Australian Government
Bureau of Meteorology

Severe Tropical Cyclone *Errol*

13 – 18 April 2011

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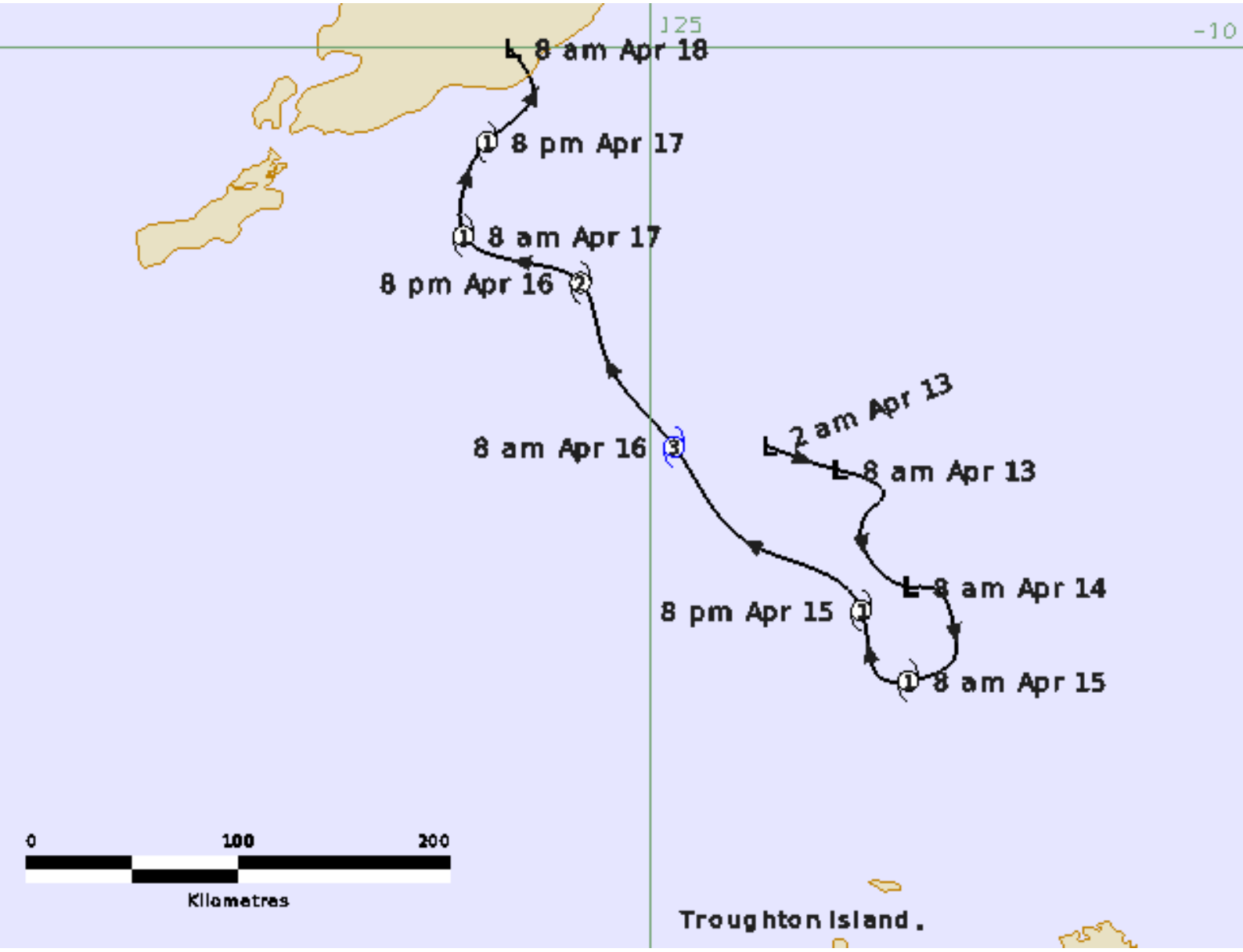

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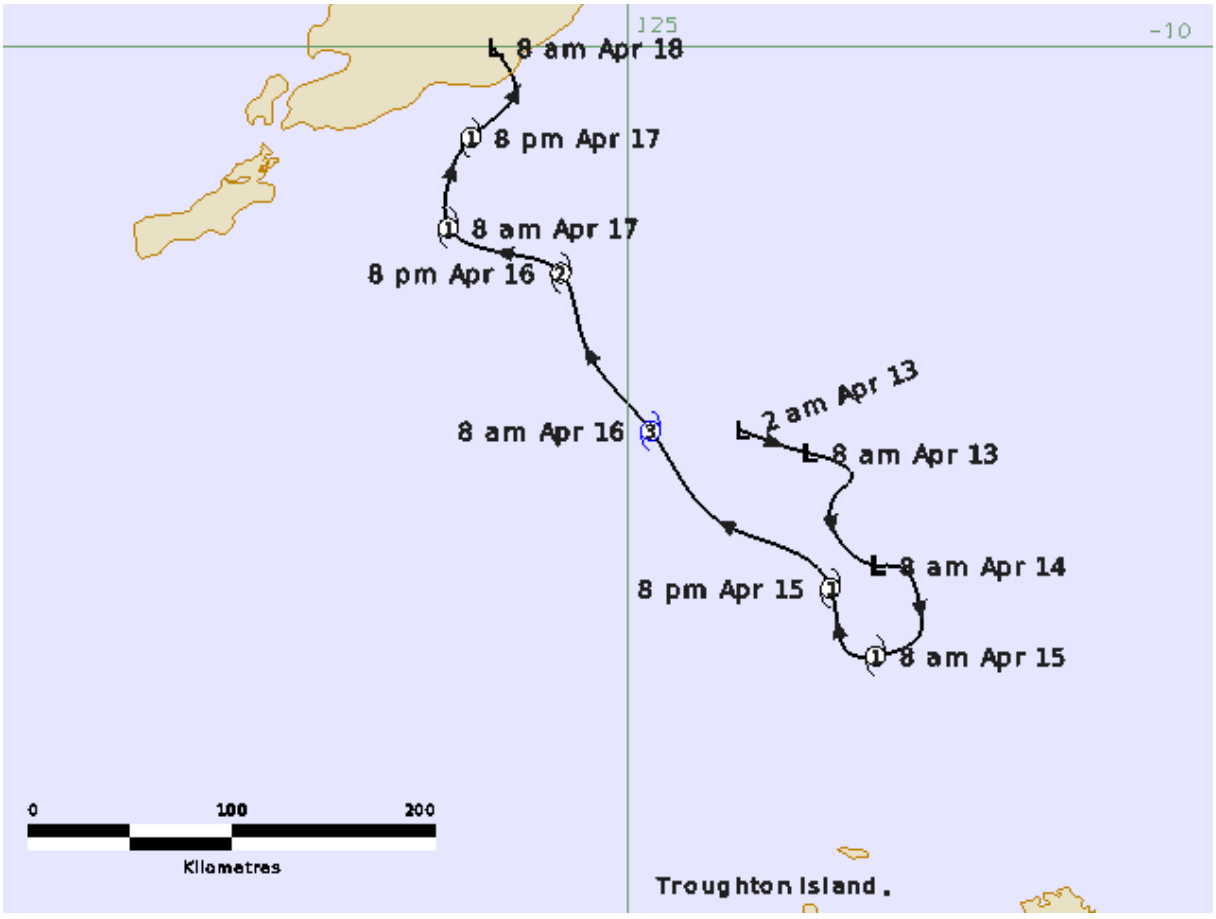
1 Summary

Severe Tropical Cyclone (STC) *Errol* was a small tropical cyclone that developed in the Timor Sea on 13 April. Initially it tracked slowly towards the north Kimberley coast before turning to the northwest away from the Australian mainland. The cyclone peaked at category 3 intensity briefly on 16 April before weakening and reaching the southern coast of West Timor on 18 April.

This tropical cyclone is noteworthy as operational responsibility was passed from the Australian Bureau of Meteorology to the newly formed Jakarta Tropical Cyclone Warning Centre (TCWC), of Badan Meteorologi, Klimatologi, dan Geofiika (BMKG), Indonesia on 17 April.

Although tropical cyclone advices were issued for the north Kimberley coast, there were no impacts to the Australian mainland.

FIGURE 1. Best track of Severe Tropical Cyclone *Errol* 13-18 April 2011 (times in AWST, UTC+8).



2 Meteorological Description

2.1 Intensity analysis

A weak low formed in the monsoon trough in the Timor Sea just south of Timor Leste on 12 April and drifted south towards the Kimberley coast. The low developed overnight on 13 April and by 0000 Universal Time Coordinated (UTC) 14 April (0800 Australian Western Standard Time (AWST) 14 April) (AWST=UTC+8 hours) an Advanced Scatterometer (ASCAT) pass showed a small area of gales in southern quadrants. Microwave imagery showed a well-defined low-level circulation with deep convection mostly south of the centre.

Tropical cyclone (TC) intensity is estimated at 1800 UTC 14 April when microwave imagery showed deep convection extending around the centre, as shown on the Tropical Rainfall Measuring Mission (TRMM) Microwave Imager (TMI) 89 GHz pass in Figure 2. The ASCAT at 0030 UTC 15 April confirmed gales around the centre. *Errol's* development was favoured by low vertical wind shear and warm sea surface temperatures (SSTs) in excess of 28°C.

Intensification continued as *Errol* tracked to the northwest and a small eye emerged on microwave imagery from 1600 UTC 15 April. This was most evident on the Special Sensor Microwave Image/Sounder (SSMIS) pass at 2155 UTC as shown in Figure 3. An eye was also evident on enhanced infra-red imagery by 0000 UTC 16 April. A concurrent ASCAT pass shown in Figure 4 continued to indicate a very small system. Peak intensity is estimated at 65 knots (kn) (120 kilometres per hour (km/h)) (Category 3) at this time. This peak is an upgrade from the operational peak of 55 kn (100 km/h) (Category 2).

Subsequent imagery indicated weakening as the northern eye wall eroded. Nevertheless, deep convection continued near the centre until *Errol* reached the southern coast of West Timor early on 18 April, whereupon the circulation weakened further.

A comparison of intensity estimates shown in Figure 5 highlights the rapid intensification of the best track to a peak higher than other estimates, other than ADT that peaked later. Partly this is related to the inability of objective techniques, as well as subjective Dvorak to resolve such a small system. Had ADT resolved an eye pattern, it is likely that it would have resulted in higher estimates. It is also possible that STC *Errol* reached an even higher peak than 65 kn (120 km/h) given the strong eye signature on microwave imagery but without further information this can not be known.

2.2 Structure

Errol was a very small TC, having gales that extended only 30 nautical miles (nm) (55 kilometres (km)) from the centre (see Figure 4). During its development gales developed south of the centre as shown on ASCAT but thereafter was mostly symmetric under low wind shear.

The radius to maximum winds (RMW) was estimated at just 5 nm (8 km) which is a factor in ASCAT being unable to detect the stronger winds. As *Errol* weakened the RMW increased to around 15 nm (28 km).

2.3 Motion

During the early stages, the circulation drifted slowly to the southeast under weak steering flow. On 15 April a mid-level ridge developed to the southwest resulting in a northwest track

FIGURE 2. TMI 85 GHz microwave image at 1733 UTC 14 April near the time of initial TC intensity.

Images courtesy NRL: https://www.nrlmry.navy.mil/TC.html

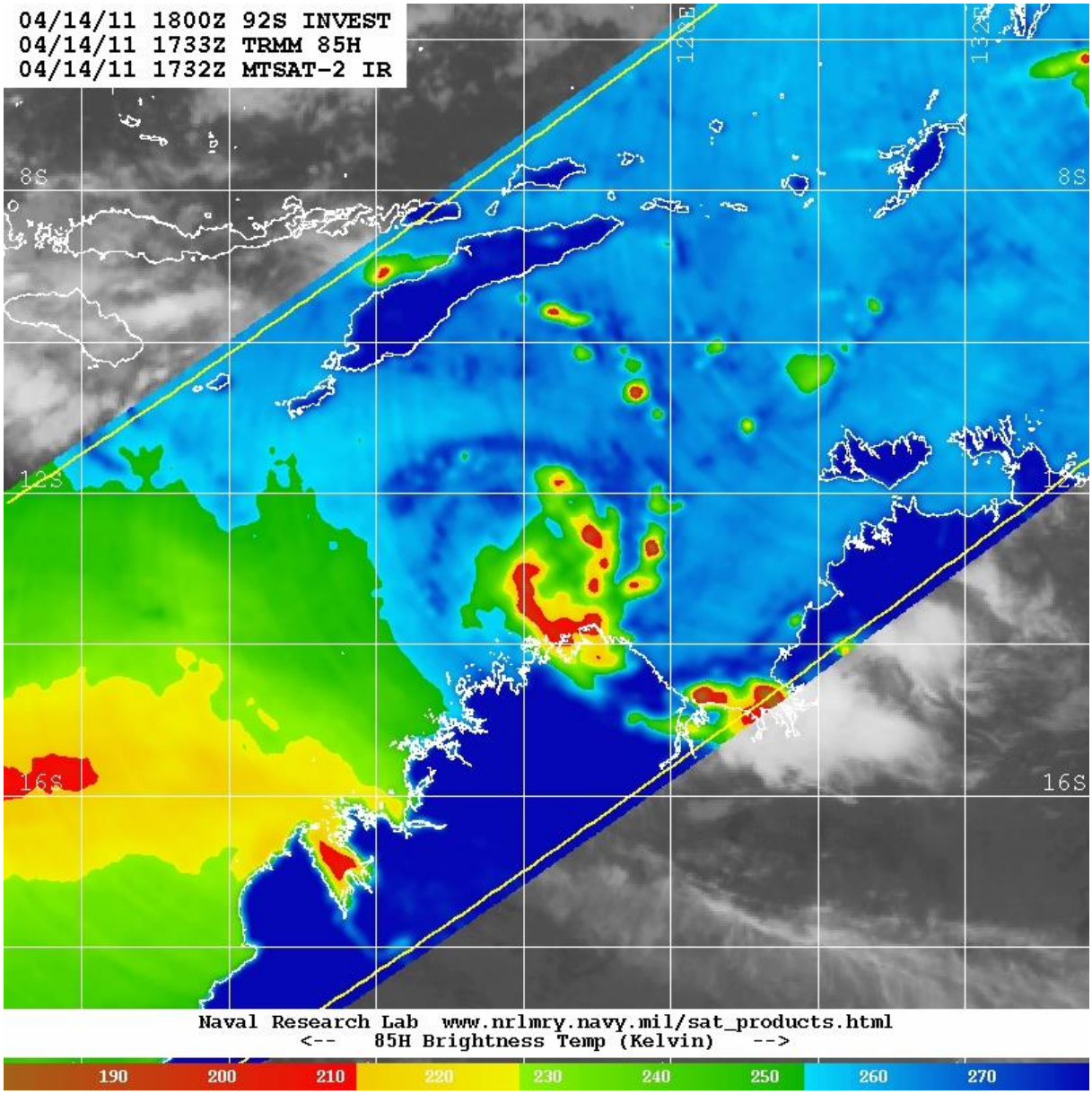


FIGURE 3. SSMIS 91GHz microwave pass of *Errol* at 2155 UTC 15 April near peak intensity.

Images courtesy NRL: https://www.nrlmry.navy.mil/TC.html

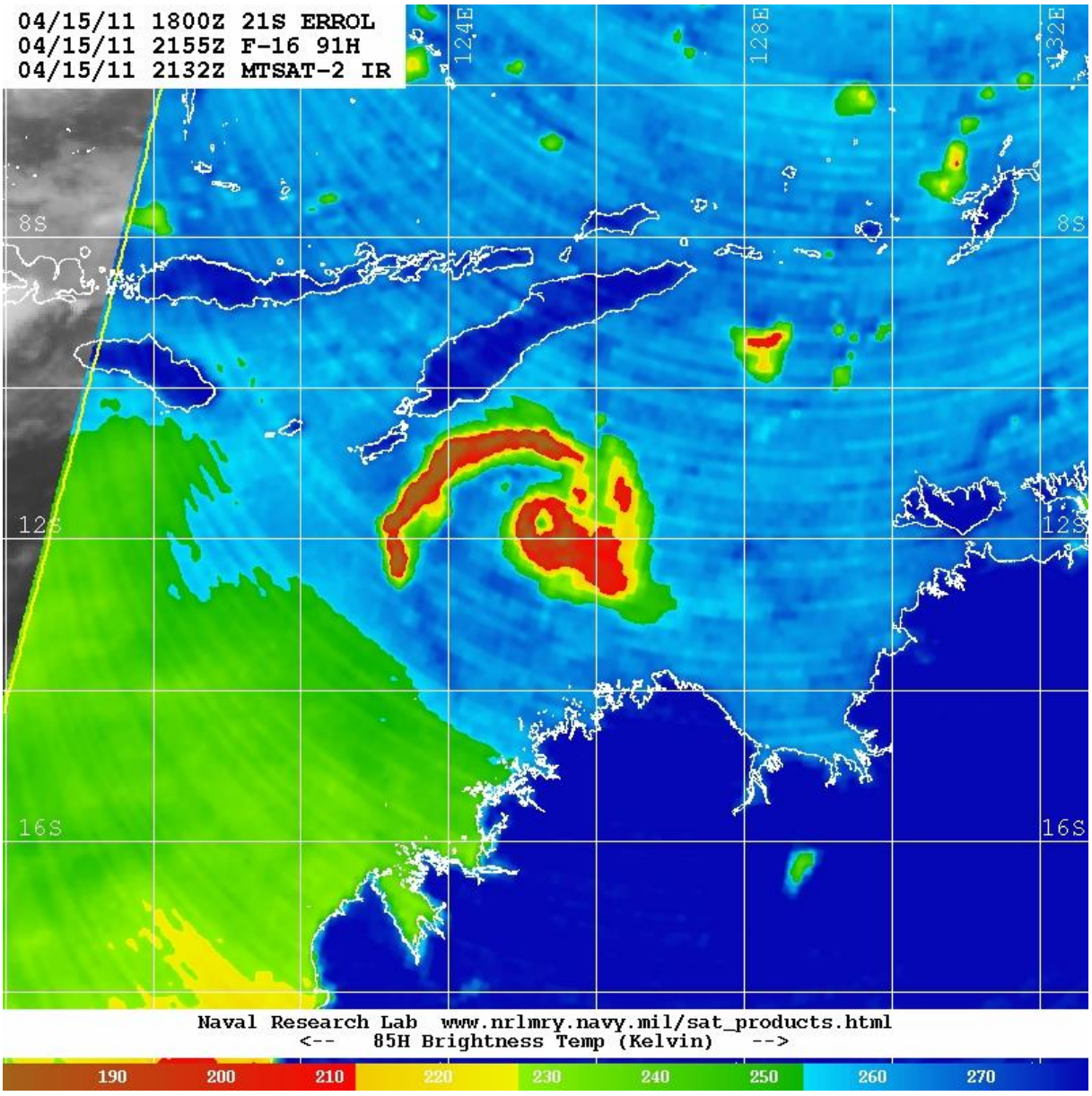


FIGURE 4. ASCAT pass at 0116 UTC 16 April near peak intensity showing the area of gales less than one degree in extent.

Image courtesy NOAA: https://manati.star.nesdis.noaa.gov/datasets/ASCATData.php

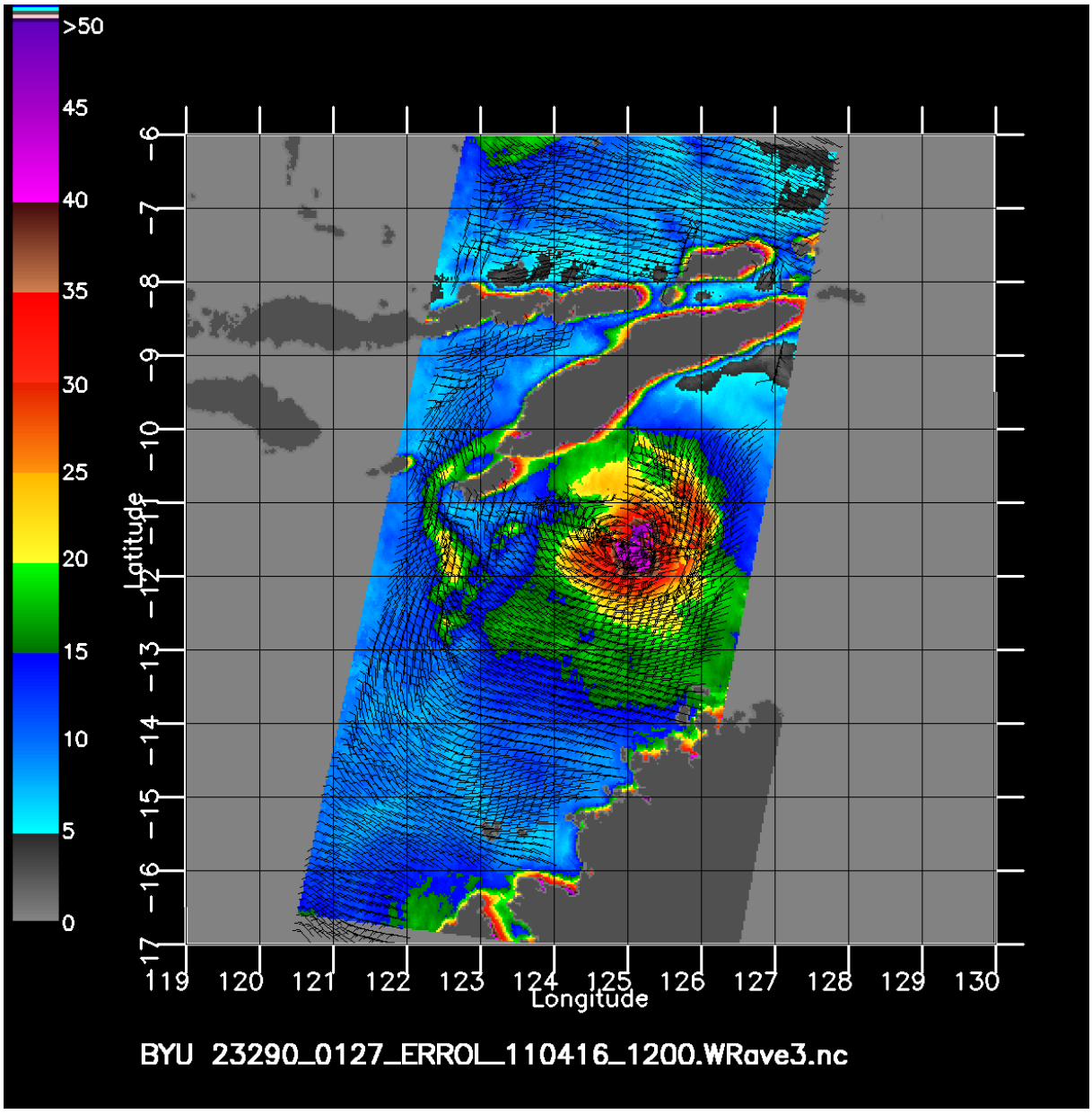
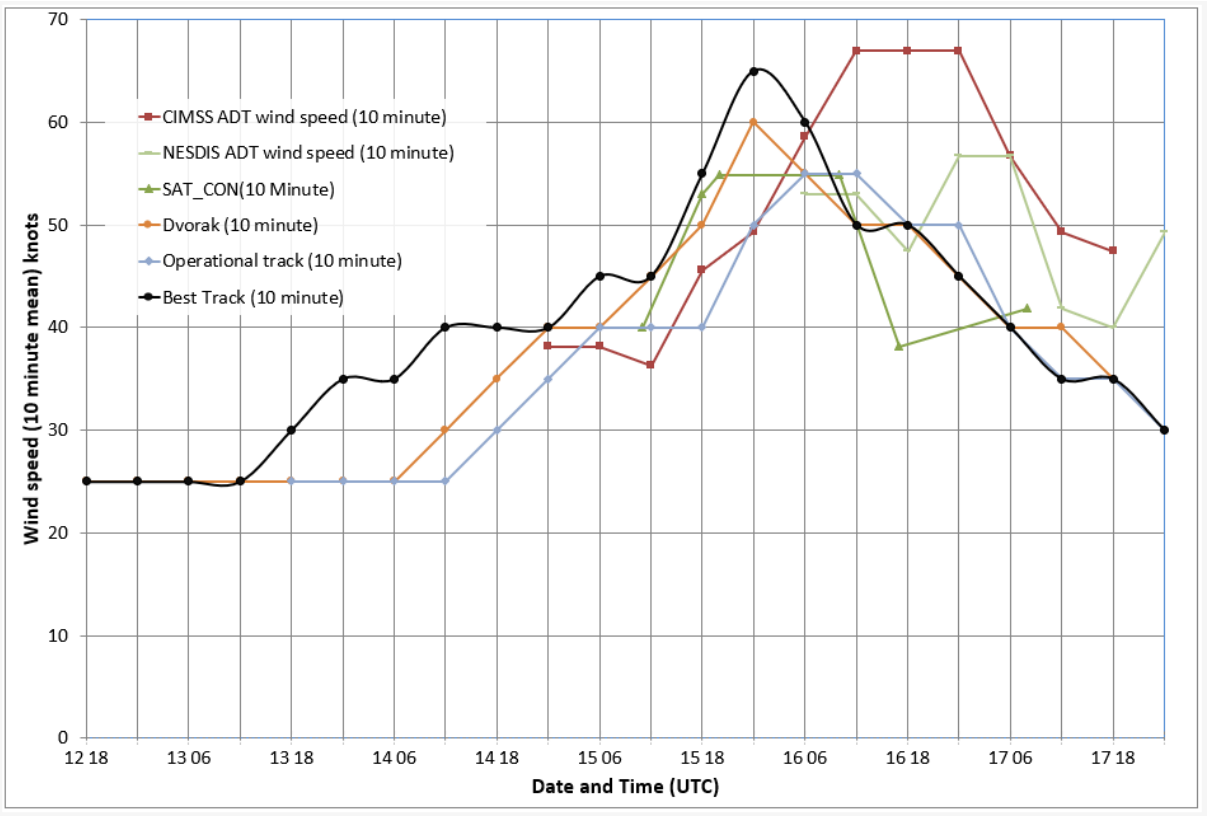


FIGURE 5. Plot of objective and subjective intensity estimates of Severe Tropical Cyclone *Errol*.



3 Impact

There were no impacts recorded to mainland Australia.

Heavy rain fell over southern parts of West Timor on 18 April which may have resulted in some flooding.

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4 Observations

Rainfall:

Faraway Bay in the northern Kimberley recorded 184 mm of rain in the 24 hours to 9am AWST 15 April.

Kupang (Eltari Airport), West Timor (Indonesia) recorded a daily rainfall total of 96.2mm on 19 April.

Otherwise there were no recorded observations of significance.

5 Forecast Performance

Official tropical cyclone forecasts were issued from 14 to 18 April. Tropical cyclone advices were issued for the northern Kimberley coast for a period from 15 to early 16 April when *Errol* was moving close to the coast.

The accuracy figures for Severe Tropical Cyclone *Errol* in Figure 6 a and b were calculated using official forecast tracks issued from 0600 UTC 14 April to 1800 UTC 16 April. These show that the forecast position was similar to the five-year average for the first 24 hours then larger at longer lead times, noting that beyond 48h there are too few data points to plot.

	00	06	12	18	24	36	48	72	96	120	144
Absolute position error (km)	15	33	50	74	103	176	242	367	-	-	-
Absolute mean wind error (kn)	9	10	11	11	12	19	16	9	-	-	-
Sample Size	11	11	11	11	11	10	8	4	-	-	-

FIGURE 6 a. Position accuracy figures for Severe Tropical Cyclone *Errol.*

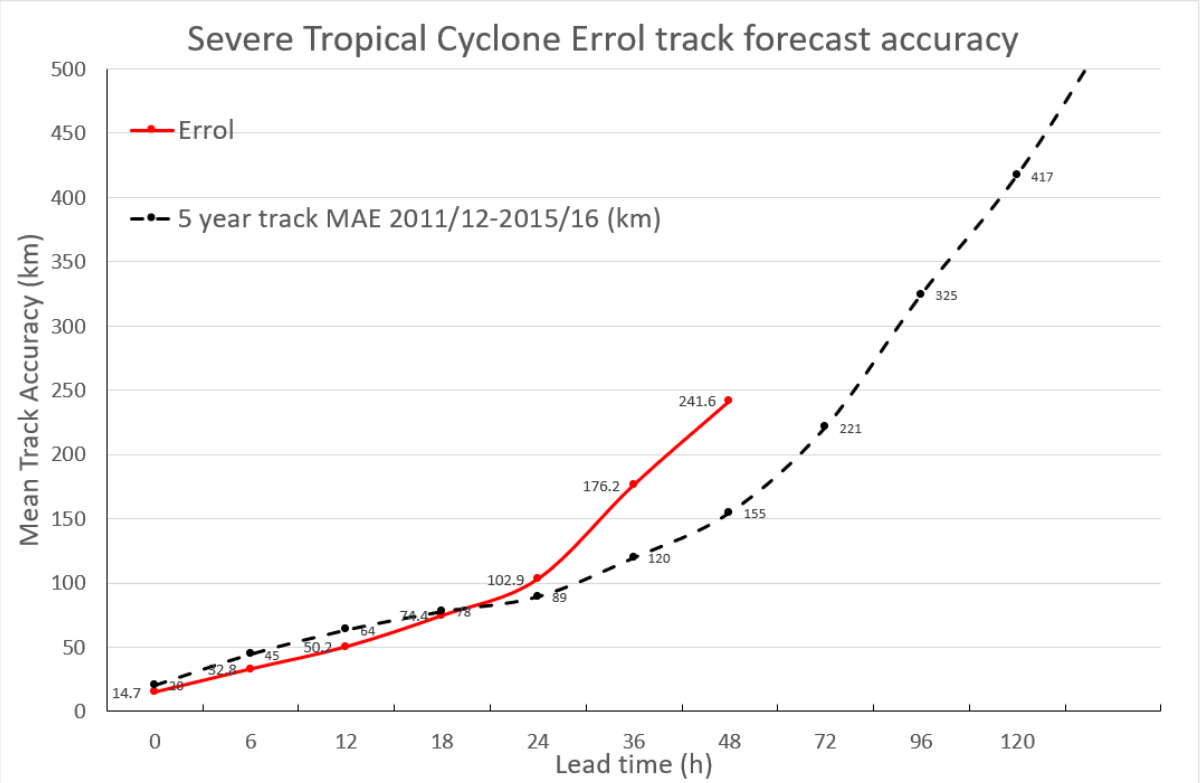

FIGURE 6 b. Intensity accuracy figures for Severe Tropical Cyclone *Errol.*

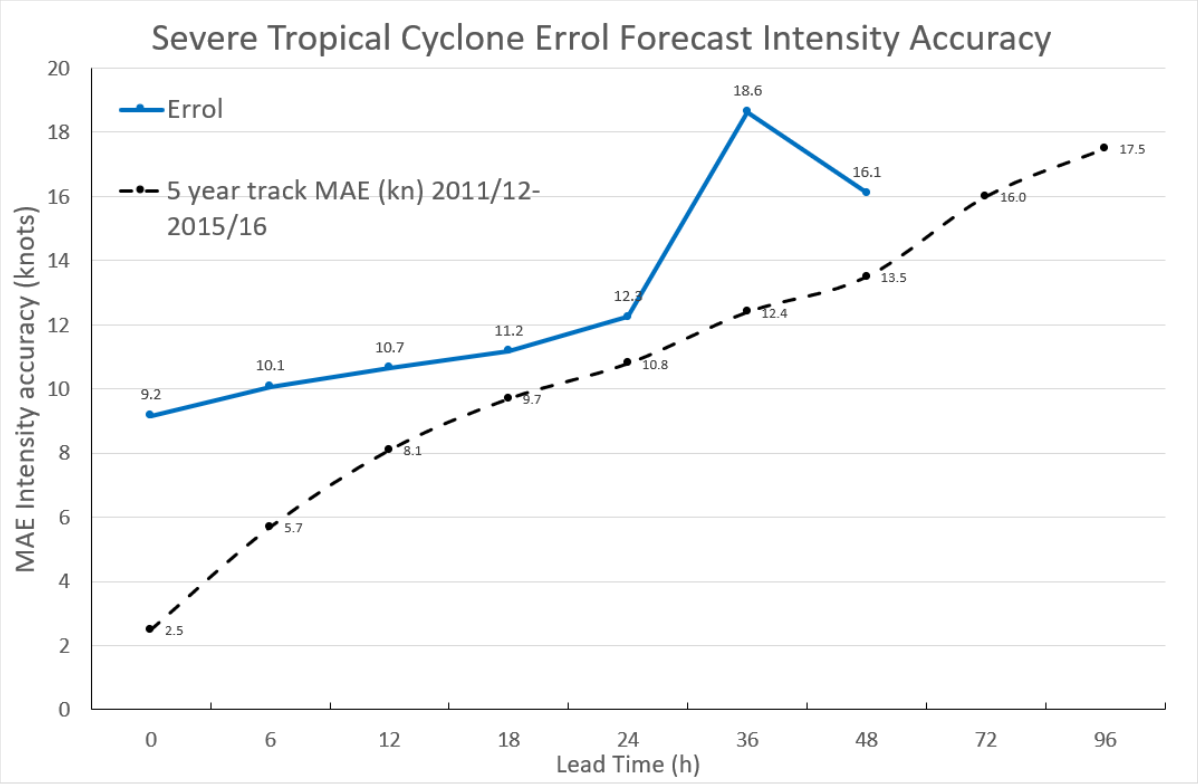

TABLE 1. Best track summary for Severe Tropical Cyclone *Errol* 12-18 April 2011.

Refer to the Australian Tropical Cyclone database for complete listing of parameters and track. Note: UTC is AWST - 8 hours.

Year	Month	Day	Hour UTC	Pos. Lat. S	Pos. Long. E	Pos. Acc. nm	Max Wind 10min kn	Max gust kn	Cent. Press. hPa	Rad. of gales (NE/SE/ SW/NW) nm	Rad. of storm nm	RMW nm
2011	4	12	18	11.7	125.5	40	25	45	1006			
2011	4	13	00	11.8	125.8	40	25	45	1006			
2011	4	13	06	11.9	126.0	40	25	45	1004			
2011	4	13	12	11.9	126.0	35	25	45	1006			
2011	4	13	18	12.0	125.9	20	30	45	1004			
2011	4	14	00	12.3	126.1	20	35	45	1004	-/30/30/-		
2011	4	14	06	12.3	126.2	20	35	45	1002	-/30/30/-		
2011	4	14	12	12.5	126.3	25	40	55	1000	-/30/30/-		
2011	4	14	18	12.6	126.3	25	40	55	998	25/30/35/25		
2011	4	15	00	12.7	126.1	20	40	55	998	25/30/35/25		15
2011	4	15	06	12.7	126.0	20	45	65	994	25/30/35/25		12
2011	4	15	12	12.4	125.9	20	45	65	992	25/30/30/25		10
2011	4	15	18	12.1	125.4	20	55	75	988	25/30/30/25	15	8
2011	4	16	00	11.7	125.1	15	65	90	985	25/30/30/25	15	5
2011	4	16	06	11.3	124.8	15	60	85	987	25/30/30/25	15	10
2011	4	16	12	11.0	124.7	20	50	70	990	25/30/30/25	15	10
2011	4	16	18	10.9	124.4	25	50	70	994	25/30/30/25	15	10

Year	Month	Day	Hour UTC	Pos. Lat. S	Pos. Long. E	Pos. Acc. nm	Max Wind 10min kn	Max gust kn	Cent. Press. hPa	Rad. of gales (NE/SE/ SW/NW) nm	Rad. of storm nm	RMW nm
2011	4	17	00	10.8	124.2	25	45	65	995	25/35/35/25		15
2011	4	17	06	10.6	124.2	30	40	55	996	25/35/35/25		15
2011	4	17	12	10.4	124.3	30	35	50	998	20/35/35/20		15
2011	4	17	18	10.2	124.5	30	35	60	998	20/35/35/15		15
2011	4	18	00	10.0	124.4	30	30	45	1000	-	-	-