

HARDEN UP

QUEENSLAND



CASE STUDY: Severe Thunder Storms and Bucca Tornado, 29th November 1992

By Mr Jeff Callaghan

Retired Senior Severe Weather Forecaster, Bureau of Meteorology, Brisbane

This was a notable severe thunderstorm day. By early afternoon thunderstorms began developing in Coastal districts between Coffs Harbour and Bundaberg and the tracks of the major thunderstorms are shown in Figure 1 and the satellite image (Figure 2) shows the early development.

At 9am 29 November (Figure 3) there a low pressure centre was centred just south of Maryborough, which intensified during the early afternoon with the pressure at Bundaberg falling 7.2hPa in the 6 hours to 3pm. The low pressure system provided a convergence area and a lifting mechanism to form thunderstorms.

Upper levels were extremely favourable for severe thunderstorm development and as the storms developed between Brisbane and Gladstone we examine the data at these stations just before and after the storms developed in Table 1.

- Severe thunderstorms develop when wind speeds increase with height up to 500hPa
- The wind directions turning anticlockwise with height signified large scale ascent associated with an upper trough which enhanced low level convergence and lift to produce thunderstorms.
- The 850hPa temperatures between +16.20C and +22.20C and 500hpa temperatures between -14.70C and -13.90C indicated a very unstable lapse atmosphere (warm low levels and cool upper levels) which gave the buoyancy to develop very strong updrafts in the thunderstorms.

The severe thunderstorms (refer to tracks in Figure 1)

Brisbane and Sunshine Coast- A severe storm cell near Esk at 12.40pm appeared to split. The southern part moved southeast and passed over Brisbane's southern suburbs between 1.15pm and 1.30pm. Extensive damage was caused by large hail up to the size of Golf Balls by this storm.

The northern part moved over Maroochydore where the damage was caused by strong winds and large hail. Five catamarans were capsized and 14 swimmers were rescued. Eighty homes were damaged when large hail punctured their roofs. Many motor vehicles sustained hail damage and wind squalls damaged thirty light aircraft at Maroochydore Airport.

Gympie Tin Can Bay Thunderstorms- Three individual storm cells, identified as severe by radar, developed west of Gympie between 1pm and 1.20pm and moved over the Gympie to Tin Can Bay areas. However no damage was reported.

The Maryborough Thunderstorm and Oakhurst-Susan River Tornado- At 1pm a severe storm cell about 110km WNW of Gympie split with the southern portion moving over Gympie while the northern portion moved towards the ENE and intensified. Between 2pm and 2.20pm the radar

indicated that the storm had tornado characteristics. At 2.30pm a Tornado struck the Oakhurst area (see Figure 4) and left a continuous path of destruction over sparsely populated country up to Aldershot. One brick house was destroyed while several others lost roofing iron. Three cattle had to be destroyed, windows were smashed by hail (up to Golf Ball size) and hundreds of acres of pine forest and native bushland was destroyed.

The Bucca Thunderstorm and Tornado- Another cell first detected by radar at 2.20pm and was located near Gin Gin at 3.10pm and to the north of Bundaberg at 4pm. The track is shown in Figure 4. Hail and wind damage was extensive through the Bullyard-Kolan-Bundaberg area. Cricket ball size hail was reported with the worst being on farms in the Hummock and Burnett Heads area. Severe wind and hail damage was reported near Calavos.

At least nine houses were extensively damaged or destroyed in the Kolan Bucca area by the tornado which apparently struck after 3.30pm and lasted for about 10 minutes. About 20 cattle were destroyed. An observer from the Bucca area noted the following evidence of high winds:-

- Stones embedded in trees
- 16-20cm saplings approximately 4-5m long driven through 5 walls of houses
- Picture frame embedded in opposite wall
- Fridge still missing weeks later
- 3 tonne truck body blown or carried 300metres.

The Gladstone area damage - Extensive hail damage to crops.

Tornado Intensity

The Fujita scale classification is used for tornado intensity as follows.

- F0 64-116km/hr Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
- F1 117-180km/h Moderate damage. The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
- F2 181-253km/h Significant damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; high-rise windows broken and blown in; light-object missiles generated.
- F3 254-332km/h Severe damage. Roofs and some walls torn off well-constructed houses; most trees in forest uprooted; skyscrapers twisted and deformed with massive destruction of exteriors; heavy cars lifted off the ground and thrown.
- F4 333-418km/h Devastating damage. Well-constructed houses levelled; structures with weak foundations blown away some distance; trains overturned; cars thrown and large missiles generated. Skyscrapers and high-rises toppled and destroyed.
- F5 419-512km/h Incredible damage. Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 m (109 yd); trees debarked; steel reinforced concrete structures badly damaged.

The Oakhurst-Susan River tornado was rated an F3.

The Bucca tornado was rated a F4 or possibly an F5.

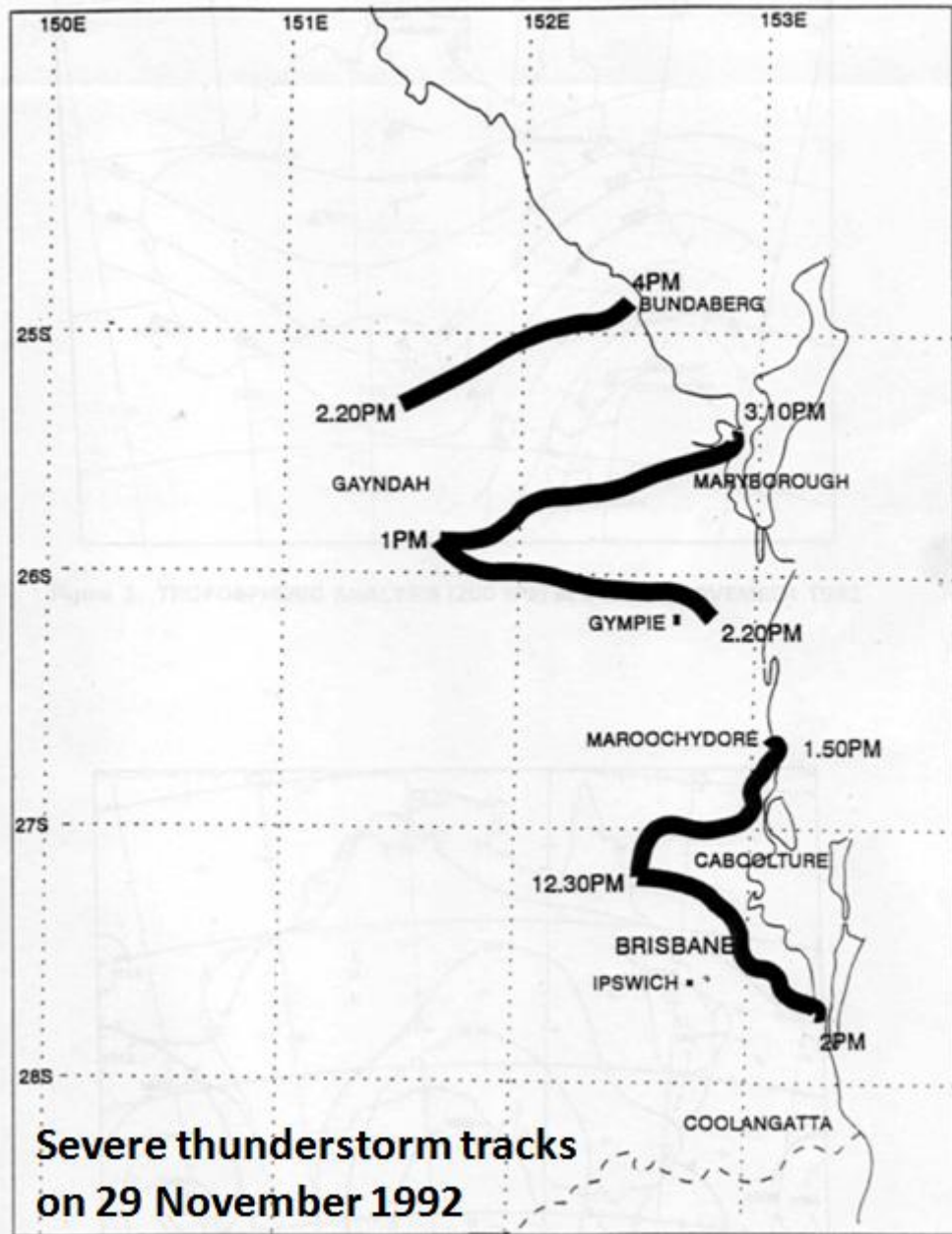


Figure 1 Tracks of the severe thunderstorms on the afternoon of 29 November 1992.

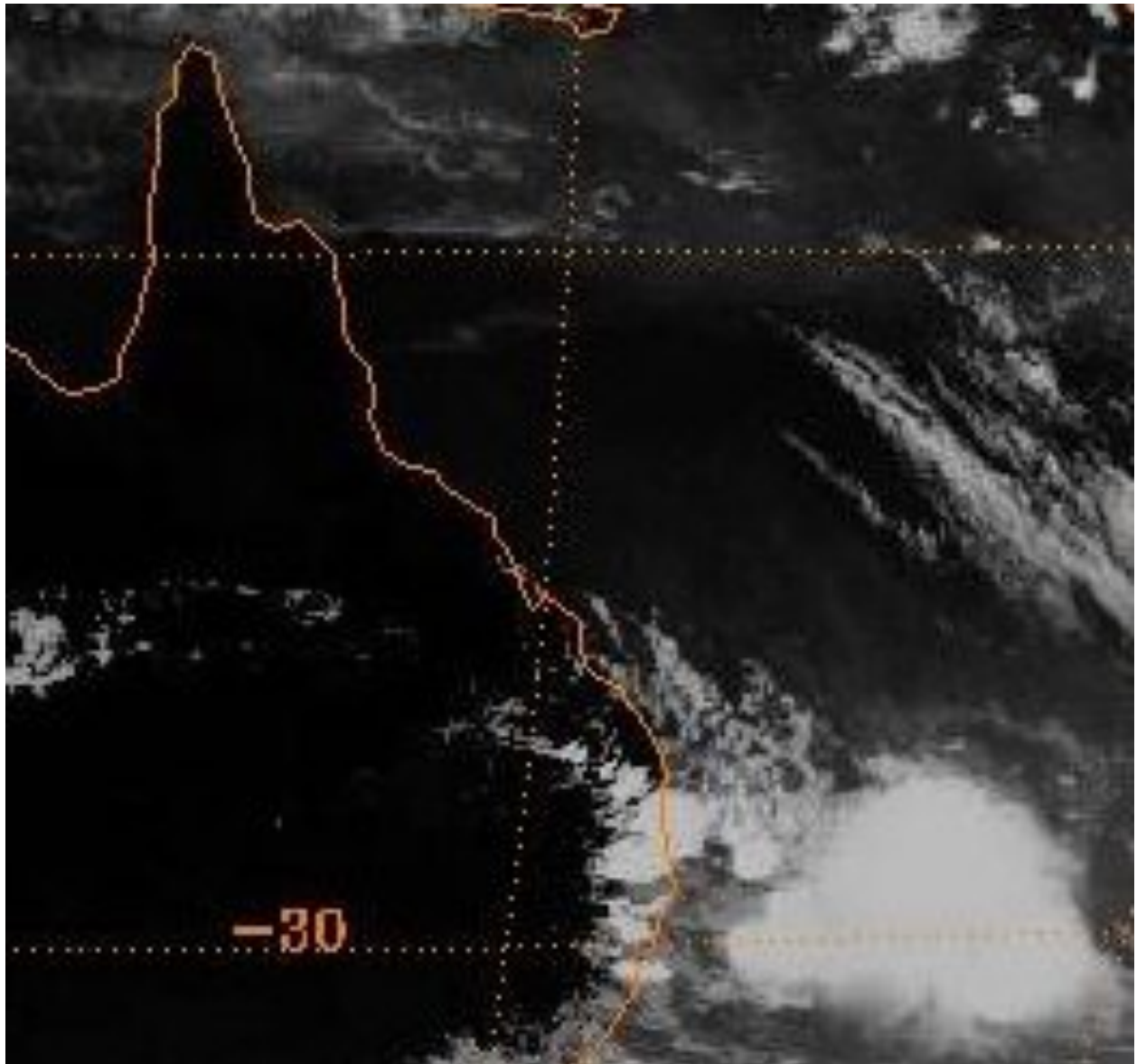


Figure 2 Satellite view of the thunderstorm development at 12.30pm 29 November 1992.

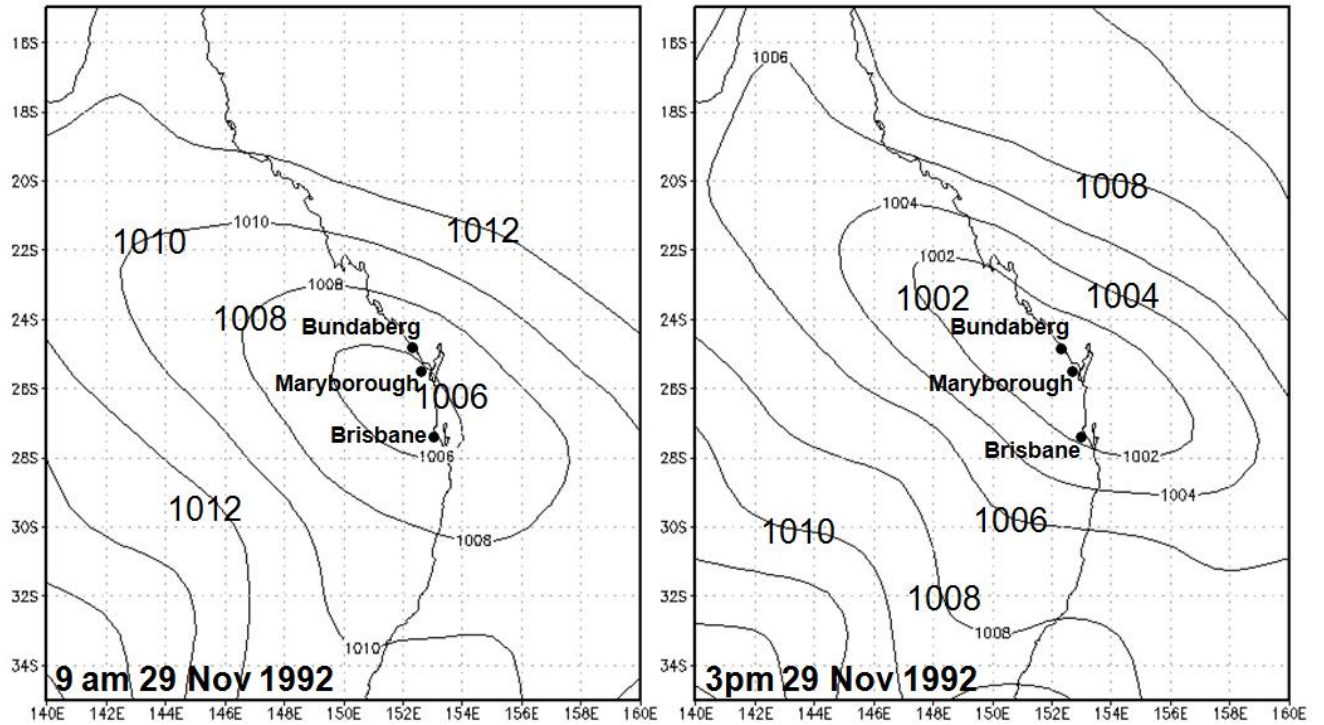


Figure 3 Mean sea level pressure analyses around the time of the thunderstorm development.

500hPa (approximately 6km elevation)	281/52knots -14.70C	255/46knots -13.90C	285/80knots	290/80knots
700hPa (approximately 3km elevation)	301/49knots	282/37knots	280/42knots	270/45knots
780hPa	315/48knots	305/40knots	260/21knots	275/42knots
850hPa (approximately 1.5km elevation)	347/25knots +16.20C	313/33knots +22.20C	270/20knots	290/35knots
925hPa	050/15knots	315/26knots	125/12knots	320/25knots
950hPa		315/26knots	125/12knots	340/26knots
	Brisbane 9am 29 Nov 1992	Gladstone 9am 29 Nov 1992	Brisbane 3pm 29 Nov 1992	Gladstone 3pm 29 Nov 1992

Table 1 Upper winds and selected temperatures for Brisbane and Gladstone before and after the thunderstorm development.

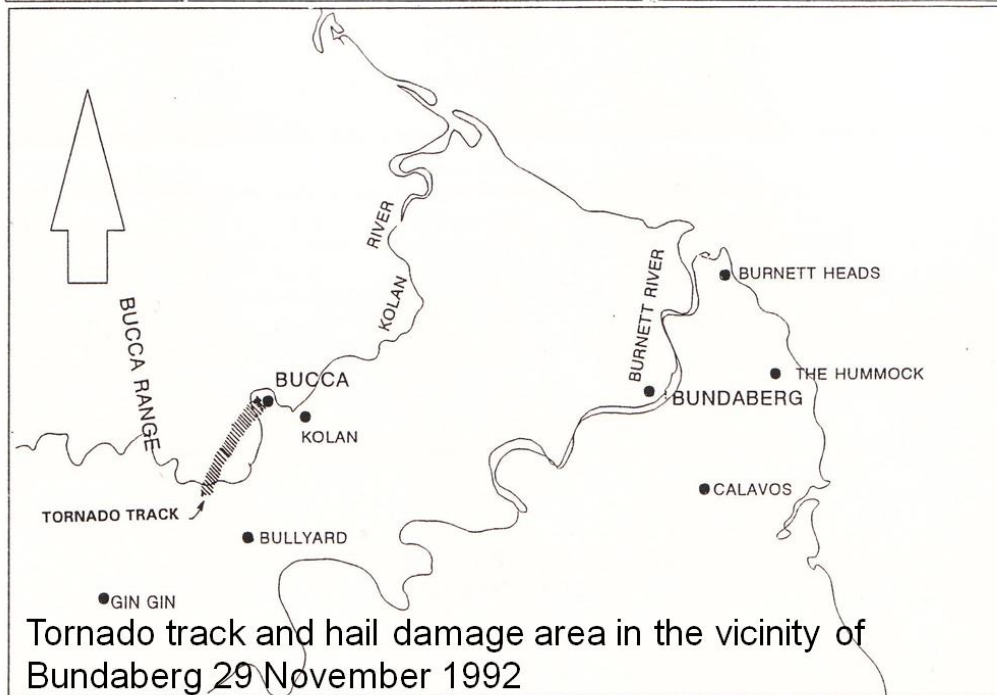
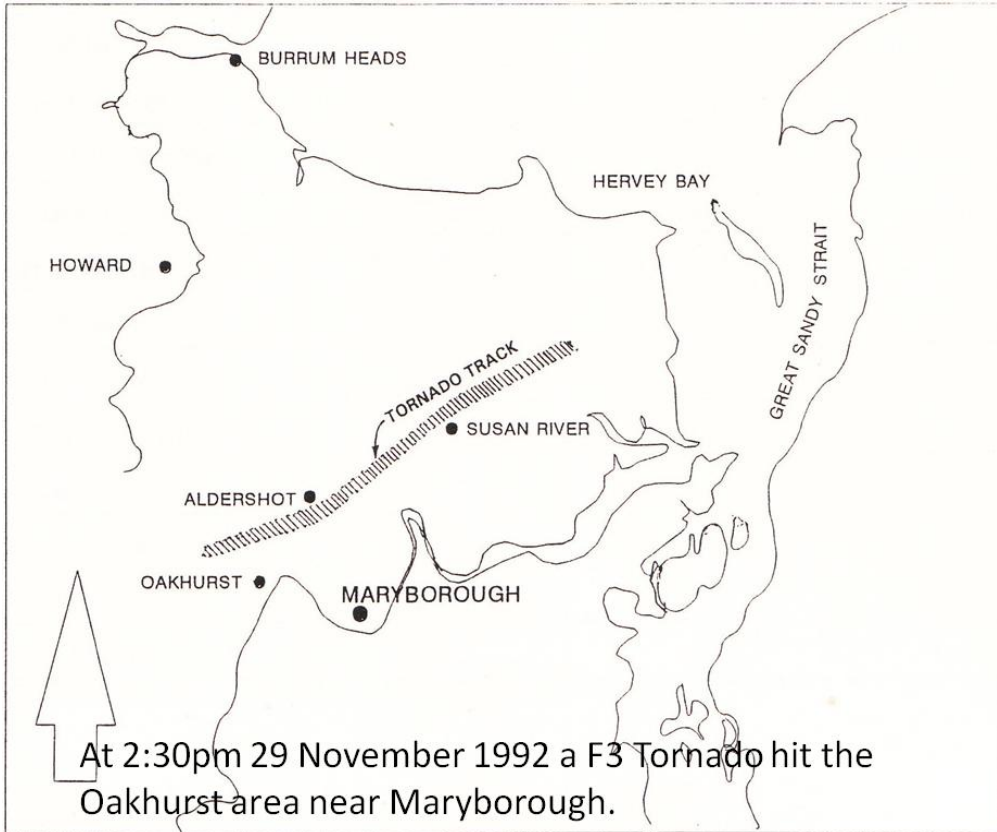


Figure 4. Tracks of the two tornadoes.



The Bucca tornado.