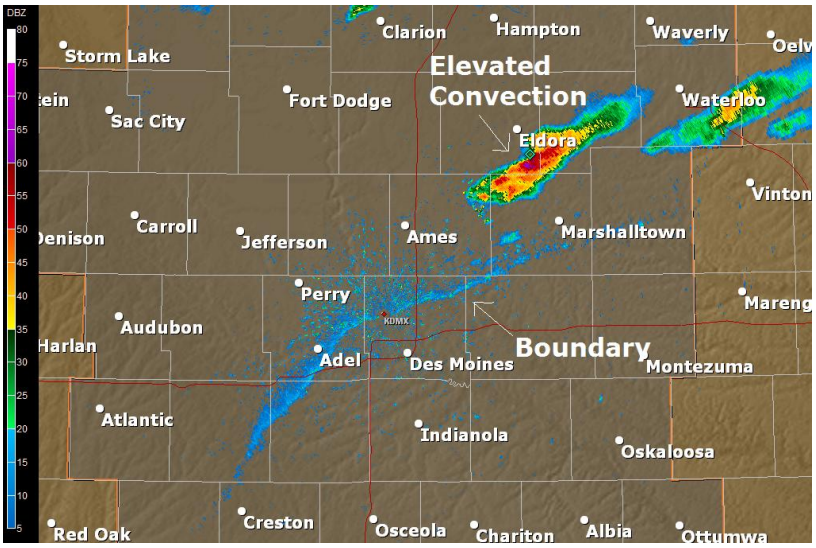



Figure 1- DMX Radar 21:11z

After discussion with a few people we decided to move back south and east. Our preliminary new target was I-80 south of Tama and Toledo. We ended up in Grinnell which is just north of the interstate. We stopped at a local Hardees to get some food, but at this time convection was beginning to initiate to our south in the warm sector. This was of some concern to me as we were eating while lone storms were beginning to fire in a surface based environment.

Storms began to increase in areal coverage so we decided that it was necessary to get out ahead of the storms on interstate 80 and see if any one of them could organize into a supercell structure. One storm in particular went right into Grinnell a few minutes after we left leaving damage from large hail and wind gusts up to nearly 100mph that overturned some semis on the interstate. This storm was merged together with another storm to its immediate south. That cell turned out to be the tornado warned one that we eventually followed north of Cedar Rapids.

This storm was moving quick, at around 50kts. This made staying with the storm nearly impossible over an extended period time. We headed northeast to try to get a good glimpse into the hook. We stopped on a muddy road in Benton County where we observed some lower clouds feeding into the storm, but no distinct rotation was noted. It was at this time the cell was tornado warned by the National Weather

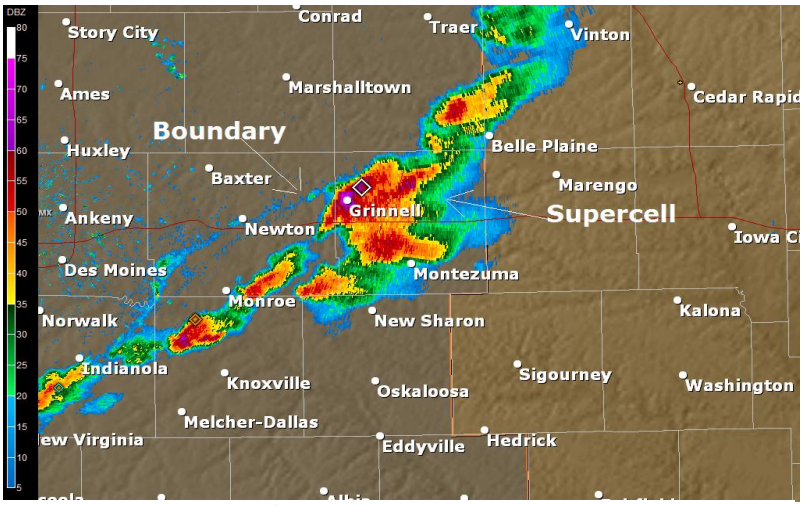



Figure 2- DMX Radar 22:56 z

Service in Davenport. The warning was based off of Doppler radar indicated rotation, which when looking over the level 2 imagery appears to be fairly weak. On reflectivity it began to look more impressive as a more defined hook became evident and the storm itself began to right turn which helped it get further away from the other storms. This left it alone and out ahead of the line.

As we approached Cedar Rapids the storm was getting well ahead of us and with the Cedar River limiting road options we began to fall behind. We headed up to Urbana and then east towards Central City where we finally decided to call it quits as the storm was pushing farther ahead of us as well as the fact it was getting dark.

We headed home and tried to intercept a cell within a line that was warned, but the initial rotation that caused the warning died out quickly. We ended up back in Ames around 10:00pm.

## Storm comments based on radar

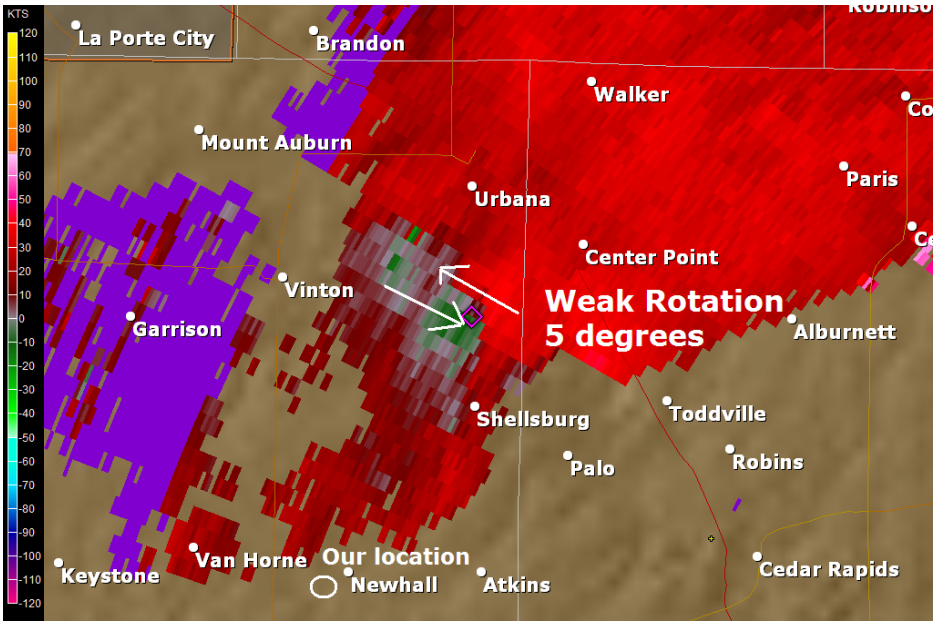



Figure 3- DVN Radar .5 SRM

The rotation throughout this storm was weak and broad. On radar the storm never developed any kind of tight circulation that would indicate a tornadic circulation. There were some interesting areas where the radar seemed to indicate strong convergence and turbulence near the bottom of the appendage of the storm. This may help explain why some of the scud clouds we were seeing on the back of the storm were turbulent and even had some sustained rotation.

The storm relative velocity images looked the best just west of Alburnett when stronger rotation seemed to be evident, but again it was more of a convergent flow rather than rotational. At midlevels a strong mesocyclone was not present. In the end, I believe this storm was not organized enough to produce tornadoes.

## Final Thoughts

When looking over model skew-ts for Cedar Rapids just before the time this storm moved in I found that this storm may not have been surface based. Warming 850mb temperatures may have suppressed lower level CAPE which may have dampened stretching in the lower levels. This may explain why so much convergence was occurring with no rotational development afterwards. This storm must have also passed just north of the boundary as surface temperature and dewpoint dropped as well as winds become more backed.

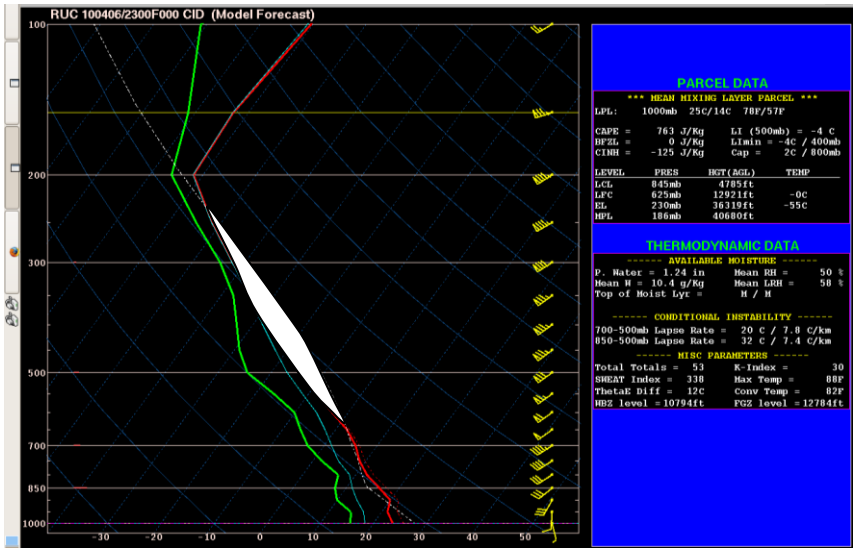



Figure 4- Modified KCID Sounding 23z, White area is positive buoyancy

Interestingly enough, numerous funnel cloud reports were reported just north of Cedar Rapids. After looking over pictures in the area I believe that a weak wall cloud was trying to develop. It was small in nature which may be the reason why so many funnel cloud reports were sent in. Other pictures near central city showed a more defined wall cloud. This was confirmed as well by my fellow chaser, Ricky McFarland.

In the end what killed the tornado potential this day was merging cells, poor surface wind directions, the boundary that was moving south where the warm front was suppose to be, and poor low level buoyancy.

In my opinion we played the setup very well and did not get distracted too much over the elevated convection that hit Waterloo. This gave us a much better opportunity to see rotational features because of how fast the storm was moving.

## Other Pictures

Figure 6- Lowering north of Cedar Rapids

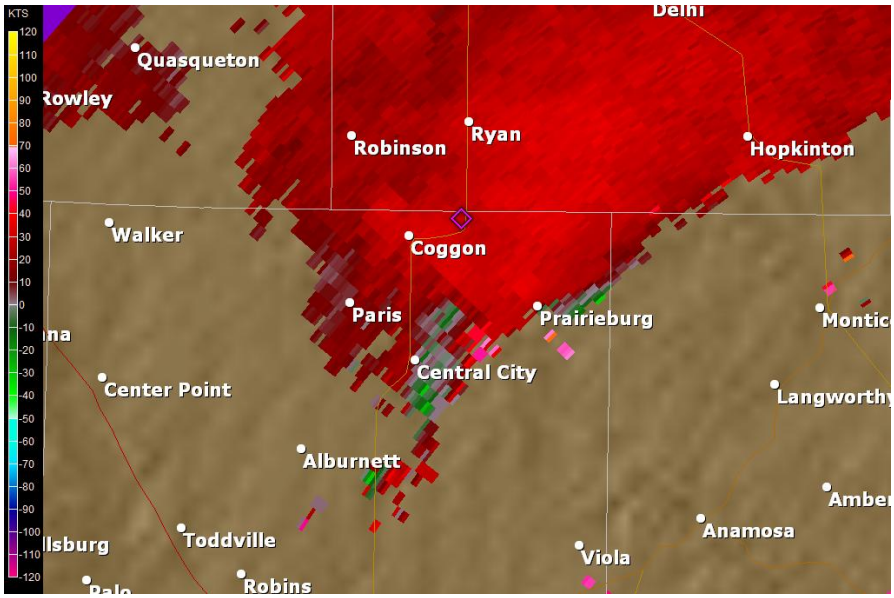



Figure 5- DVN .5 SRM, storm recycling, time of more defined wall cloud