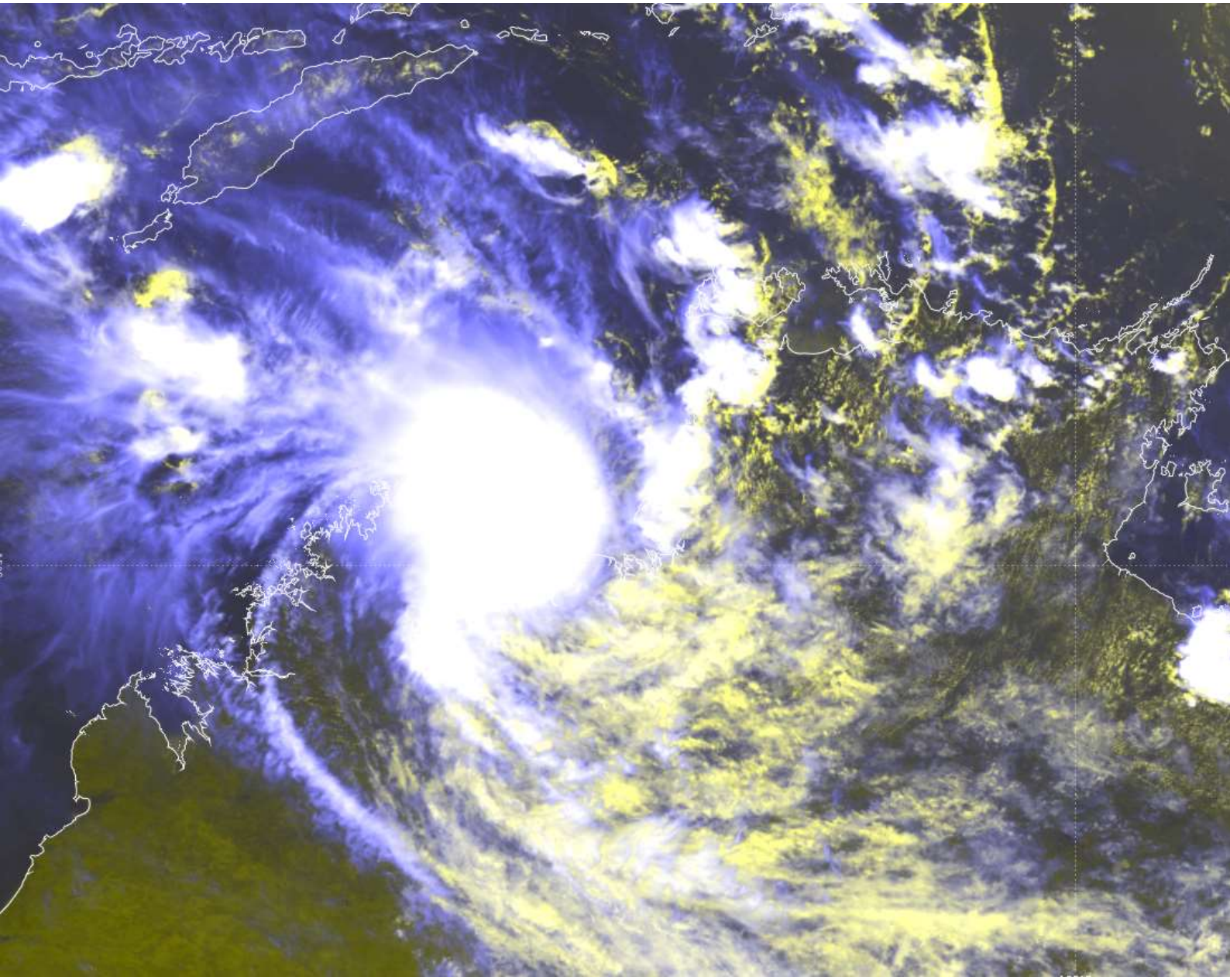
Australian Government
Bureau of Meteorology

Tropical Cyclone *Blanche*

5 – 6 March 2017



Tropical Cyclone

© Commonwealth of Australia 2017

This work is copyright. Apart from any use as permitted under the Copyright Act 1968, no part may be reproduced without prior written permission from the Bureau of Meteorology. Requests and inquiries concerning reproduction and rights should be addressed to the Production Manager, Communication Section, Bureau of Meteorology, GPO Box 1289, Melbourne 3001. Information regarding requests for reproduction of material from the Bureau website can be found at www.bom.gov.au/other/copyright.shtml

Published by the Bureau of Meteorology

Front cover: Himawari-8 Daytime RGB satellite image at 0300 UTC 6 March 2017. Image courtesy of the Japanese Meteorological Agency (JMA).

Table of Contents

List of Tables

List of Figures

1 Summary

Tropical Cyclone *Blanche* was a Category 2 tropical cyclone that made landfall in the northeast Kimberley district of Western Australia on the 6 March 2017.

A weak tropical low was identified on the 2 March 2017 southwest of New Guinea, within a trough over the Arafura Sea. The tropical low moved west until overnight on the 3 March, when the tropical low made an abrupt turn towards the south and began to strengthen. The tropical low steadily developed during the 4 March and adopted a southwest track, which was maintained until landfall in Western Australia on 6 March.

The tropical low passed directly over the Tiwi Islands (Bathurst and Melville Island) of the Northern Territory during the early morning of the 5 March and produced a record 24-hour rainfall total at Point Fawcett Automatic Weather Station (AWS) of 384 millimetres (mm). After moving back over water to the south of the Tiwi Islands, the tropical low experienced a brief, strong period of development during which time a 91 kilometre per hour (km/h) wind gust was observed at Point Fawcett AWS on Bathurst Island.

The tropical low moved further south during the 5 March and reached tropical cyclone intensity at 1200 UTC[1] 5 March, approximately 200 kilometres (km) west of Darwin and 340 km north northeast of Wyndham. Tropical Cyclone *Blanche* strengthened quickly to a Category 2 tropical cyclone over the Timor Sea. Landfall occurred near Berkeley River Mouth on the northeast Kimberley coast, between Kalumburu and Wyndham, at Category 2 intensity at 0300 UTC 6 March. Tropical Cyclone *Blanche* weakened steadily as it moved inland over the north Kimberley and was downgraded to a tropical low 9 h after landfall, when located approximately 110 km west of Wyndham.

There were minimal impacts caused by Tropical Cyclone *Blanche* due to the relatively small size of the tropical cyclone and the low population density in the areas affected. Minor damage was reported at a lodge near the Berkeley River on the northeast Kimberley coast. Heavy rainfall occurred near the path of the tropical cyclone, which caused moderate flooding in parts of the Kimberley.

[1] UTC = Universal Time Coordinated.
Australian Central Standard Time (ACST) = UTC + 9.5h.
Australian Western Standard Time (AWST) = UTC + 8h.

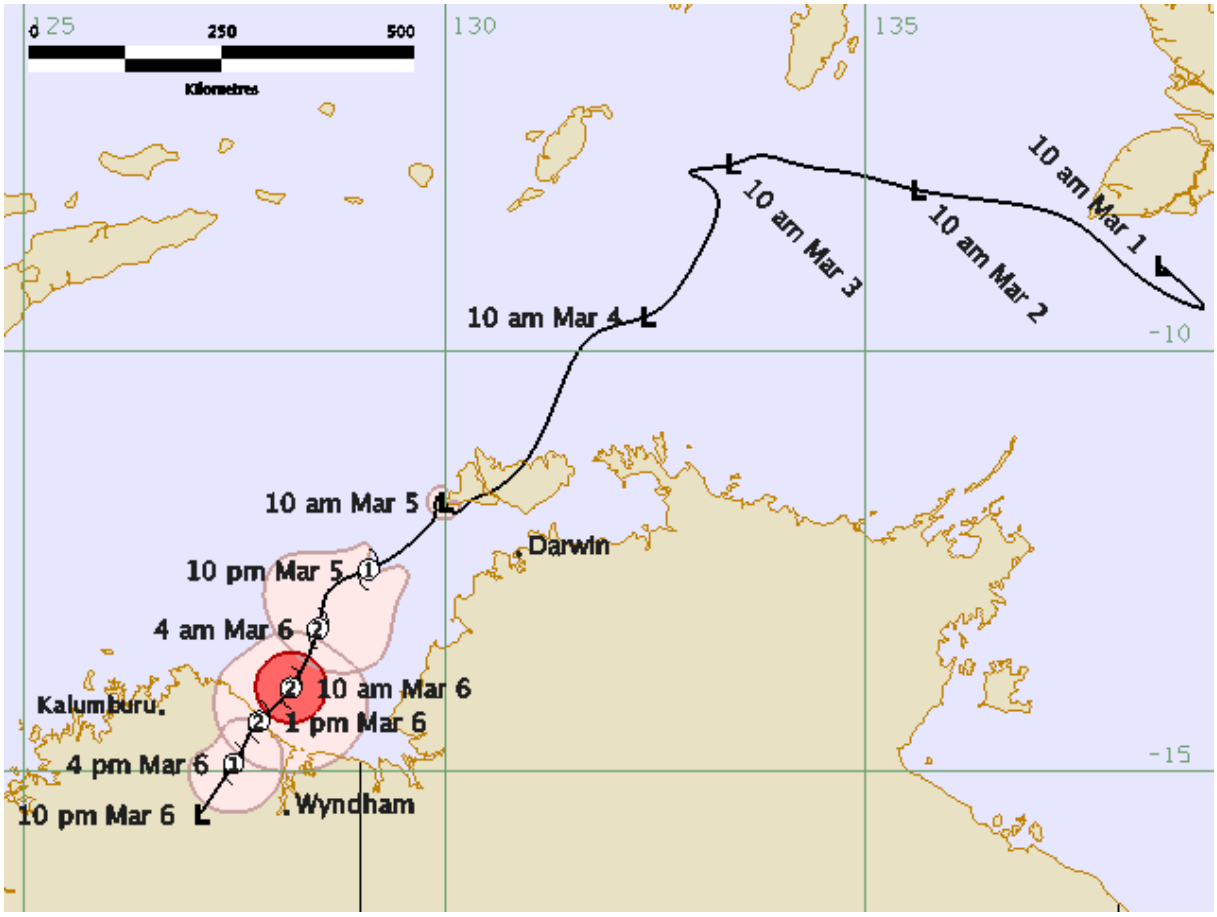


Figure 1 Best track map of Tropical Cyclone *Blanche*. Date and time is Australian Central Standard Time (ACST).

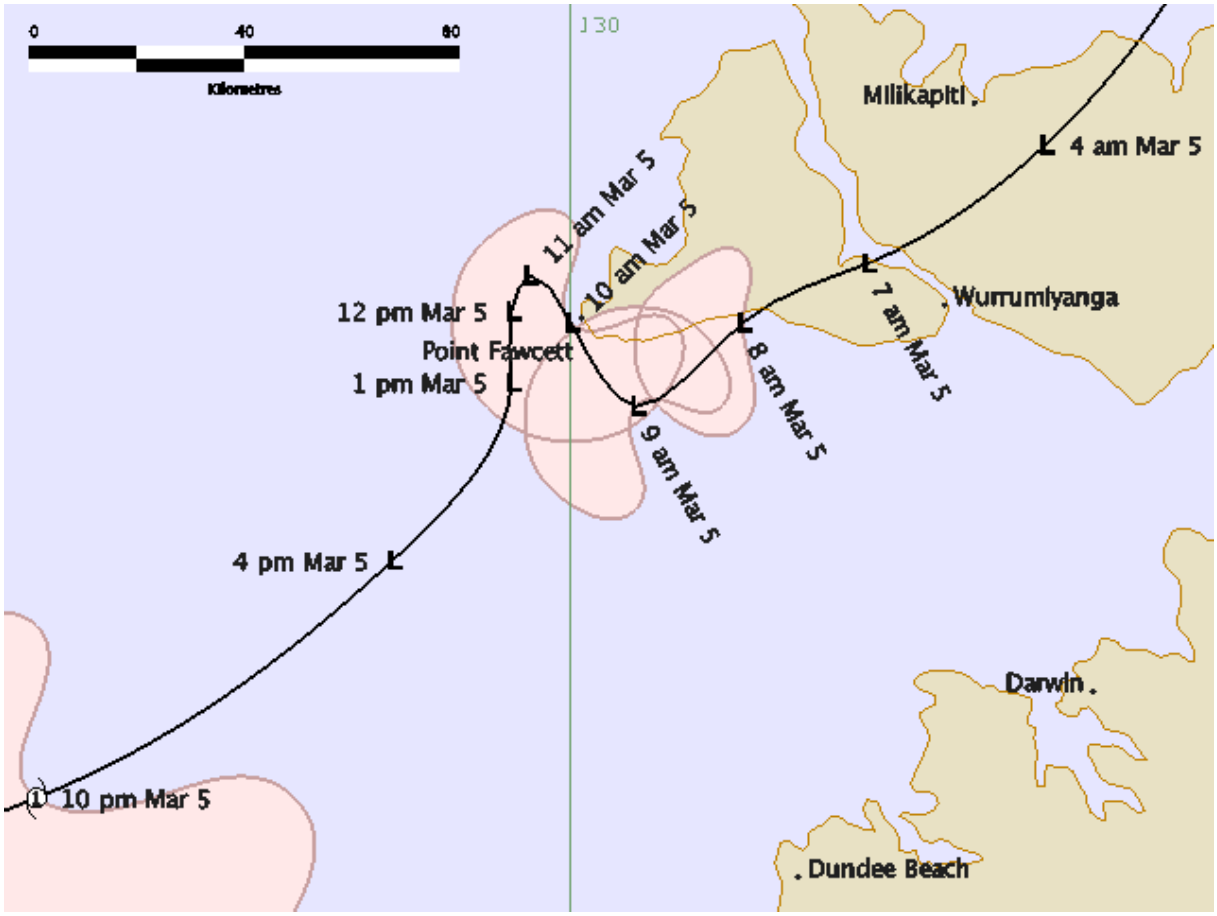


Figure 2 Best track map of the tropical low crossing the Tiwi Islands and passing west of Darwin. Date and time is ACST. Pink shading indicates the radius of gales that developed near Bathurst Islands between approximately 8:00 am and 10:00 am ACST 5 March 2017.

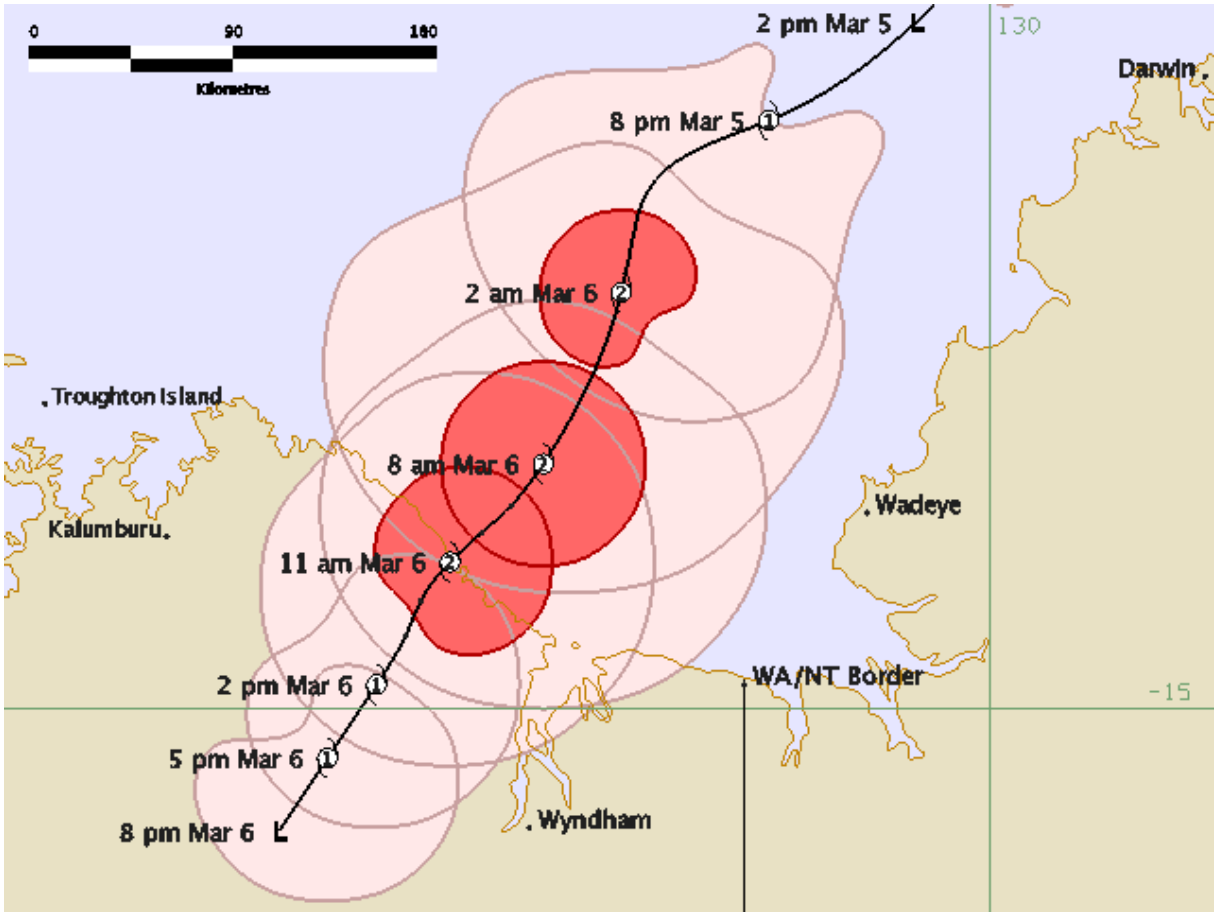


Figure 3 Best track map of Tropical Cyclone *Blanche* as it approached and made landfall on the northeast Kimberley coast in Western Australia. Date and time is Australian Western Standard Time (AWST).

2 Meteorological Description

2.1 Intensity Analysis

The tropical low was initially assigned an intensity of 15 knots (kn) (28 km/h) on 2 March by Darwin Tropical Cyclone Warning Centre (TCWC). The tropical low strengthened on 3 March and was analysed at 20 kn (37 km/h) at 0000 UTC 3 March, which corresponded to a Dvorak initial classification and Current Intensity (CI) of 1.0 and was further supported by an Advanced Scatterometer (ASCAT) pass at 0045 UTC 3 March. Improved curvature of the cloud features by 0600 UTC 3 March indicated the tropical low had strengthened further to 25 kn (46 km/h), which corresponded to a Dvorak CI of 1.5.

The tropical low remained at 25 kn (46 km/h) intensity for the next day and a half. Satellite images during this period showed a small, tight low-level circulation with thunderstorms constantly developing near the tropical low before being displaced to the west due to a high amount of vertical wind shear (25 kn based on the Cooperative Institute for Meteorological Satellite Studies (CIMSS) estimate). A Dvorak CI of 2.0 was assigned at 1800 UTC 3 March based on an averaged shear pattern.

The tropical low strengthened to 30 kn (56 km/h) at 1500 UTC 4 March when located just to the north of the Tiwi Islands. The tropical low crossed the north coast of the Tiwi Islands at 1700 UTC 4 March and re-emerged south of the Bathurst Island at 2200 UTC 4 March.

Satellite imagery showed strong thunderstorms developing over the tropical low from 2100 UTC 4 March. Likewise, Berrimah radar showed a rapidly developing vortex and increased winds on Doppler radar. This small vortex moved over Point Fawcett AWS (southwestern tip of Bathurst Island) at 2320 UTC 4 March and produced a wind speed of 32 kn (59 km/h) and a wind gust of 49 kn (91 km/h). Subsequently, the intensity of the tropical low at 0000 UTC 5 March was increased to 35kn (65 km/h). Based on the duration of the strong convection that wrapped around the small vortex as seen on radar, gales were estimated to have occurred between 2200 UTC 4 March and 0000 UTC 5 March. Despite gales developing over up to 3 quadrants, due to the time these gales persisted, the Australian definition[2] of a tropical cyclone was not met[3]. This assessment was also consistent with a Dvorak CI of 2.5 at 0000 UTC 5 March and an ASCAT pass at 0100 UTC 5 March.

The strong morning convection did not persist and the intensity was lowered again to 30kn (56 km/h). However by around 0900 UTC 5 March another strong burst of

[2] A tropical cyclone is defined as a non-frontal low pressure system of synoptic scale developing over warm waters having organised convection and a maximum mean wind speed of 34 knots or greater extending more than half-way around near the centre and persisting for at least six hours http://www.bom.gov.au/cyclone/faq/index.shtml#definitions

[3] Operationally, Darwin TCWC named the tropical low as Tropical Cyclone *Blanche* at 0000 UTC 5 March.

convection began. A bulls-eye ASCAT pass at 1239 UTC 5 March showed maximum winds of 40 kn (74 km/h) in the southern semicircle and gales beginning to develop within the northwest quadrant. As such, tropical cyclone intensity was assigned at 1200 UTC 5 March.

Tropical Cyclone *Blanche* intensified further overnight in a more favourable atmospheric environment with low to moderate vertical wind shear (10-20 kn, 19-37 km/h) and strong outflow due to dual upper-level outflow channels to the north and south. Strong convection persisted over the tropical cyclone. A dense shield of cirrus made Dvorak estimates difficult. However, microwave images showed the deep convection wrapping tighter around the centre of the tropical cyclone.

A corresponding ASCAT pass at 1333 UTC 5 March showed a small area of 45 kn (83 km/h) winds in the southwest quadrant. Tropical Cyclone *Blanche* was upgraded to category 2 (50 kn, 93 km/h) at 1800 UTC 5 March based on a combination of the aforementioned ASCAT pass and improved structure as well as a Dvorak CI of 3.5.

Tropical Cyclone *Blanche* strengthened to its peak intensity[4] of 55 kn (102 km/h) by 0000 UTC 6 March. This was based on increased curvature of the inner core seen in microwave and Wyndham radar and was higher than the subjective Dvorak estimate of 50 kn (CI 3.5) and the corresponding Automated Dvorak Technique (ADT) estimates from CIMSS and the National Environmental Satellite, Data, and Information Service (NESDIS) of 47 kn (87 km/h) and the Satellite Consensus (SATCON) of 46 kn (85 km/h).

Tropical Cyclone *Blanche* maintained peak intensity of 55 kn (Category 2) to landfall at 0300 UTC 6 March. Tropical Cyclone *Blanche* weakened at a slightly faster rate than the standard decay model (Kaplan, 1995) as it moved inland over the north Kimberley. The cyclone was downgraded to a tropical low at 1200 UTC 6 March[5], 9 h after landfall, when located approximately 110 km west of Wyndham.

[4] Operationally, Darwin TCWC assessed peak intensity at 50 kn (93 km/h) at 0000 UTC 6 March.
[5] Operationally, Darwin TCWC downgraded Tropical Cyclone *Blanche* to a tropical low at 0900 UTC 6 March.

2.2 Motion

Initially located within Jakarta TCWC area of responsibility, the tropical low moved towards the west northwest at 5-8 kn (9-15 km/h) during the 2 and 3 March due to a low to middle level high located over southern Australia.

An abrupt turn towards the south overnight on 3 March occurred due to the combination of the arrival of a westerly wind surge and a weakening of the middle level high. This weakening of the middle level high and associated ridge was caused by the retrogression and deepening of a middle level trough over eastern Australia. The southerly motion at about 8 kn (15 km/h) continued throughout the night and the tropical low entered Darwin TCWC area of responsibility at 1800 UTC 3 March.

During the 4 March, the tropical low adopted a southwest motion due to its position between two middle level ridges separated by the middle level trough. These middle level highs were located over the Coral Sea to the east of the tropical low and over southwestern Australia to the south of the tropical low. The southwest motion was maintained to landfall on the Kimberley coast on 6 March.

Oscillations in the southwest motion occurred during the 4 March due to asymmetries in the thunderstorms developing near the tropical low, which were displaced westwards to varying distances due to vertical wind shear.

The tropical low crossed the north coast of the Tiwi Islands at 1700 UTC 4 March and re-emerged south of the Bathurst Island at 2200 UTC 4 March, about 95 km northwest of Darwin.

It was at this time, very close to southern Bathurst Island that some erratic motion developed, caused by the occurrence of very strong thunderstorm activity and intensification of the tropical low. Based on Berrimah (Darwin) radar and observations at Point Fawcett AWS, the motion initially shifted from southwesterly at 10 kn (19 km/h) to west southwesterly at 10 kn (19 km/h). At 2300 UTC 4 March, the tropical low turned towards the northwest at 10 kn (19 km/h) for two hours, to be located about 10 km west northwest of Point Fawcett AWS at 0100 UTC 5 March. The tropical low then slowed and turned southwards again. By 0300 UTC 5 March, the tropical low had re-adopted a southwest motion of 8 kn (15 km/h).

Tropical Cyclone *Blanche* moved steadily southwest at 8-10 kn (15-19 km/h) across the Timor Sea during the 5 and 6 March and made landfall on the northeast Kimberley coast near Berkeley River Mouth, about 125 km east of Kalumburu and 125 km north northwest of Wyndham.

Following landfall, Tropical Cyclone *Blanche* continued inland in a south southwest direction at 9-12 kn (17-22 km/h) and was located approximately 110 km west of Wyndham at the time of being downgraded to a tropical low.

2.3 Structure

Tropical Cyclone *Blanche* was a small and at times asymmetric tropical cyclone, which grew in size and symmetry as the tropical cyclone strengthened.

Prior to tropical cyclone development, the tropical low was associated with a very small and tightly wrapped low-level vortex. This was observed initially from 1230 UTC 3 March on near infra-red satellite imagery and persisted during the day on visible satellite imagery, while located over the Arafura Sea to the north of the Tiwi Islands. Due to the vertical wind shear displacing the thunderstorm activity to the west of this small vortex, the maximum winds most likely occurred in the western semicircle.

This very small and tightly wrapped low-level vortex was again observed between 2100 4 March and 0100 UTC 5 March on Berrimah radar, near Bathurst Island. The gales that briefly developed during this time had an estimated gale radius of up to 12nm (22 km).

During the 5 March, the tropical low grew in size. By the time Tropical Cyclone *Blanche* was named at 1200 UTC 5 March, the gale radius was assessed at up to 80nm (148 km).

An ASCAT pass at 1333 UTC 5 March showed asymmetric winds with 40-45 kn (75-83 km/h) in the southwest quadrant and 25-30 kn (46-56 km/h) in the northeast quadrant.

As Tropical Cyclone *Blanche* strengthened to Category 2, the storm-force wind radii were estimated based on the convective structure indicated in microwave and Wyndham radar.

As Tropical Cyclone *Blanche* intensified until landfall, microwave images showed a band of thunderstorms wrapping evermore tightly into the centre from the southwest to northwest to northeast. At 2143 UTC 5 March a Special Sensor Microwave Imager/Sounder (SSMIS) microwave image at 37 GHz showed an eye feature in the early stages of formation. Likewise, as Tropical Cyclone *Blanche* approached the Kimberley coastline, Wyndham radar showed a developing eye feature. There was however no indication of an eye on satellite imagery.

Wyndham radar continued to indicate curvature of the rain bands from landfall at 0300 UTC 6 March and 0600 UTC 6 March. This curvature became less symmetric from 0600-0900 UTC and was completely lost by 1200 UTC 6 March.

3 Impact

Northern Territory

There were no reported impacts on the Tiwi Islands as the strengthening tropical low crossed the islands. However, gales with damaging wind gusts were estimated to occur over southwestern parts of Bathurst Island for 3 hours during the morning of 5 March.

Very heavy rainfall also occurred over parts of the Tiwi Islands (see Observations section).

There were no reported impacts in Darwin or elsewhere in the Northern Territory.

Western Australia

Minor damage was reported from Berkeley River Lodge, located approximately 5-10 km to the northwest of where Tropical Cyclone *Blanche* made landfall on the northeast Kimberley coast.

Gales with damaging wind gusts were estimated to have developed on the northeast Kimberley coast from 1800 UTC 5 March. Storm-force winds with destructive wind gusts were estimated to have developed from 0100 UTC 6 March.

The passage of Tropical Cyclone *Blanche* also produced heavy rainfall over the Kimberley region. The heavy rainfall caused minor flooding over North Kimberley catchments including the Ord River. Minor flooding occurred in the Fitzroy River at Fitzroy Crossing and Noonkanbah. The Margaret River responded sharply in response to heavy rainfall and peaked around the moderate flood level.

4 Observations

4.1 Wind

The strongest observed 10-minute mean wind speed was at Point Fawcett AWS with 32 kn (59 km/h) at 2320 UTC 4 March.

The strongest observed wind gust was at Point Fawcett AWS with 49 kn (91 km/h) at 2320 UTC 4 March.

4.2 Pressure

The lowest observed pressure observed was at Point Fawcett AWS with 994.4 hPa at 2320 UTC 4 March.

4.3 Rainfall

384.0 mm of rain was observed at Point Fawcett AWS during an 18-hour period between 0600 UTC 4 March and 0000 UTC 5 March. This was also the highest 24-hour rainfall recorded to 9 am CST for Point Fawcett AWS since records began on 12 July 1971.

In the Kimberley, the highest recorded 48-hour rainfall was 207 mm at Me No Savvy (located between Fitzroy Crossing and Halls Creek).

4.4 Storm Tide

In the Northern Territory, abnormally high tides, up to 0.5m above predicted levels, were observed about the western Top End coast. However tides did not exceed the highest astronomical tide of the year.

In Western Australia, Tropical Cyclone *Blanche* made landfall near high tide. Landfall occurred at 0300 UTC 6 March and high tide occurred at 0329 UTC 6 March, based on tides at Reverley Island[6]. However the amplitude of the storm tide on the northeast Kimberley coast is unknown.

[6] Reveley Island is located at the mouth of the Berkeley River, near 14.36S 127.81E.

5 Forecast Performance

5.1 Tropical Cyclone Outlook

On 28 February, the Darwin TCWC Tropical Cyclone Outlook[7] first raised the likelihood of a tropical cyclone forming from Very Low (<5%) to Low (5-20%) for the forecast day of 3 March.

On 1 March, the likelihood was raised further to Moderate (20-50%) for the forecast day of 4 March.

On 2 March, the outlook probability on the forecast day of 4 March was lowered to Low and a Moderate probability was assigned on the forecast day of 5 March (the day Tropical Cyclone *Blanche* formed).

On 3 March, a Moderate probability was maintained for the forecast day of 5 March and a High (>50%) probability was forecast for the 6 March. This outlook was updated at 9 am CST 4 March to increase the probability on the forecast day of 5 March to High.

From 4 March, a High probability was maintained on tropical cyclone outlooks until Tropical Cyclone *Blanche* made landfall on the 6 March.

5.2 Tropical Cyclone Advices

A Tropical Cyclone Advice was first issued in the form of a Watch[8] at 5 pm CST 3 March for the Northern Territory between Cape Fourcroy (very close to Point Fawcett) on the Tiwi Islands and Croker Island. This was approximately 40 hours prior to the near-gale force winds observed at Point Fawcett and 52 hours prior to the formation of Tropical Cyclone *Blanche*.

This Tropical Cyclone Advice was upgraded to a Warning[9] at 11 am CST 4 March, approximately 22 hours prior to the near-gale force winds observed at Point Fawcett and 34 hours prior to the formation of Tropical Cyclone *Blanche*. Also at 11 am CST 4 March, a Watch was extended southwards along the Northern Territory coast between Point Stuart and the NT/WA border, which included Darwin.

At 2pm CST 4 March, the Watch was extended to Western Australia between the NT/WA border and Mitchell Plateau. This was approximately 36 hours prior to when

---

[7] Darwin TCWC Tropical Cyclone Outlooks are issued routinely at 2:15 pm CST each day during the tropical cyclone season and updated when required.
[8] A Tropical Cyclone Watch is issued for coastal communities when the onset of gales is expected within 48 hours, but not within 24 hours.
[9] A Tropical Cyclone Warning is issued for coastal communities when the onset of gales is expected within 24 hours, or is already occurring.

gales were estimated to have begun on the northeast Kimberley coast and approximately 48 hours prior to landfall.

At 5pm CST 4 March, the Watch in Darwin was upgraded to Warning and at 8pm CST 4 March, the Watch in the Kimberley was extended to Kuri Bay.

At 11am CST 5 March, the Watch for the Kimberley was upgraded to Warning between the NT/WA border and Mitchell Plateau, approximately 15 hours prior to when gales were estimated to have begun on the northeast Kimberley coast and approximately 21 hours prior to landfall. Also at 11am CST 5 March, the Watch was extended further west to Cockatoo Island.

During 5 and 6 March, Tropical Cyclone Advices were also progressively cancelled in from north to south as the tropical low then tropical cyclone moved southwards. The Tropical Cyclone Advice was cancelled for the Tiwi Islands at 2pm CST 5 March and for Darwin at 5pm CST 5 March. The final Tropical Cyclone Advice was cancelled at 8pm CST 6 March.

5.3 Verification of Official Forecast Tracks

Table 1 Verification of the Best Track data compared to the Official Forecast Tracks.

Great Circle Distance (nm)	0hr	6hr	12hr	18hr	24hr	36hr	48hr	72hr	96hr	120hr	144hr	168hr+
Sample size	20	20	20	19	18	16	14	10	6	3	0	0
Mean abs. err.	21.64	31.3	40.22	49.99	56.27	73.76	96.19	112.49	113.49	168.48	0	0
RMS err.	27.65	35.18	46.06	57.58	65.77	88.11	102.89	116.13	114.82	169.69	0	0
Mean signed err.	-	-	-	-	-	-	-	-	-	-	-	-
Standard dev.	17.66	16.48	23.04	29.37	35.04	49.78	37.92	30.39	19.08	24.79	0	0
Across Track (nm)	0hr	6hr	12hr	18hr	24hr	36hr	48hr	72hr	96hr	120hr	144hr	168hr+
Sample size	20	20	20	19	18	16	14	10	6	3	0	0
Mean abs. err.	14.38	17.27	17.63	21.32	19.34	24.23	46.2	62.87	39.47	45.36	0	0
RMS err.	21.5	22.51	24.56	25.97	28.24	35.6	56.39	74.79	53.78	54.11	0	0
Mean signed err.	0.07	1.47	7.61	14.86	18.09	-0.36	-18.34	-26.46	-3.69	-29.68	0	0
Standard dev.	22.06	23.05	23.96	21.88	22.32	36.77	55.34	73.73	58.77	55.41	0	0
Along Track (nm)	0hr	6hr	12hr	18hr	24hr	36hr	48hr	72hr	96hr	120hr	144hr	168hr+
Sample size	20	20	20	19	18	16	14	10	6	3	0	0
Mean abs. err.	11.95	21.44	29.05	40.14	47.32	63.08	76.76	76.58	97.04	158.33	0	0
RMS err.	17.38	27.03	38.97	51.39	59.4	80.6	86.06	88.84	101.44	160.83	0	0
Mean signed err.	-2.59	-7.38	-18.81	-28.88	-39.67	-56.44	-59.55	-76.58	-97.04	-158.33	0	0
Standard dev.	17.64	26.68	35.01	43.68	45.5	59.42	64.48	47.47	32.37	34.61	0	0
Pressure (hPa)	0hr	6hr	12hr	18hr	24hr	36hr	48hr	72hr	96hr	120hr	144hr	168hr+
Sample size	18	18	18	17	16	14	12	8	4	1	0	0
Mean abs. err.	1.61	3.05	2.6	2.2	2.89	3.11	4.01	5.31	7	6	0	0
RMS err.	2.3	4.31	3.99	3.04	4.26	4.99	6.43	8.03	8.83	6	0	0
Mean signed err.	0.39	-0.49	-0.46	-0.15	-0.76	-1.11	-0.82	-1.94	-5	6	0	0
Standard dev.	2.33	4.41	4.08	3.13	4.33	5.05	6.66	8.33	8.41	0	0	0
Mean Wind (knots)	0hr	6hr	12hr	18hr	24hr	36hr	48hr	72hr	96hr	120hr	144hr	168hr+
Sample size	18	18	18	17	16	14	12	9	5	2	0	0
Mean abs. err.	3.33	3.79	3.82	2.65	3.75	4.46	5	6.67	11	10	0	0
RMS err.	5	5.54	5.57	4.11	6.06	6.58	7.91	11.06	15	11.18	0	0
Mean signed err.	-1.67	-0.87	0.07	0.29	1.56	3.04	2.5	5.56	7	-10	0	0
Standard dev.	4.85	5.63	5.73	4.23	6.05	6.06	7.83	10.14	14.83	7.07	0	0

6 Table and Figures

Table 2 Best Track data. Wind radii indicated are the maximum for any quadrant at that time.

	Latitude	Longitude	Uncertainty	Category	Pressure	RMW	MeanWind	WindGust	FT	CI	GaleRadius	StormRadius	EyeRadius
Time[yyyyMMdd'T'HH:mm:ss'Z']	degrees	degrees	nm		hPa	nm	kn	kn			nm	nm	nm
2017-03-01T00:00:00Z	-9.0	138.5	60	0	1006		15	45					
2017-03-01T06:00:00Z	-9.5	139.0	60	0	1003		15	45					
2017-03-01T12:00:00Z	-9.3	138.5	90	0	1006		15	45					
2017-03-01T18:00:00Z	-8.5	137.5	75	0	1004		15	45					
2017-03-02T00:00:00Z	-8.1	135.6	60	0	1004		15	45					
2017-03-02T06:00:00Z	-7.9	134.8	35	0	1003		15	45					
2017-03-02T12:00:00Z	-7.8	134.2	60	0	1004		15	45					
2017-03-02T18:00:00Z	-7.7	133.7	45	0	1002		15	45					
2017-03-03T00:00:00Z	-7.8	133.4	35	0	1003		20	45	1.0	1.0			
2017-03-03T06:00:00Z	-7.9	132.9	40	0	1001		25	45	1.5	1.5			
2017-03-03T12:00:00Z	-8.0	133.1	15	0	1002		25	45	1.5	1.5			
2017-03-03T18:00:00Z	-8.9	133.0	15	0	1001		25	45	2.0	2.0			
2017-03-04T00:00:00Z	-9.6	132.4	30	0	1001		25	45	2.0	2.0			
2017-03-04T06:00:00Z	-9.8	131.8	15	0	1000		25	45	2.0	2.0			
2017-03-04T12:00:00Z	-10.4	131.4	20	0	1001		25	45	2.0	2.0			
2017-03-04T18:00:00Z	-11.5	130.8	20	0	1000		30	45	2.5	2.5			
2017-03-04T21:00:00Z	-11.7	130.5	15	0	998		30	45	2.5	2.5			
2017-03-04T22:00:00Z	-11.8	130.29	15	0	996	5	35	50			12		
2017-03-04T23:00:00Z	-11.94	130.11	7	0	994	5	35	50			12		
2017-03-05T00:00:00Z	-11.8	130.0	25	0	994	5	35	50	2.5	2.5	12		
2017-03-05T01:00:00Z	-11.72	129.93	10	0	996		30	45					
2017-03-05T02:00:00Z	-11.78	129.9	20						2.0	2.5			
2017-03-05T03:00:00Z	-11.9	129.9	15						2.5	2.5			
2017-03-05T06:00:00Z	-12.2	129.7	20	0	995		30	45	2.5	3.0	80		
2017-03-05T12:00:00Z	-12.6	129.1	20	1	994	30	40	55	3.0	3.0			
2017-03-05T15:00:00Z	-12.9	128.6	25										
2017-03-05T16:21:00Z	-13.06	128.55	15										
2017-03-05T18:00:00Z	-13.3	128.5	20	2	986	15	50	70	3.5	3.5	80	20	
2017-03-06T00:00:00Z	-14.0	128.18	10	2	984	12	55	75	3.5	3.5	60	25	10
2017-03-06T01:00:00Z	-14.17	128.05	10										
2017-03-06T02:00:00Z	-14.28	127.93	10										
2017-03-06T03:00:00Z	-14.4	127.8	10	2	985	10	55	75	3.5	3.5	50	25	7
2017-03-06T04:00:00Z	-14.56	127.68	10										
2017-03-06T05:00:00Z	-14.7	127.62	15										
2017-03-06T06:00:00Z	-14.9	127.5	20	1	992	10	45	65			35		
2017-03-06T09:00:00Z	-15.2	127.3	20	1	994	5	35	55			35		
2017-03-06T12:00:00Z	-15.5	127.1	30	0	1000		30	45					

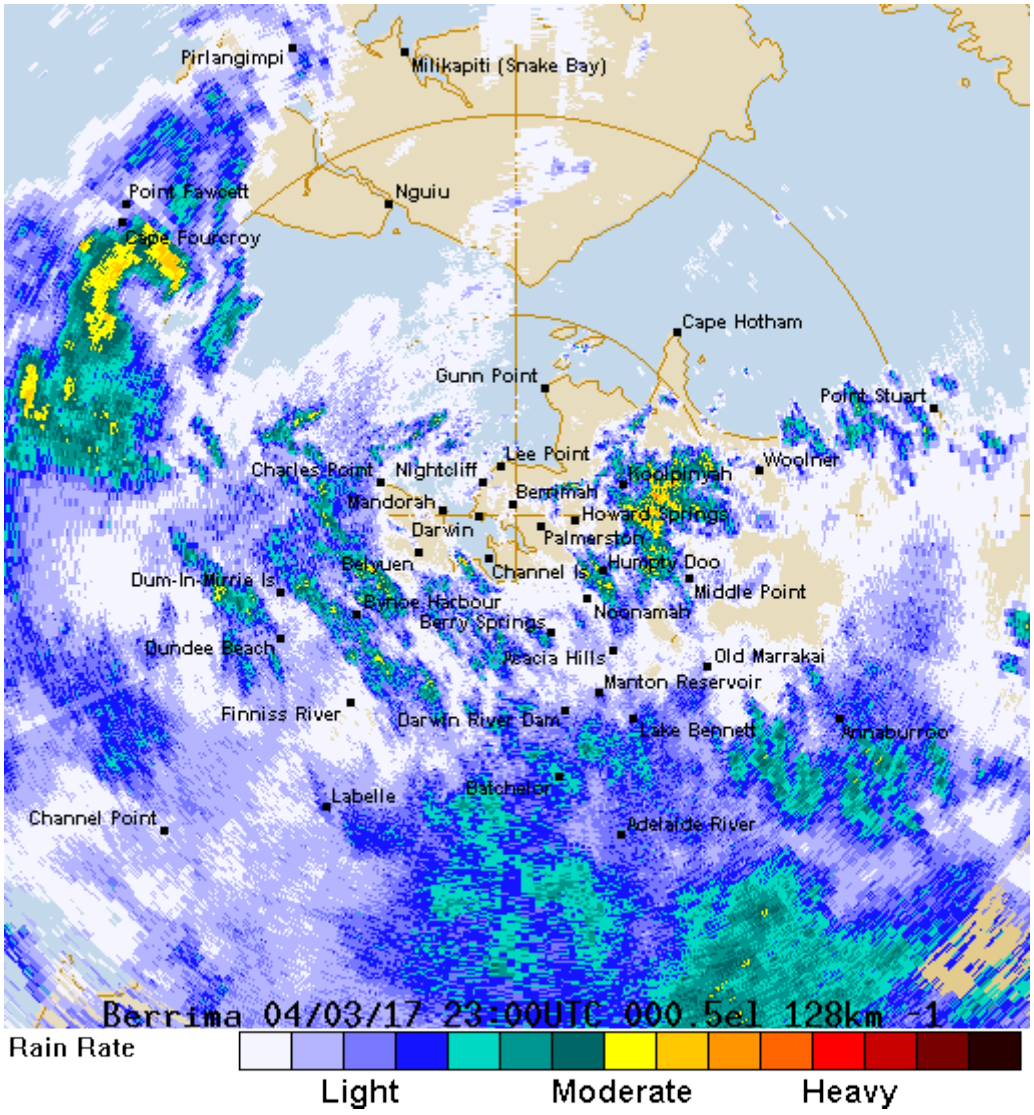


Figure 4 Berrimah (Darwin) radar image at 2300 UTC 4 March 2017 showing the small vortex near Cape Fourcroy on Bathurst Island (top left corner of image).

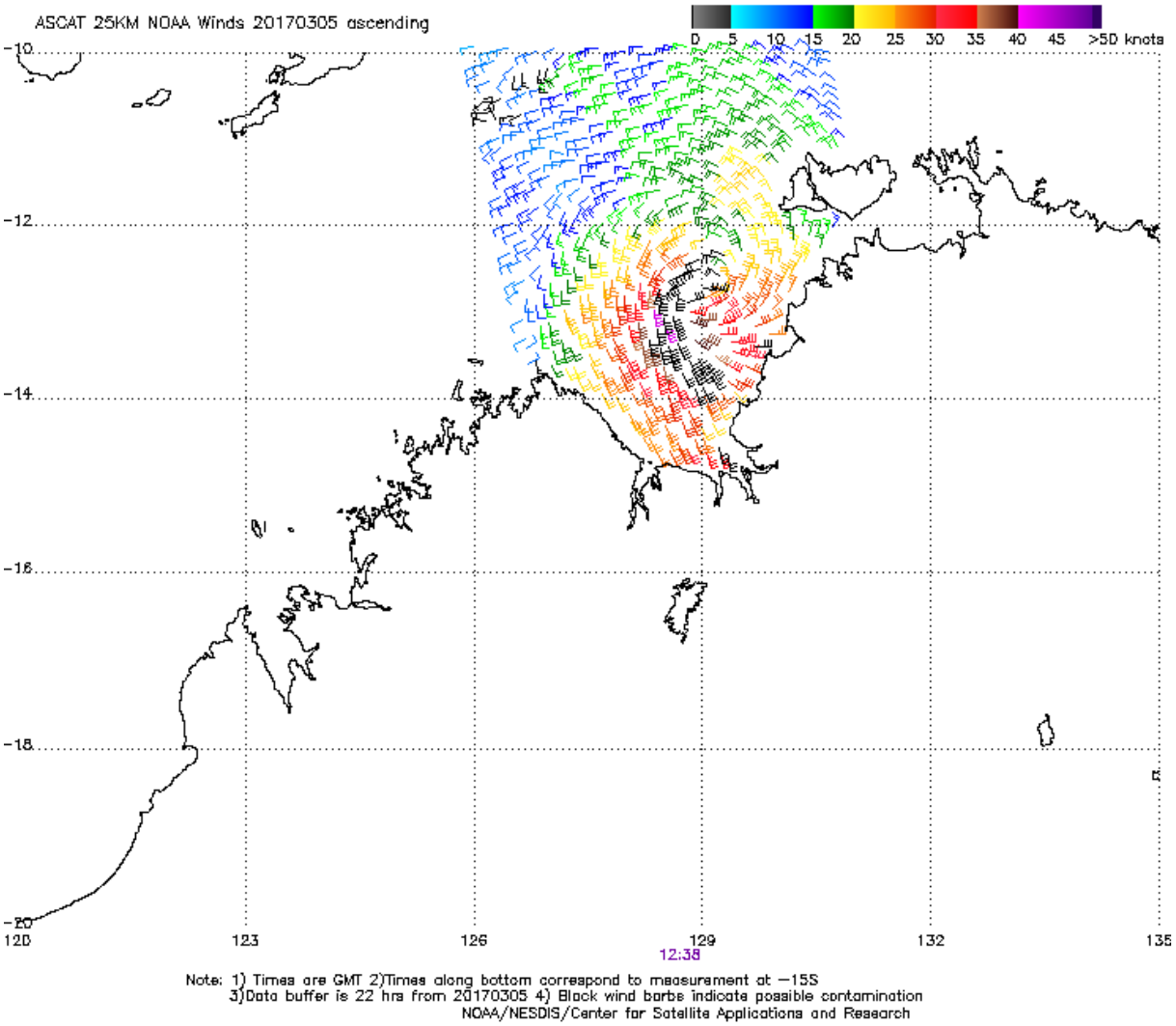


Figure 5 Advanced Scatterometer (ASCAT) pass at 1238 UTC 5 March, corresponding to when Tropical Cyclone *Blanche* first reached tropical cyclone status. Image courtesy of US NESDIS (National Oceanic and Atmospheric Administration (NOAA)).

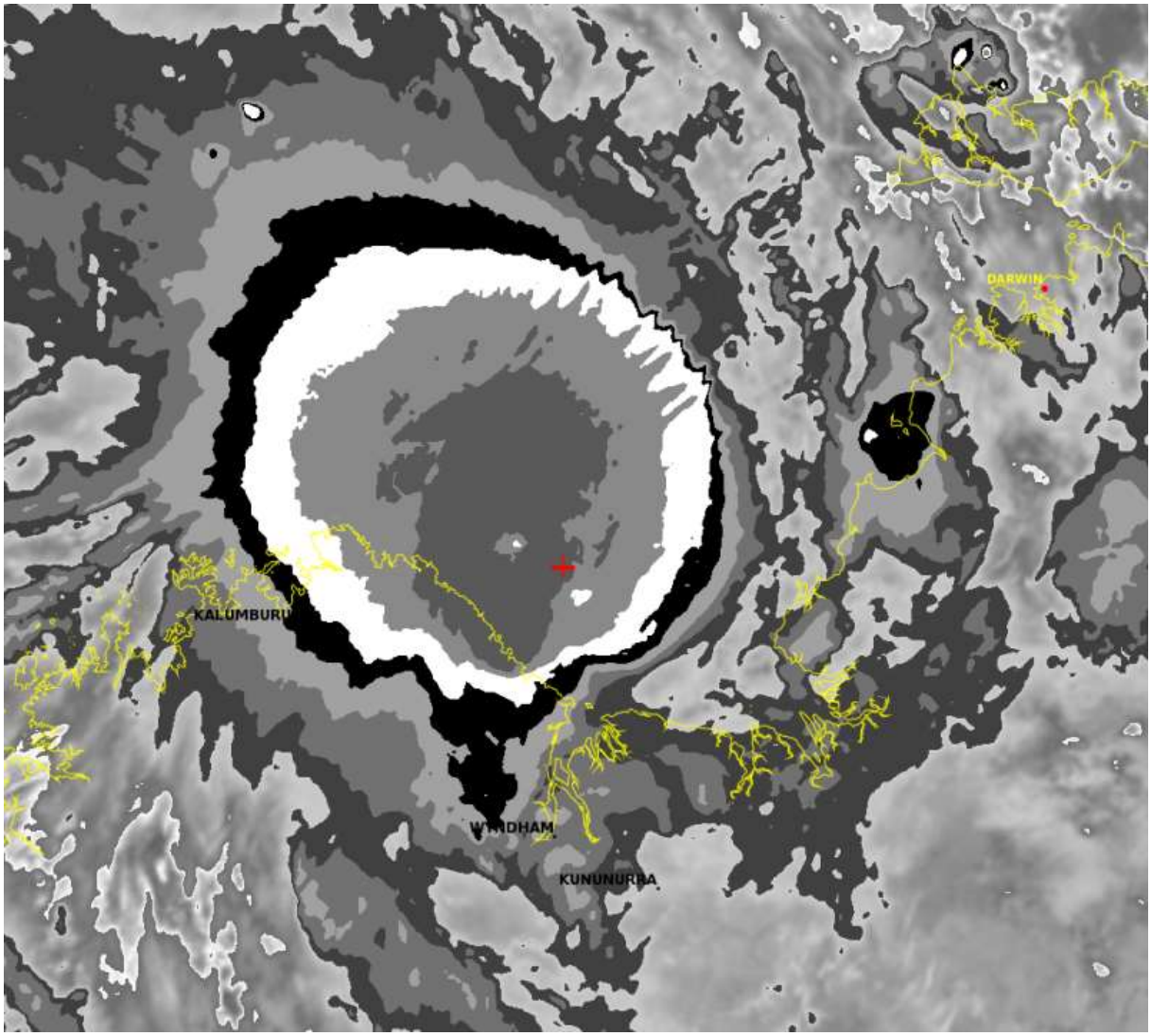


Figure 6 Himawari-8 infra-red satellite image with Dvorak enhancement of Tropical Cyclone *Blanche* at 0000 UTC 6 March. The image corresponds with when Tropical Cyclone *Blanche was at* maximum intensity. The red cross indicates the position of the low level centre. Image courtesy of JMA.

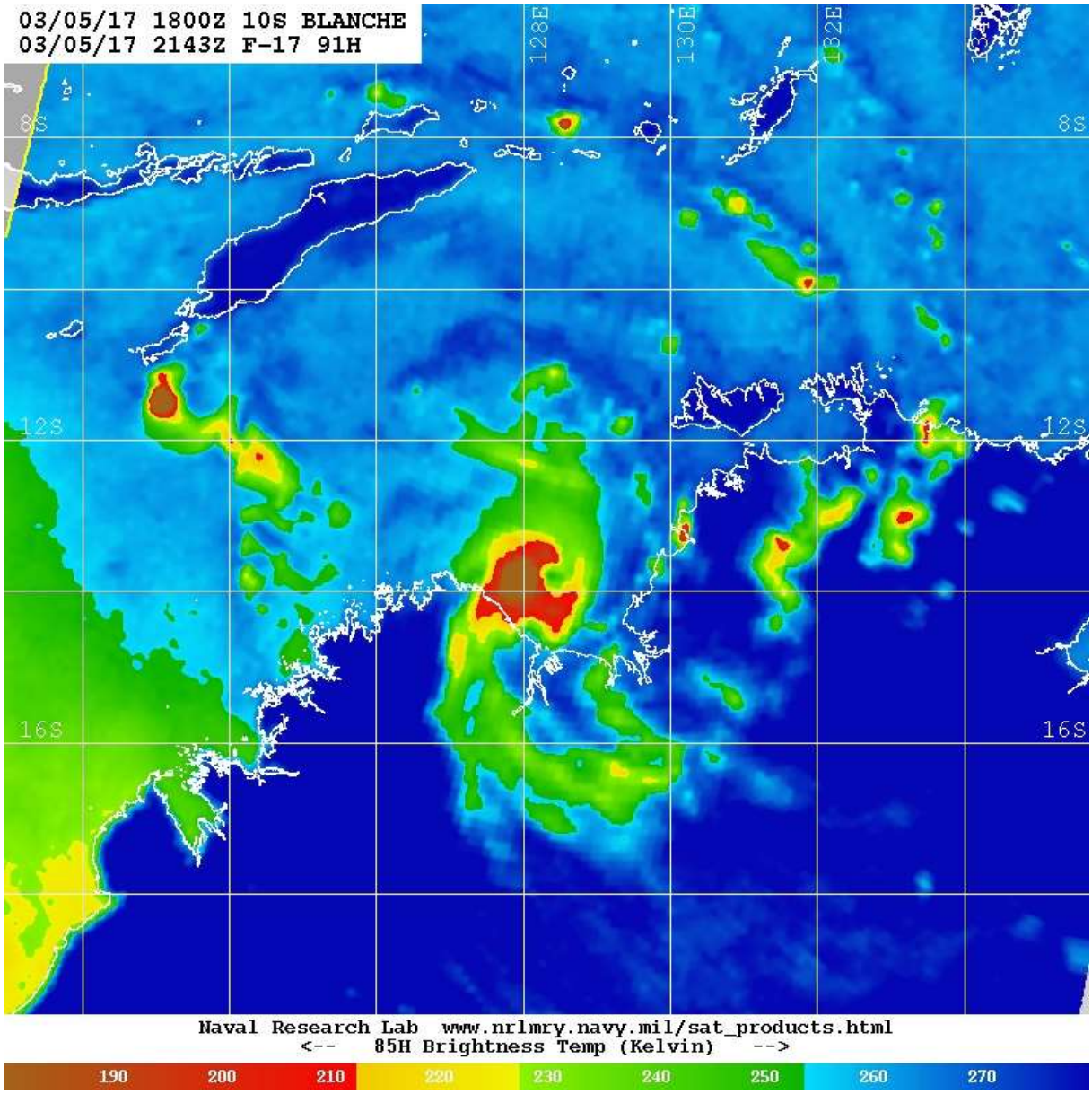


Figure 7 Tropical Cyclone Special Sensor Microwave Imager/Sounder (SSMIS) 91 GHz microwave image at 2143 UTC 5 March. Image courtesy of the United States Naval Research Laboratory (NRL).

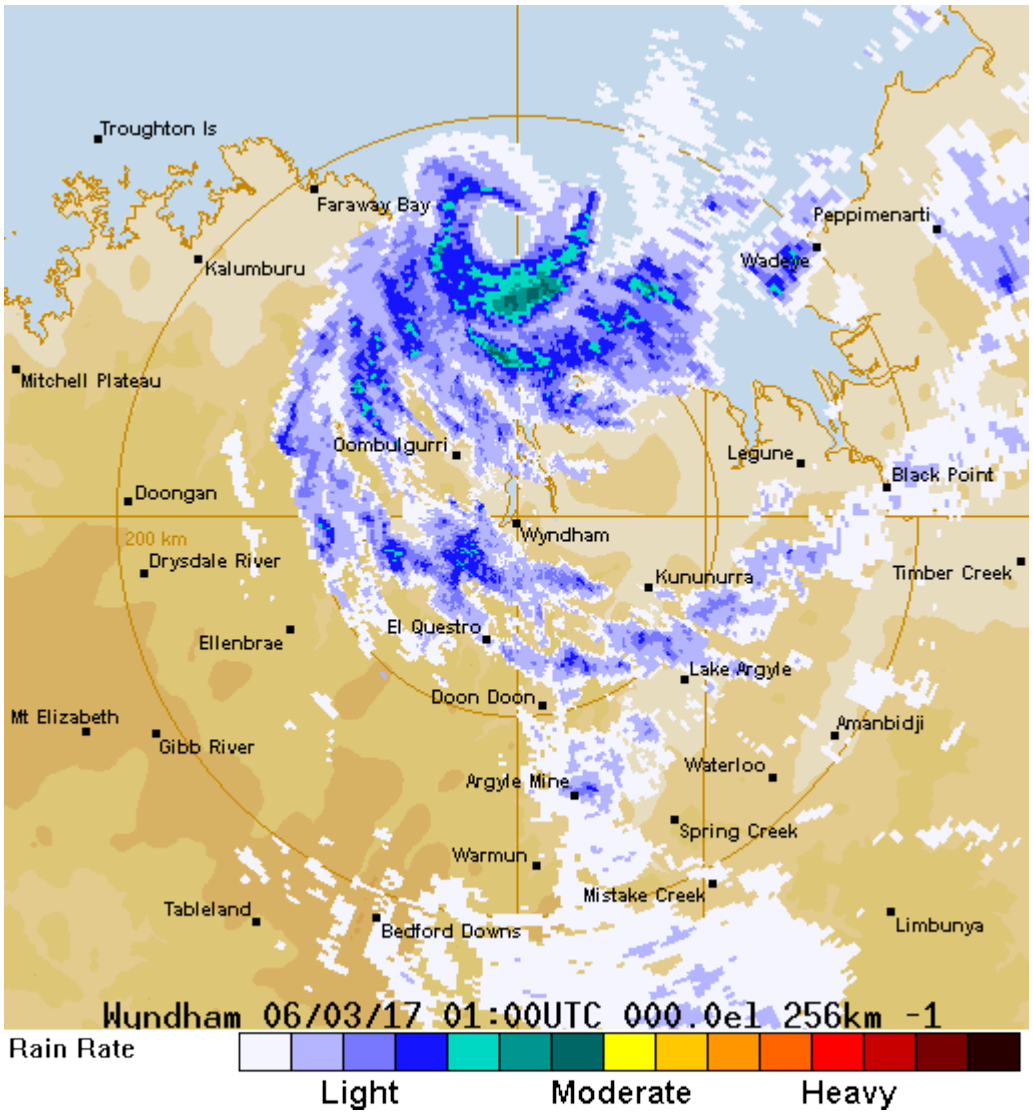


Figure 8 Wyndham radar of Tropical Cyclone *Blanche* at 0100 UTC 6 March 2017.

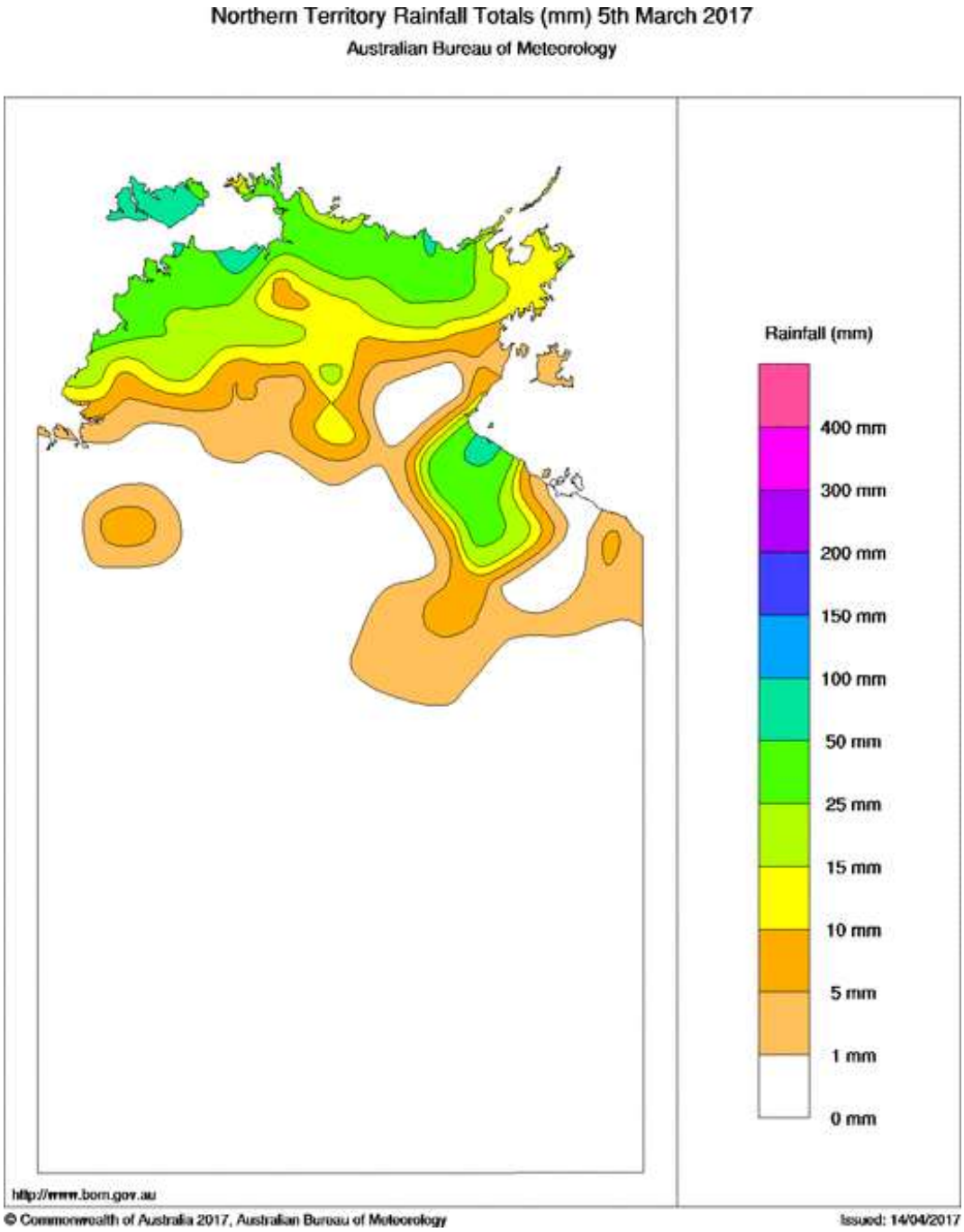


Figure 9 Rainfall during the 24 h to 9 am ACST 5 March 2017 in the Northern Territory.

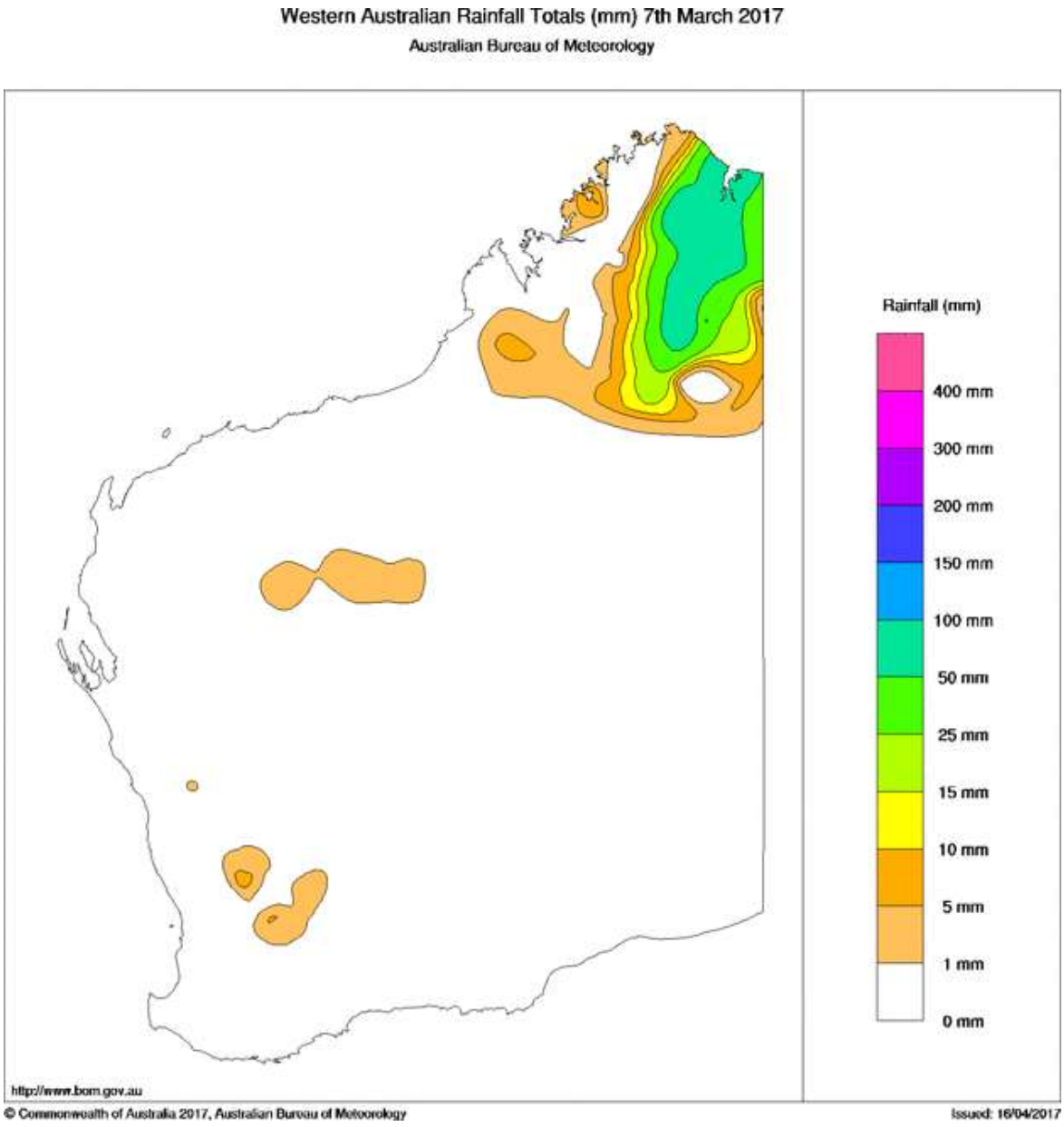


Figure 10 Rainfall during the 24 h to 9 am AWST 7 March 2017 in Western Australia.

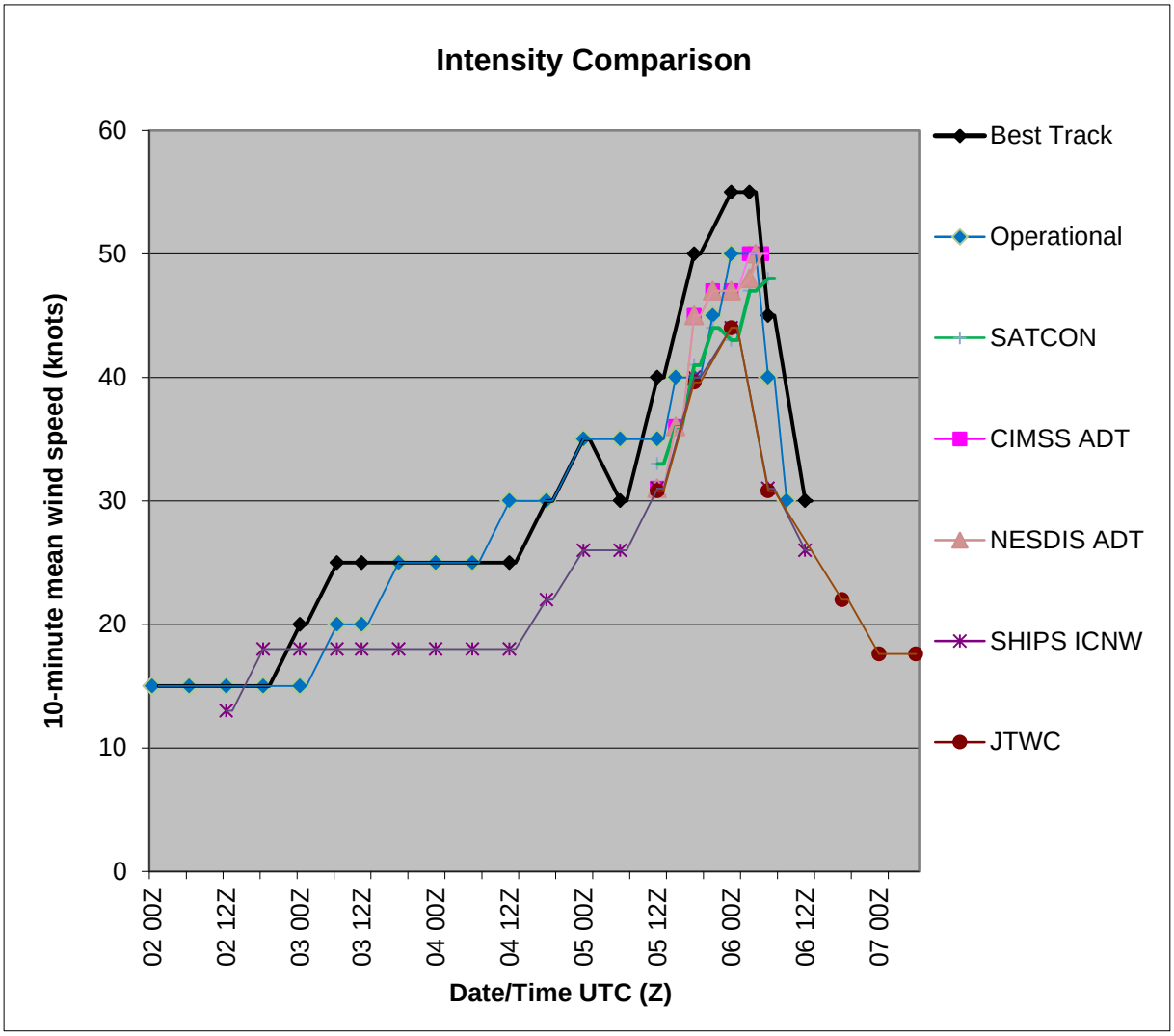


Figure 11 Comparisons of intensity estimates for Tropical Cyclone *Blanche*.

Table 3 Observations from Point Fawcett AWS between 2100 UTC 4 March and 0300 UTC 5 March

Date (UTC)	Time (UTC)	Air Temp (˚C)	MSLP (hPa)	Wind Dir (degrees)	Wind Speed (kn)	Wind Gust (kn)	Rain (since 2330 UTC)
4 March	2100	25.6	999.8	190	11	21	333.2
4 March	2130	25.7	999.6	210	13	23	343.0
4 March	2141	25.8	998.9	210	15	25	346.2
4 March	2200	25.5	998.8	200	15	32	359.4
4 March	2230	25.6	997.0	220	24	36	366.4
4 March	2300	25.6	996.0	230	27	38	373.2
4 March	2320	25.5	994.4	230	32	49	383.8
4 March	2330	26.0	995.1	230	28	45	384.0
4 March	2340	26.1	996.5	190	11	29	0.0
5 March	0000	25.9	996.5	050	12	20	0.0
5 March	0030	26.4	997.4	050	12	18	0.0
5 March	0100	26.5	998.1	020	13	19	0.0
5 March	0130	26.7	998.3	030	17	27	0.0
5 March	0200	27.2	997.8	030	20	29	0.0
5 March	0230	27.2	997.7	020	18	28	0.0
5 March	0300	27.8	997.3	020	23	33	0.2

References

Kaplan, J., and M.De Maria, 1995: A simple empirical model for predicting the decay of tropical cyclone winds after landfall. *Journal of Applied Meteorology*, **34**, 2499-2512.