

THE JOURNAL OF AUSTRALIAN STORM CHASING

THE **Australian** *Storm Chaser*

Feature Chases

NSW SUPERCCELL OUTBREAK

November 21st 2003

ORANGE LIGHTNING SHOW

December 12th 2003

LIGHTNING MAYHEM!!!

January 24th 2004

**Mega Severe Storm
Issue!!!**

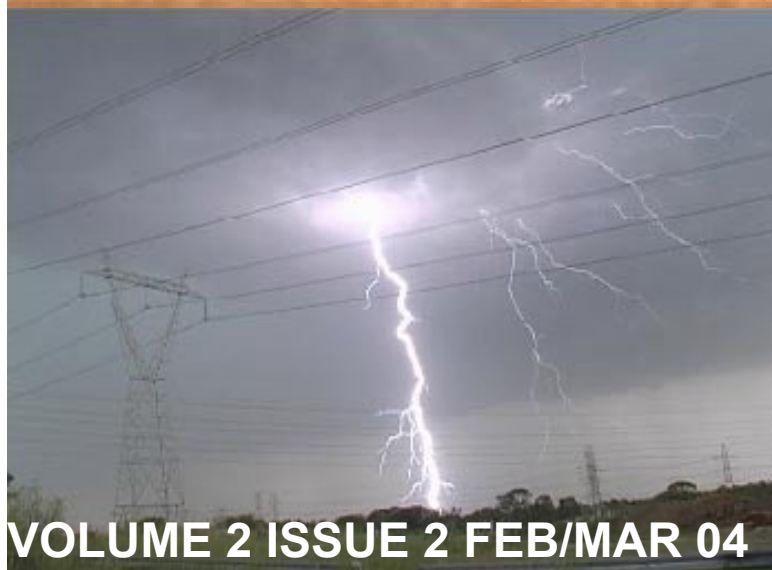
Plus

• *Editorial*

• *Wordfinder Puzzle*

• *Fujita Tornado Damage Scale*

VOLUME 2 ISSUE 2 FEB/MAR 04



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Submissions

All submitted articles must be in MS Word format with photos and graphics in a separate file. Articles can be submitted by post on CD, email jbrislane@optusnet.com.au for address or alternatively articles that aren't too large can be submitted via email to mpiper@bigpond.net.au or jbrislane@optusnet.com.au

100 kb is large enough for picture files and please give credits when taking pictures or graphics from sources other than yourself.

Pictures or information submitted without due credit will be discarded. Articles may be shortened or altered for editorial purposes.

Letter from the Editor

Welcome to the Feb/Mar edition of the ASC Journal, The Journal of Australian Storm Chasing!

What a bizzare start to the year we have had! From a stormy January to a hot February to a warm and dry March and now a hot and dry beggining to April as we are experiencing one of the hottest “Indian Summers” in over a decade. Sooner or later we will start to desend into autumn with crisp nights and dewy mornings and then finally winter will upon us again for another year. With the storm season now over in the eastern states, we can only reminisce about the amazing season we have just had. Luckily for you we have collected some of the best storm events from the season just ended, and have presented them here for your viewing pleasure!

We have decided this time to include a feature article on an amazing storm day from last November. That day was the 21st, where an inland trough with multiple convergence zones produced a number of H.P. supercells from the N.S.W./Victorian border right up to Dubbo in the N.S.W. central west slopes. All the severe storm criteria were present this day, including large hail, damaging straight line winds and torrential rain.

Jimmy Deguara intercepted the first supercell near the small country town of Temora in the northern riverina. This awesome storm produced massive straight line winds, and as he was heading north, trying to avoid it, he inadvertantly headed straight into the core due to the road network and ended up only just making it out the other side! Trees were literally knocked down right in front of his car as he tried to make his escape north!

In the second part of this feature we take you out with Matthew Piper and Myself as we head west to our target area on the same day, only to drive around in a huge circle before finally coming across a massive H.P. supercell near the locality of Bogan Gate west of Parkes N.S.W. This supercell was absolutely awesome with a large persitant rain free base that produced numerous funnel clouds and lowerings!

We also travel to Orange in this issue with Jimmy Deguara again as he witnesses a severe storm that produced some beutifull stacatto lightning on the 12th of December 2003. This day started with an MCS that formed in the wee hours just west of Dubbo and went on to produce a number of severe storms and some large hail to 6cm’s.

The 24th of January 2004 was a great day for chasing in western Sydney and we all managed to intercept the same severe storm that formed near Silverdale and tracked east over the western suburbs into Fairfield. Jimmy’s account is presented in this issue with some amazing photos of the intense lightning he witnessed on this day from the northern side of this storm between Mt Druitt and Blacktown. The high CAPE, deep atmosphere, gave an unfogetable lightning show that Jimmy won’t be forgetting in a hurry!

So enjoy this edition as we take you along with us into thunderstorm nirvana.

Thankyou, and happy storm chasing.

Jeff Brislane and Matthew Piper

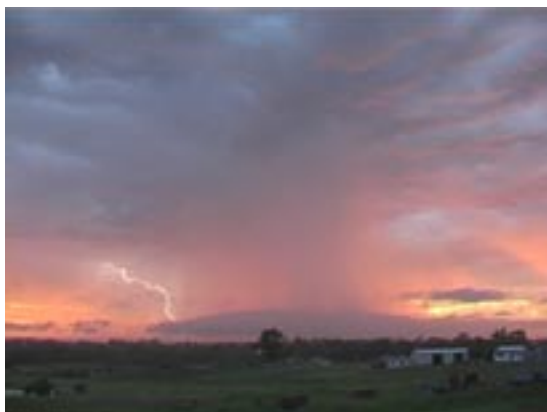
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12th December 2003 Orange and Central West Chase by Jimmy Deguara

With an upper trough expected to affect central NSW on this day, moisture advection and moderate to high wind shear profile were sufficient for supercell thunderstorms. There was a lot of energy with high dew points and warm conditions anticipated with models reflecting CAPEs about 2500. It was to be a long day picking up Ray and Harley during the morning and heading out to the target of Orange. With the Hunter Region recovering from an overnight storm complex, it made for an excellent set up west of the divide in clearer air. This overnight complex though during the morning may have been weakening but Sydney was experiencing sporadic lightning in the form of anvil crawlers and cloud to ground lightning activity.

Heading over the ranges, we finally were in clearer air but storms were already firing in the unstable air mass. I soon received the first warning call from David Croan that a Severe Thunderstorm Advice centred on the regions of the western Central Tablelands had already been issued. A storm was already active and rapidly approaching us with the intercept at Orange.

The first storm band was embedded in rain but the main storm approaching Orange was experiencing inflow a good sign for severe storms to remain organised. But this storm was large and quickly sent up powerful pulses that merged into the side anvils. And what anticipation! The adrenalin rush! Fear of the erratic lightning. Lightning was bolting in the hills but the occasional bolt nearby. A shelf cloud appeared in the distance part of the main core of this storm line. Then suddenly Harley noticed that bolts were appearing in a core to the southwest. This gradually spread towards the tops of Mt Canobolis. What we experienced with the camera mounted on a tripod aimed at the mount was a fierce display of powerful and frequent multiple bolts. I was almost in disbelief at the amount of energy being dispersed by these bolts!!



Thick bolts with consistent behaviour beginning with staccato bolts followed by long pulses lasting 1 or two seconds - a display of power. A few bolts Harley noted had struck the tower on top of Mt Canobolis. Ray was in his element watching from the safety of the vehicle. This was one of the most powerful displays of lightning activity and certainly broke the lightning drought of the summer thus far.

After being alerted to a closer lightning bolt by Harley, we sheltered in the vehicle. Heading back to Orange and northwest, the shelf cloud overtook us moving into difficult terrain. So after a brief chase in this region, we settled for an observation and watched the storm with interesting base features and wrap around precipitation core disappear. Next - lunch at Molong enjoying a view of the next developing activity.

And what emerged were rapidly developing and organising severe storms. Heading north of Molong, we observed an interesting base that soon was confirmed as a wall cloud. Excellent inflow to this right mover with inflow characteristics umm this means there was a left mover. So after some photography and video opportunities, we zoomed towards Wellington. And this is where the interesting base of the left mover was to be. It was but was shadowed by rainfall. The main storm was confirmed heading rapidly east of Dubbo. We were in the hail shower and tried to remain behind to finally meet up with David and Brett. This was the downfall unfortunately end of the chase. Incidentally this storm did produce giant hail to 6.6cm about 25 kilometres south of Dubbo. We were not that far off but simply not close enough and quick enough to get that beast.

Despite another set of extensive anvil plumes, the storms split and decayed. Frequent lightning did occur but these storms passed over impossible chasing terrain and a poor road network.

With our destination Sydney, we observed an interesting storm to the southeast that brilliantly reflected the setting sun illuminating its spectacular mammatus. There is nothing like a chase with storms on the return journey a complete chase.





N.S.W. Supercell Outbreak

21st November 2003

Chase 1: Temora Supercell by Jimmy Deguara

Chase 2: Bogan Gate Supercell by Jeff Brislane and Matt Piper



Chase Number 1 Temora Supercell by Jimmy Deguara

Two things were in the plans for this day, chase storms but also meet up with David C, Darren C and David H. Checking models seemed to indicate that several areas would fire across central New South Wales. After some deliberation, we targeted the region near West Wyalong where favourable wind shear was to develop.

Heading north of Wagga Wagga though, we noted storms were already ongoing to our west. Just south of Temora, we passed through a localised development area of cumulus development but also noted the storms to the west in a whole band. This storm band was heading generally southeast.



On the radar and lightning tracker, it was going ballistic! I took an interest to an isolated cells moving slightly left of the steering wind shear. It also had a red core Leeton and the region just north of Narrandera were devastated by a hailstorm at this time. But what we had in front of us seemed embedded rubbish. But then like a curtain opening at a stage show, what came into view was an impressive green sculptured storm. “Hey look what we have here!”, I yelled pointing at the green beast.

And this was a large storm too. What encouraged me was there was increasing inflow from a northeaster feeding ample moisture into the central part of the storm. We made a quick dash on the local roads to get closer but with little luck in finding the good viewing points. We ended up going straight back to where we had started. The northern part of other developing storms had merged into a squall line complex. I began to realise though that the region to the southwest seemed be an indentation in the line and possible embedded supercell (timelapse reveals clockwise rotation of the whole base). There was an inflow tail feeding into this circular wall cloud.

Lightning strobed repeatedly in several sections of the storm with some strikes lasting up to 2 seconds. This storm had tapped a deep atmosphere. The storms may have been moving at a reasonable pace but we had observed them for some time. But with the main band and a serious base to the north and no road options east beyond Temora, it was time to head north.



With Temora only 10 kilometres away, a menacing thick dark rain core revealed itself with the familiar green tinge. This was a scene from hell. The contrast and pure density of this core was a clear warning “Do not enter”. It was a race against the clock. We had to make it to Temora and head east, that wasn’t too much to ask for. Was it?

But what would you expect; the road turned northwest toward the township. Lightning strobed and hit a tree in the field. Lightning was flashing in the core. The microburst had just unleashed onto the township.



We made it to the main intersection, rounded the round-a-bout and headed on the east road option. Strong winds and rain were accompanied by the squall. Lightning, captured on video, pulsed ahead.



But the scene we were about to face was one of chaos. Several trees had already been toppled over the road. This was dangerous chasing. I drove over the side of the road on the northern side of the trees.



Another four trees lay over the road. We continued on the grass. Finally some clear. Nick was somewhere behind and in contact. But there was little time for communication - this was dangerous. A haze appeared further down in the fields. More debris and branches on the road. Suddenly we were blasted by ferocious winds and horizontal precipitation.



Trees were swaying violently. Debris in the form of leaves and twigs, some small branches flew past - visibility almost zero. More branches to swerve around. Tiny hail and sand blasted our vehicle. Stopping now was basically too late and dangerous. We cautiously maneuvered further. The whole scene was eerie and seemed like a sound barrier within the roar of the winds and rain.



A quick call from Nick - he would catch up later (what Nick did not tell us is that within the 100 metre spacing of our vehicle a large branch had fallen onto the road in between us!! This shut his chase for a little while).



It was a wild ride and one I would never forget. Seldom have I experienced so much surface water on the road so quickly to cause such dangerous driving conditions. By the time we entered the second core, we were aquaplaning. Remaining ahead of the storm was not a problem but the gust front progressed at a rapid pace. After several slightly weaker cores but still strong winds and violent rain, we were out.

Rarely is it possible to beat such a fast moving storm front once it overtakes. It did take us a distance of 50 kilometres to exit the storm front. The structure of the shelf cloud had become rather ragged so a northern route was taken. Finally, we made it to Cowra allowing the storm line to pass.



A message from Matt Piper and Jeff Brislane indicated a storm had developed just to the west of West Wyalong. This was the target region finally breaking the cap. Waiting for David and crew took a little while to join us our next destination the region north of West Wyalong.

By the time we were half way across and just pass Grenfell, the anvil came into view. It was obvious the storm was not moving east or east southeast but more east northeast. Missing the opportunity to head north to Forbes, we tried another minor road. The crisp side anvil indicated a very large menacing storm most likely a supercell based on the structure. There seemed to be inflow streaming from the east-northeast into the main updraft region. Flashes of lightning began to appear as we neared. Though it was the wrong turn offs made that put us out of contention. Too much of a westerly component in our route. The storm also seemed to split off a weaker component that gusted out and slowed us down. We had one last chance to get into line with the menacing storm to the north but the chasers were generally tired and wanted to call it quits. Phone call from Matt and Jeff, alerted us that it was still going though our move north was fruitless. We enjoyed a night out at Dubbo teaming up with Jeff and Matt.

Chase Number 2 Bogan Gate Supercell by Jeff Brislane and Matt Piper

Any chaser knows that there is nothing like having a free day or two to chase in the peak of the severe storm season, but on the morning of the 21st of November 2003 I was on the first day of a 10 day storm chasing holiday. Just try and beat that for sheer excitement! And as a lot of chasers also know, there is nothing like starting off a 10 day chasing storm chasing adventure with a supercell on the very first day.

My day began with a last check of the models before packing the car and heading off to get my chase partner for this holiday Matt Piper. According to GFS this day the best CAPE and LI's would be in the region west of a line from Dubbo south to Forbes and west toward Condobolin with the limit further west around Lake Cargelligo and as a result, this is where we headed. Many thoughts were expressed on the drive out as to what sort of storms we would really see on this day. The usual things came up like, "imagine if we saw a massive supercell that dumped huge hail!" Little did we know what was really in store for us this day.

This was my first ever drive west of Parkes. We had chased out to Parkes a few times and we had even ventured about 15kms west of town once, but I had never driven to Condobolin. I think I was expecting to see a desert or something considering how far west we were! But in actual fact Condobolin is a river town on the mighty Lachlan with not a sand dune in sight! Although the Lachlan wasn't looking too mighty this day. One thing I was surprised to find was that Condobolin had a library with fast Internet access. It was here at about 11am that we stopped to find out what was happening weather wise.



On our way into Condobolin from Parkes we had noticed some strong convection in a large system to the south. We were tempted to head that way as not much was happening around our target area at that time. There was a weak line of convergence about 200km west but it didn't seem to hold much potential as the air was relatively dry. It was after a lot of umming and ahhring that we decided against our better judgement to head south. This would take us to the southern most edge of our target area for today. We were also supposed to meet up with some other chasers today, and all we had heard thus far, was that they were further south near Temora. We then figured that if everyone else was further south, then that must be where the action will probably be today, south of our target area. Wrong!

We left Condobolin and headed south to West Wyalong. About 30km or so south of town we passed under a weak looking north-south convergence line. The cumulus along this line appeared to be really struggling in the dry air. This was the major turning point for this day. It was here that we passed underneath a supercell trigger without even realising it! We got to West Wyalong and went straight to the library. The convergence line further west wasn't looking much better although there appeared to be a strongish looking cell on the north side of it according to the Mildura 256km radar. It looked like we would be in for at least a 2-hour wait for this system to reach us.

We headed over to Wyalong (east) to a hamburger shop to get some lunch while we waited. West Wyalong is a strange place. It's the bigger of the 2 towns and yet it doesn't even have a decent takeaway! Go figure. It became apparent during our lunch break that the western sky was starting to darken. The storms to the distant west mustn't have been as distant as we thought. We cleaned up and jumped back into the car and headed north along the Newell Highway to about 5km north of town, where we pulled over to watch the developing storms across a stunted wheat field.



We didn't know it at the time but we were now in the wrong spot for this developing system. The storm we were watching had in fact developed on the same convergence line that we had passed under on our way to West Wyalong from Condobolin earlier. It was gaining strength and moving east.



After about 20 minutes of watching we realised that it was moving more east-northeast than due east. At first it looked like it would pass just to the north of us but as it got closer it appeared to be veering more northeast. We had no choice now but to head north as well. Luckily for us the Newell Highway was basically going that direction. From Wyalong to Forbes it sort of goes northeast before turning due north after Forbes.



As we were nearing Forbes it was becoming apparent that the original storm we were tracking was starting to bow out and collapse. It was darker on the northern side but we couldn't see anything out there as yet. At Forbes we almost turned up the Lachlan Valley Way which heads west northwest out of Forbes, but decided against it. We instead decided to stop in town briefly to try and contact the other chasers. We waited for 15 minutes and got no answer so we left again. At the time we didn't think that the system we were following was all that great anyway and we figured that we would have plenty of time to catch it. Wrong again!

From Forbes we decided to head toward Bogan Gate 40km north-northwest of Forbes. The drive from Forbes is basically northerly all the way, and we figured that it would take us to an intercept with the active northern side of this system. At about half way we stopped at a junction where we had an uninterrupted view of proceedings. The southern side was bowing out and decaying but the northern side was very dark and looked to be propagating forward of the line.

After about 5 minutes it started to become apparent that something significant was happening on the northern side of this line. At first we thought that it was forming a gust front as a lowering had appeared forward of the rain shaft. But after watching it for about 60 seconds it lifted back up into the dark base of the storm. My first reaction was “what the hell was that?” That was quickly followed by “wait a minute, there’s a massive tower above that” and then the realisation of what we just saw sunk in. I yelled out to Matt “my goodness that’s not a gust front, that’s inflow”, Whooohooo!



I ripped my camera out of its bag as fast as I could and started snapping like I haven’t snapped before! Pretty soon another funnel like lowering appeared and twisted around underneath the base before lifting back up again. Then another one formed straight after it! Then the realisation came that this storm was behaving like a High Precipitation Supercell.





Unfortunately we were too far south to see it properly and it wasn't getting any closer, in fact it was now actually moving left of the mean wind flow, which for this day was generally east. We had to get north NOW! We were in the car in a flash and heading north again. We came to a junction with a road that headed back east to Parkes. We decided to take it. Heading north now would be pointless as the storm was really starting to move left rapidly. We had to go more north east to keep in front of it. I think I covered the 20km to Parkes in about 10 minutes or less. Lets just say that I set a new speed record for the Falcon! Every now and then along the road to Parkes we got glimpses of the base. There were wall clouds and probable funnels and that only made me more and more hyped! It was definitely a HP Supercell.

After filling the tank at Parkes (in about 30 seconds!) we headed north along the Newell Highway again. I was going as fast as I would dare, as there were police out between Parkes and Peak Hill. I kept to about 130kmh and luckily at one point we passed the cops when we got stuck behind a slower car. The storm was now outpacing us and it seemed like we would never quite intercept it.

The last decent view we got of the storm as a whole looked like this.



I pulled over when I saw this as it looked just to amazing not too! The thick cloud around this beast was literally curving into it form all directions. Just amazing!

As we drove further north we entered the edge of its outflow. We got one last glimpse of the base and were awestruck to see a massive funnel like lowering protruding from the base!

It was like an elephants trunk casually hanging from the base of the storm. It was probably a funnel cloud and if it wasn't then it was an inflow stinger, as they were the only two things it could have possibly been. Either way it was an awesome sight, and I wished we could have seen it up close. In one of the stills you can see where I have deliberately over-boosted the contrast so you can see the shape of the storm and the inflow and base structure.





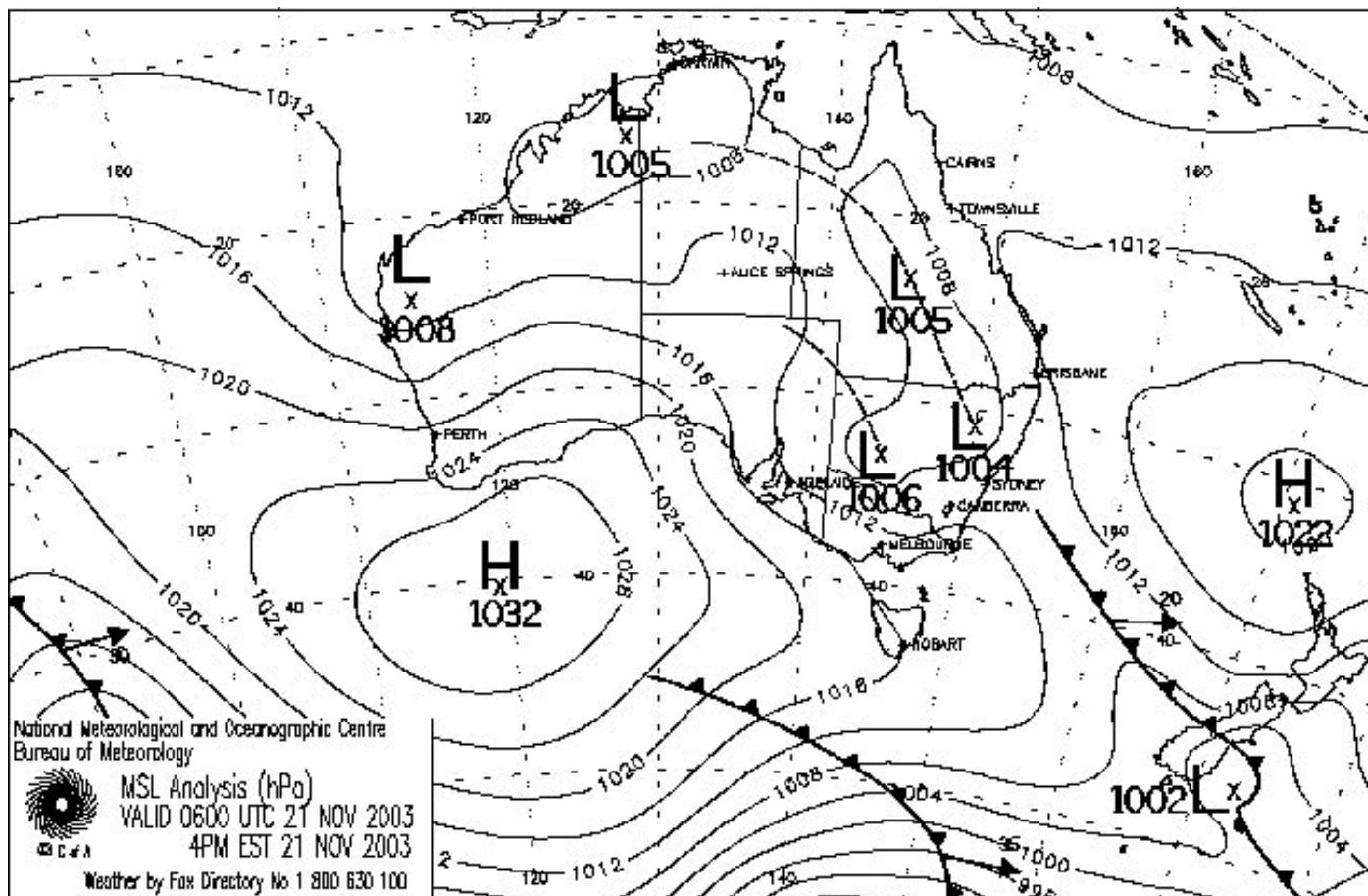
The only hope left for us now as we entered the outflow core was large hail. But alas, that was not to be. We didn't see a single bit of hail in this entire storm. All we saw after this was very heavy rain in the order of around 100mm/hour. We hoped though that when we drove out of the northern side of the core, we would see an awesome lightning show. Darkness was now setting in and we were salivating at the chance to photograph some lightning. But to our dismay the Supercell completely collapsed, which for this country is something that is becoming frequently annoying! The atmosphere stabilised and we headed north to Dubbo to find some accommodation for the night.

You can always learn something from each and every chase you embark upon. Even the successful ones. This chase was no different for us. Firstly, we should have never left our target area. We chose the area between Parkes and Condobolin and we should have waited there for developments instead of heading south where storms were already firing. That cost us the chance of seeing this beast up close and personal.

All the other mistakes we made were minor compared to this main one. I believe even to this day that this storm was one of the most significant supercells witnessed this season. We witnessed violent motion under the base from approx 50km away, and its mesocyclone persisted for nearly 2 hours! It is also my personal belief that this storm could have been tornadic. Some of the funnel clouds were coming so close to the ground that it makes me wonder if a couple of them briefly touched.

But with very few houses and people out there and plenty of open paddocks, I guess we'll never know!

4PM Synoptic Chart 21st November 2003 courtesy of the BoM
www.bom.gov.au



Fujita Tornado Damage Scale

Developed in 1971 by T. Theodore Fujita of the University of Chicago

SCALE	WIND ESTIMATE *** (MPH)	TYPICAL DAMAGE
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

*** **IMPORTANT NOTE ABOUT F-SCALE WINDS:** Do not use F-scale winds literally. These precise wind speed numbers are actually guesses and have never been scientifically verified. Different wind speeds may cause similar-looking damage from place to place -- even from building to building. *Without a thorough engineering analysis of tornado damage in any event, the actual wind speeds needed to cause that damage are unknown.*



F0 Tornado Damage (Online Tornado FAQ)

Here are broken tree branches and only superficial house damage; so this scene was rated F0. Elsewhere in the tornado path through Columbus GA, on 13 March 1997, there was isolated F1 damage.



F1 Tornado Damage (Online Tornado FAQ)

This wood-frame house was pushed bodily off its concrete block foundation by the Spencer SD tornado of 30 May 1998 (a tornado which later did marginal F4 damage in the town of Spencer). Here, the house had no bottom anchoring at all. It was simply resting on its foundation by gravity alone; so it was easy for relatively weak winds near the edge of the tornado to slide the house aside with minor structural damage. It experienced partial roof removal, only on the windward (near) side; therefore, this damage site was rated F1.

Photo courtesy NWS Memphis



F2 Tornado Damage (Online Tornado FAQ)

On 3 January 2000, a tornado struck this wood-frame home near Paris, MS. The roof and one large outer wall segment came off; while the remaining inner and outer walls were left (barely) standing. Quality of construction must be considered when rating damage; since the F scale is best applied to *well-built* homes. Here, the wall-to-roof and wall-to-wall attachments were very weak or nonexistent; so this is only marginal F2 damage.

NWS photo by Mike Branick



F3 Tornado Damage (Online Tornado FAQ)

All but a few parts of the outer and inner walls were toppled or removed from this house in Moore, OK, on 3 May 1999. For a well-built home, any removal of inner walls constitutes F3 damage; so this site was rated high-end F3. The same tornado caused [F5 damage](#) in several locations elsewhere in its path.

NWS photo by Mike Branick



F4 Tornado Damage (Online Tornado FAQ)

A tornado in Moore, OK on 3 May 1999 demolished this house (foreground) down to a short pile of debris on and around the foundation, with no walls standing. In order for this scene to be rated F5, the debris must have been swept away, leaving behind evidence that the house was well-attached to its slab. [The brick house in the left background suffered F3 damage, with a mixture of inner

and outer walls removed.] This tornado caused an immense amount of F4 damage on its path through the southern portion of the Oklahoma City metropolitan area, and several locales of [F5](#) damage.



F5 Tornado Damage (Online Tornado FAQ)

This is classic F5 damage. The Bridge Creek/Moore, Oklahoma, tornado of 3 May 1999 leveled this house, swept the foundation almost completely clean, shredded the house remains into small pieces and scattered the debris downwind to the northeast (rear). The house was relatively well-constructed with slab-to-wall anchor bolts evenly spaced around the bottom plate. Some of those bolts can be seen in this photo, protruding upward from just inside the edges of the concrete slab.

This information is free and provided by SPC and the NWS/NOAA and is not subject to copyright protection.

<http://www.spc.noaa.gov/faq/tornado/f-scale.html>

While your surfing the web why dont you check out the WDU Shop, a Journal of Australian Storm Chasing Partner.



Australias Leading Weather Instrument Retailer

Horsley Park Lightning Show 24th January 2004 by Jimmy Deguara



This day evolved from a local chase into an extraordinary event. With moderate wind shear and a high CAPE environment, it was anticipated that severe storms would develop over the ranges and drift towards the coast. The atmosphere was more saturated further north though, with higher CAPE and weaker capping so storms would develop earlier. It was a test of patience, “when does one take off and chase?”

You guessed it, storms did develop further north along and near the Mid- North Coast, and then the Central West south of Bathurst fired also. You required nerves of steel to wait patiently “should I leave now?”. A storm developed to the south and passed near Campbelltown. Some good inflow was observed, and a warning was issued for it including large hailstone’s. “To late storm was headed for the ocean.”

Weak anvils began to hover over the Sydney basin about 2pm. After that observation, I was astonished to find a powerful side anvil! Wow!! No hesitation I grabbed the gear and was off. “All the gear except my wallet!” I was low on fuel so I had to turn back to get it. The intercept was not difficult and I targeted the region near Penrith. A rainfree base indicated a possible wall cloud region with bolts pulsing from this region.



By the time I headed out to Plumpton, it was evident the storm was on the move meaning that an escape route and positioning was not too far way.

I chose a quiet road in the back of Mt Druitt. With so much adrenalin, I was out in a flash and shooting video. What I did not realise was that the storm was about to go ballistic! Besides those erratic bolts shooting out of the anvil above me within a kilometre or so, the main core began sending powerful bolts at a frequency one rarely observes. Multiple bolts 2 and 3 at a time and in some cases 4 bolts. Some of these bolts were pulsing indicating a relatively high energy environment.

This display lasted about 15 to 20 minutes. Light rain spoiled the rest of the show so I had to reposition. The repositioning took me closer to the core where better observation of it was possible. At Erskine Park, strong winds bowed trees and made driving conditions hazardous. So a trip down the freeway to film more lightning seemed to be a better option.

After some heavy rain and strong winds, the gust front reappeared. Lightning again pulsed to my left from an electrically active core of the storm, though it seemed more infrequent. The storm was in a weakening phase. Meeting up with David Croan and Paul Graham we discussed how active this storm was. David and Paul captured different perspectives of the event and we heard that Matthew Piper and Jeff Brislane also got a different perspective of this event.

After watching a couple of other storms, and also giving some details to David Simpson about target regions for that evening around Mudgee, I called it quits.



Solution to last issues Puzzle

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	H	G	N	A	I	R	T	H	I	N	A	U	C	L	S	H
2	E	N	O	M	T	S	A	R	T	N	O	C	N	O	N	E
3	I	A	C	S	B	M	A	S	F	O	O	T	E	P	T	C
4	G	A	G	A	S	R	A	D	A	I	U	L	P	T	C	S
5	H	D	S	L	C	O	N	D	E	N	S	A	T	I	O	N
6	T	E	T	S	R	T	P	E	C	N	O	C	P	C	L	O
7	D	I	M	E	N	S	I	O	N	A	L	O	N	A	O	I
8	N	F	C	S	T	R	A	T	O	C	U	M	U	L	U	S
9	R	I	N	T	S	E	U	Q	I	N	H	C	E	T	R	U
10	N	S	S	R	D	D	R	C	T	V	O	C	R	E	U	L
11	E	S	M	U	I	N	C	E	A	H	A	Z	R	M	O	L
12	E	A	O	C	N	U	H	E	V	F	G	P	I	C	U	I
13	G	L	O	T	M	H	C	I	R	E	R	I	O	R	U	R
14	C	C	D	U	I	T	R	U	E	E	A	T	L	U	O	T
15	R	H	L	R	N	E	S	O	S	B	H	R	E	N	R	H
16	H	U	I	E	R	E	N	C	B	N	V	P	L	S	U	T
17	S	N	B	V	I	E	W	P	O	I	N	T	S	C	D	S

(G3, SW) arc

(L6, W) concept

(A14, NE) cloud

(G11, SW) cirrus

(E5, E) condensation

(P12, N) illusions

(A1, S) height

(M17, NW) sphere

(I17, N) observation

(P17, NW) sunlight

(D8, E) stratocirrus

(F14, N) thunderstorms

(G15, NE) surface

(J10, SE) vapour

(E3, SW) base

(O4, S) colour

(P15, NW) horizon

(N2, S) optical

(N9, W) techniques

(D17, E) viewpoints

(A7, E) dimensional

(B7, N) classified

(L2, W) contrast (D8, S) structure

Mystery words were: contrast and structure.

This Issue's Puzzle is: Observing Clouds

P R E C I P I T A T I O N
 B R E E Z E S
 C O S M O D R O M I C
 D A C C O M L M T
 E T N L D R U A D O A O E
 G M E O R D T Y A I T E
 G O U D A P I E C S I H
 A S U D T L F R S T Y O S
 R P B P I E L S A U R N E
 G H R R O T A E C R C V I
 F E U G M B M T E H S G
 A R I L M P E R A T U R E
 R E F L E C T I V I T Y X

OBSERVING CLOUDS

F T I C F M I D D L E S C O U C O E C O U C O C O S M O S M E T E O R I O E I A S O E M I D D L E S	P R O C E S S M I C R O P H Y S I C S P R O C E S S I N G P R O C E S S I N G P R O C E S S I N G P R O C E S S I N G P R O C E S S I N G P R O C E S S I N G P R O C E S S I N G P R O C E S S I N G
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The Journal of Australian Storm Chasing Volume 2
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