Australian Government
Bureau of Meteorology

Tropical Cyclone Edna

31 January – 6 February 2014

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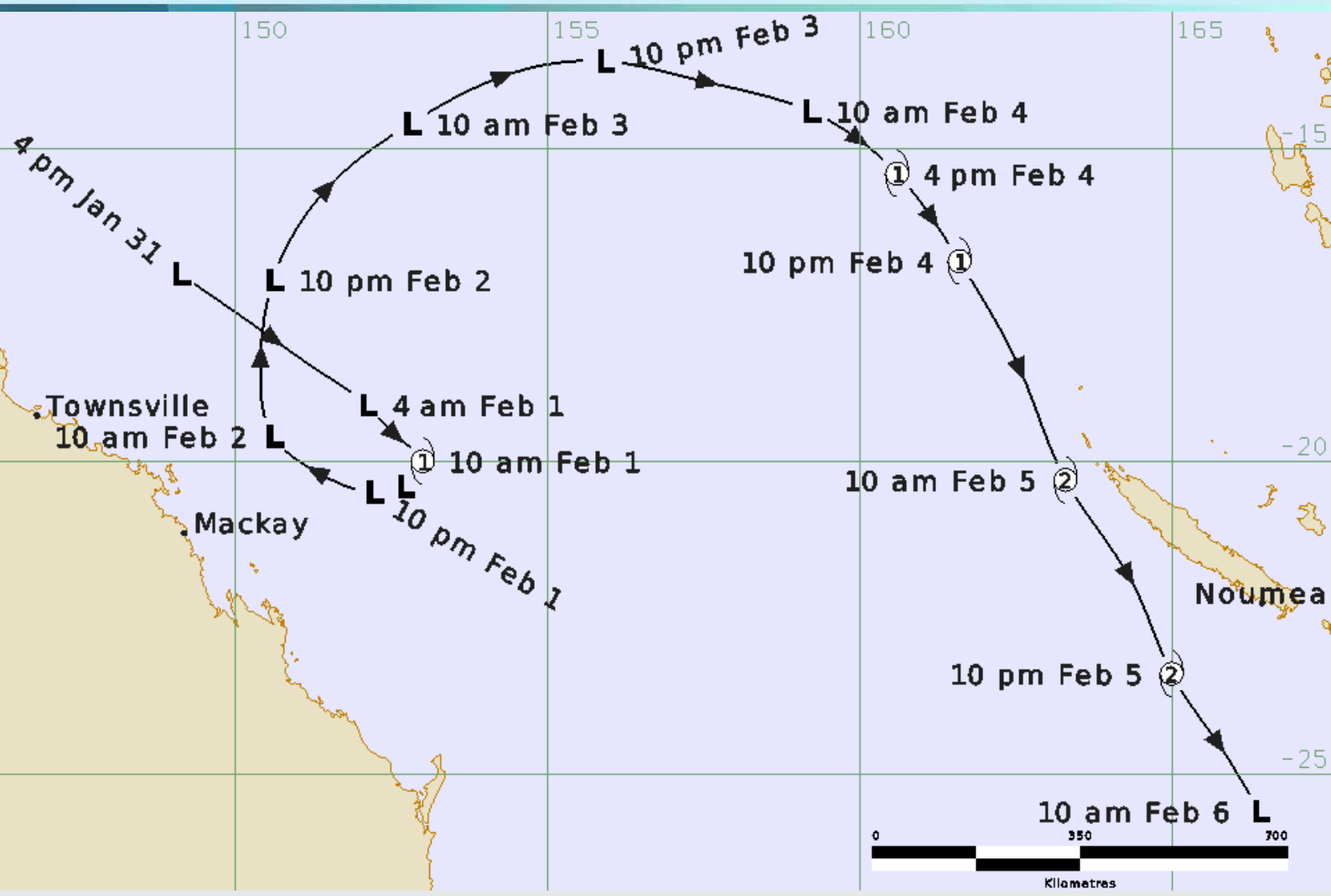

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1. Summary

Tropical Cyclone Edna formed over the Coral Sea and briefly reached category 1 intensity on 1 February before weakening and moving east of the Australian region on 4 February. The cyclone then re-intensified reaching category 2 intensity as it passed west of New Caledonia before weaking on 6 February. The track was quite unusual, initially moving to the southeast then turning through the south then west then north then east and eventually accelerating to the southeast.

Tropical Cyclone Edna was a small system and there were no known impacts from the cyclone in Australian waters.

Figure 1. Best track of Tropical Cyclone Edna 31 January – 4 February 2014 (times in AEST, UTC+10).

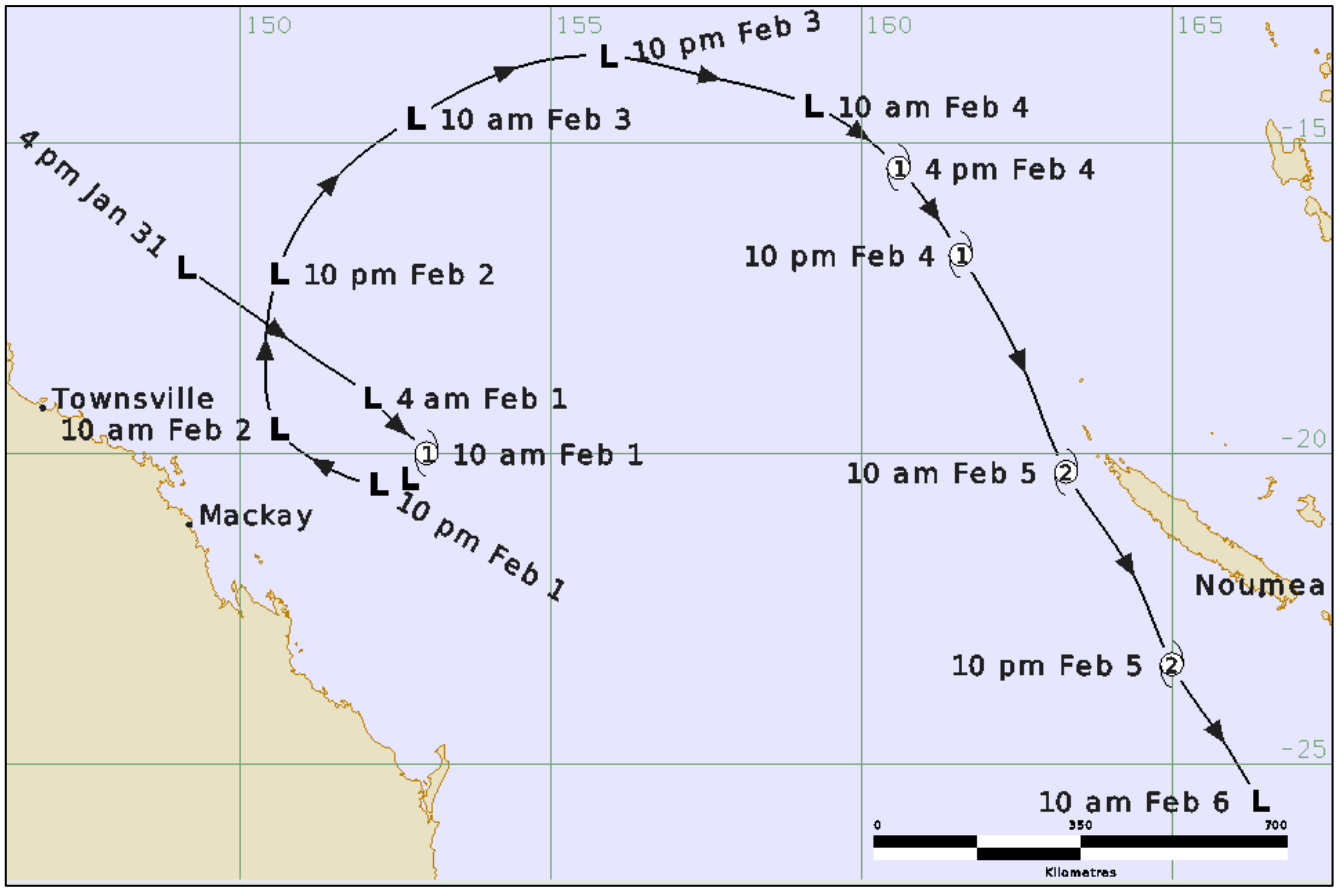
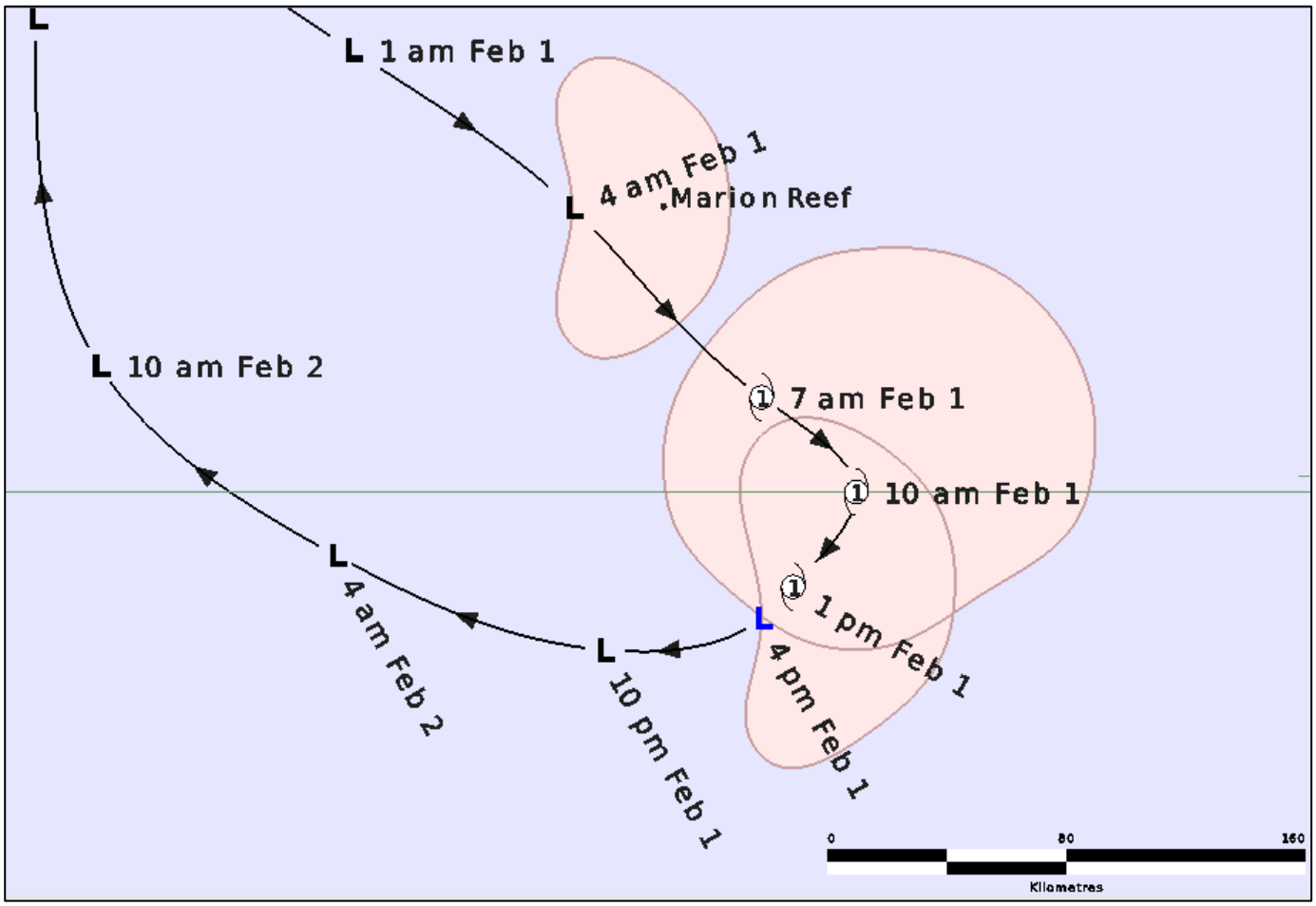


Figure 2. Detailed Best Track of Tropical Cyclone Edna 31 January – 1 February.



2. Meteorological Description

2.1 Intensity analysis

Figure 1 shows the track of Edna while Figure 2 shows a detailed track when it was at tropical cyclone intensity from 31 January to 1 February. Table 1 shows the best track details in tabular form.

A low became evident late on 31 January and then rapidly intensified overnight developing a tight convective banding. An ASCAT-A pass at 1155 UTC 31 January showed a band of winds of 20-25kn northeast of the centre. The subsequent development was quite remarkable. Microwave imagery identified tight curvature from about 14 UTC. Marion Reef reported a period of gales from 1730 to 1930 UTC as the centre passed within 20 km to the west early on 1 February. Gales are estimated from 18 UTC in eastern quadrants extending to more than halfway around the centre at 2100 UTC 31 January to reach tropical cyclone intensity.

The satellite sequence peaks around 0000 UTC 1 February. Figure 4 shows the visible image at 0001 UTC and a near coincident microwave image at 0024 UTC that depict a small and tight circulation.

Deep convection weakened quite rapidly during the diurnally unfavourable daytime period on 1 February. Gales are estimated to have contracted to just eastern quadrants at 0600 UTC then ceasing by 1200 UTC. Deep convection then occasionally reformed close to the centre overnight into the 2 February. Being a small system, it is possible that gales occurred at times but overall the system remained below tropical cyclone intensity after 0600 UTC 1 February. ASCAT passes around 1200 UTC 2 February confirmed that winds had weakened significantly.

Overnight from 3 to 4 February, the circulation accelerated to the east-south-east. Gales are estimated in the northeast quadrant at 0000 UTC 4 February, just prior to the circulation moving east of 160E and outside the Australian area of responsibility. Figure 4 is a visible image at 0600 UTC when it is estimated that Edna once again reached tropical cyclone intensity in a low wind shear environment. Edna continued to develop as it moved quickly to the south-east into 5 February. The ASCAT images round 12UTC 4 February showed gales around the circulation particularly in the northeast quadrant.

An eye appeared on microwave imagery (AMSR2 at 1425 UTC) suggesting further intensification. Deep convection rapidly weakened under increasing wind shear late on 5 February and weakening below tropical cyclone intensity is estimated on the morning of 6 February.

2.2 Structure

Tropical Cyclone Edna was a very small system. The extent of gales was 30-50 nm to the northeast of the centre and less in other quadrants on the order of 20-40 nm (35-75 km). The radius of maximum winds (RMW) was on the order of 10-15 nm (20-30 km).

2.3 Motion

The circulation was initially steered to the southeast under the influence of the monsoonal flow. A strengthening sub-tropical ridge to the southwest was then responsible for the turn to the west, and then combined with a slow-moving broad trough to the east to steer the circulation to the northwest on 2 February. The ridge weakened and the circulation moved around the top of the trough to accelerate to the east then southeast on 3 and 4 February.

Table 1. Best Track details of Tropical Cyclone Edna.

Refer to the Australian Tropical Cyclone database for complete listing of parameters and refer to Nadi RSMC (Fiji Met. Service) for official information east of 160°E.
Note: UTC is AEST – 10 hours.
*Not at tropical cyclone intensity using Australian definition as gales in two or less quadrants.

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)	Rad. of storm (NE/SE/ SW/NW)	RMW nm
2014	1	31	0600	17.0	149.1	50	20	40	1003	0/0/0/0	0/0/0/0	-
2014	1	31	1200	17.9	150.4	30	25	40	1003	0/0/0/0	0/0/0/0	-
2014	1	31	1500	18.6	151.4	30	25	45	1001	0/0/0/0	0/0/0/0	-
2014	1	31	1800	19.1	152.1	25	35*	50	997	30/30/0/0	0/0/0/0	-
2014	1	31	2100	19.7	152.7	20	35	50	997	30/30/0/30	0/0/0/0	15
2014	2	1	0000	20.0	153.0	20	40*	55	994	50/30/30/40	0/0/0/0	10
2014	2	1	0300	20.3	152.8	45	40*	50	994	50/30/20/30	0/0/0/0	10
2014	2	1	0600	20.4	152.7	30	35*	50	995	40/30/0/0	0/0/0/0	10
2014	2	1	1200	20.5	152.2	30	30	45	996	0/0/0/0	0/0/0/0	-
2014	2	1	1800	20.2	151.4	30	30	45	997.5	0/0/0/0	0/0/0/0	-
2014	2	2	0000	19.6	150.6	25	25	45	1000	0/0/0/0	0/0/0/0	-
2014	2	2	0600	18.5	150.4	25	25	45	998	0/0/0/0	0/0/0/0	-
2014	2	2	1200	17.1	150.6	30	25	45	998	0/0/0/0	0/0/0/0	-
2014	2	2	1800	15.5	151.6	20	25	45	998	0/0/0/0	0/0/0/0	-
2014	2	3	0000	14.6	152.8	25	25	45	998	0/0/0/0	0/0/0/0	-
2014	2	3	0600	13.8	154.4	25	25	45	996	0/0/0/0	0/0/0/0	-
2014	2	3	1200	13.6	155.9	25	30	45	998	0/0/0/0	0/0/0/0	-
2014	2	3	1800	13.9	157.4	25	30	45	998	0/0/0/0	0/0/0/0	-
2014	2	4	0000	14.4	159.2	25	35	45	996	40/0/0/0	0/0/0/0	-
2014	2	4	0600	15.4	160.6	25	40	55	993	40/20/0/20	0/0/0/0	20
2014	2	4	1200	16.8	161.6	25	45*	65	990	40/20/0/25	0/0/0/0	20
2014	2	4	1800	18.6	162.6	25	50*	70	988	40/30/20/30	20/20/0/0	15
2014	2	5	0000	20.3	163.3	25	50*	70	986	40/30/20/30	20/20/0/0	15
2014	2	5	0600	22.0	164.4	25	50*	70	985	40/30/20/30	20/20/0/0	15
2014	2	5	1200	23.4	165.0	25	50	70	986	40/40/20/30	25/20/0/0	20
2014	2	5	1800	24.6	165.8	25	40*	55	992	40/40/0/30	0/0/0/0	20
2014	2	6	0000	25.6	166.4	25	30	45	996	0/0/0/0	0/0/0/0	-

Figure 3. Visible image at 0001 UTC 1 February (left) and TMI 85 GHz microwave image at 0024 UTC 1 February (right), when Edna near peak intensity. The 'x' marks the centre location. The lines are spaced every two degrees (220 km).

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

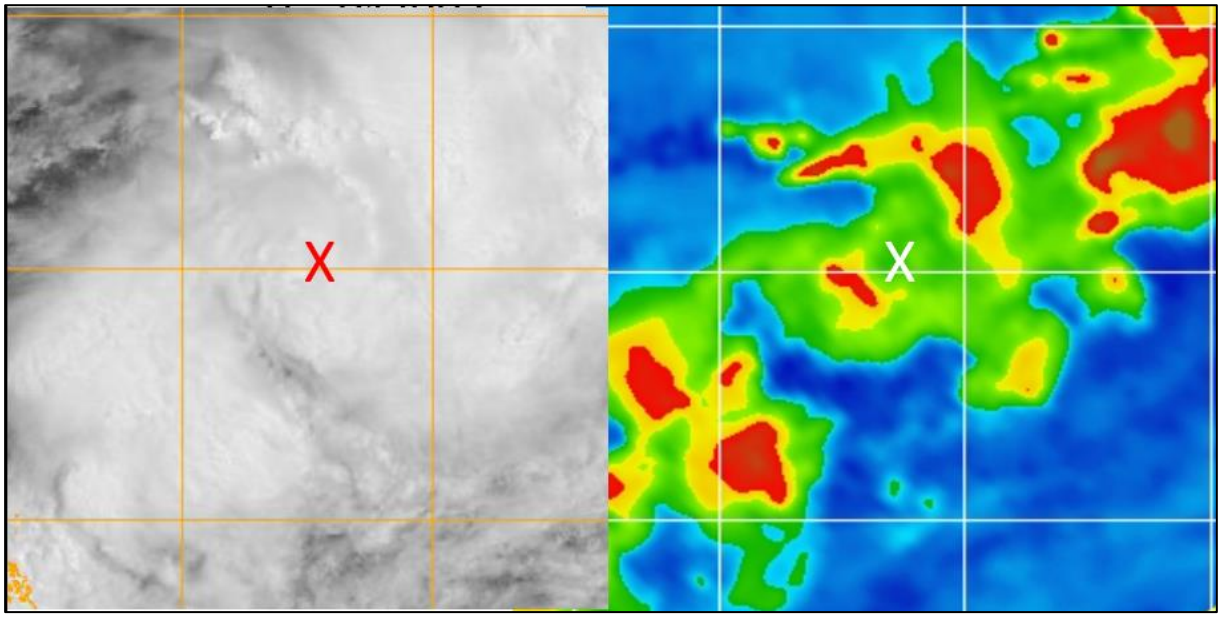
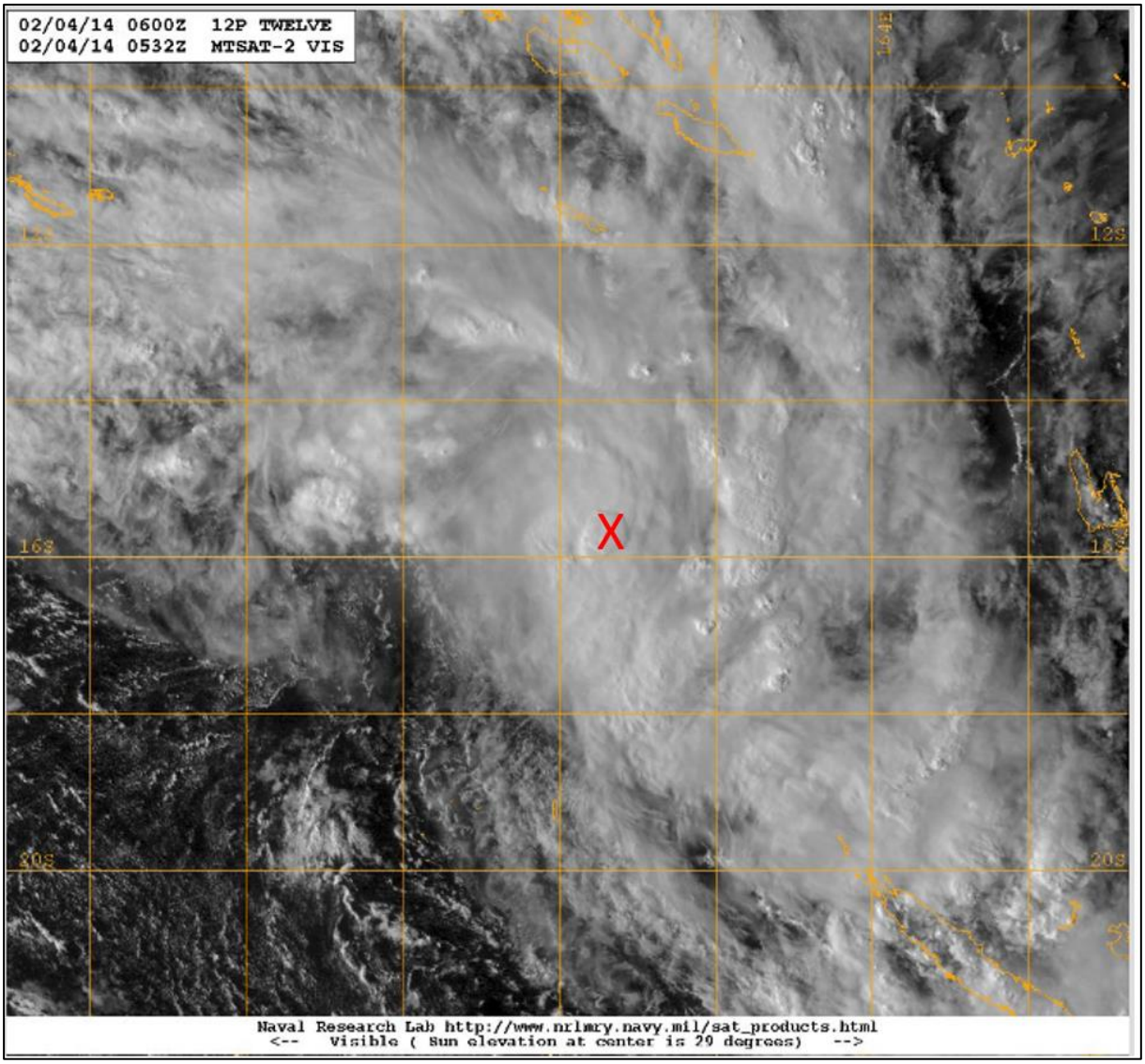


Figure 4. Visible image at 0532 UTC 4 February when Edna re-intensified into a tropical cyclone just east of the Australian area of responsibility. The 'x' mark the centre location.

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



3. Impact

There were no known impacts from Tropical Cyclone Edna in Australian waters.

4. Observations

Marion Reef reported a period of gales between 0330 and 0530 AEST and a maximum wind gust of 100 km/h (54 kn) at 5:00am AEST).

5. Forecast Performance

Official tropical cyclone forecasts were issued from 0000 to 1200 UTC 1 February and then again from 0400 to 1200 UTC 3 February. There were no tropical cyclone advices (Watch or Warning) issued during the event.

The first Ocean Wind Warning was issued when Edna was first named.

Overall, computer models struggled to resolve the circulation and failed in picking the initial intensification period. Some tracks also struggled with the motion and this resulted in higher than average forecast track errors.

The accuracy figures for Edna in the table below and in Figures 8 and 9 show that the forecast position were slightly above the five-year average until 48h lead time. The intensity forecast errors were below the five-year average.

	0	6	12	18	24	36	48	72	96	120
Position Absolute error (km)	43	59	86	116	142	169	191	197	351	0
Intensity Absolute error (kn)	2.9	2.1	4.6	5.0	6.1	3.6	5.0	9.4	20.6	0.0
Sample Size	7	7	7	7	7	7	7	4	4	0

Figure 5. Position accuracy figures for Tropical Cyclone Edna.

Note: no data presented for 120h lead time as insufficient data.

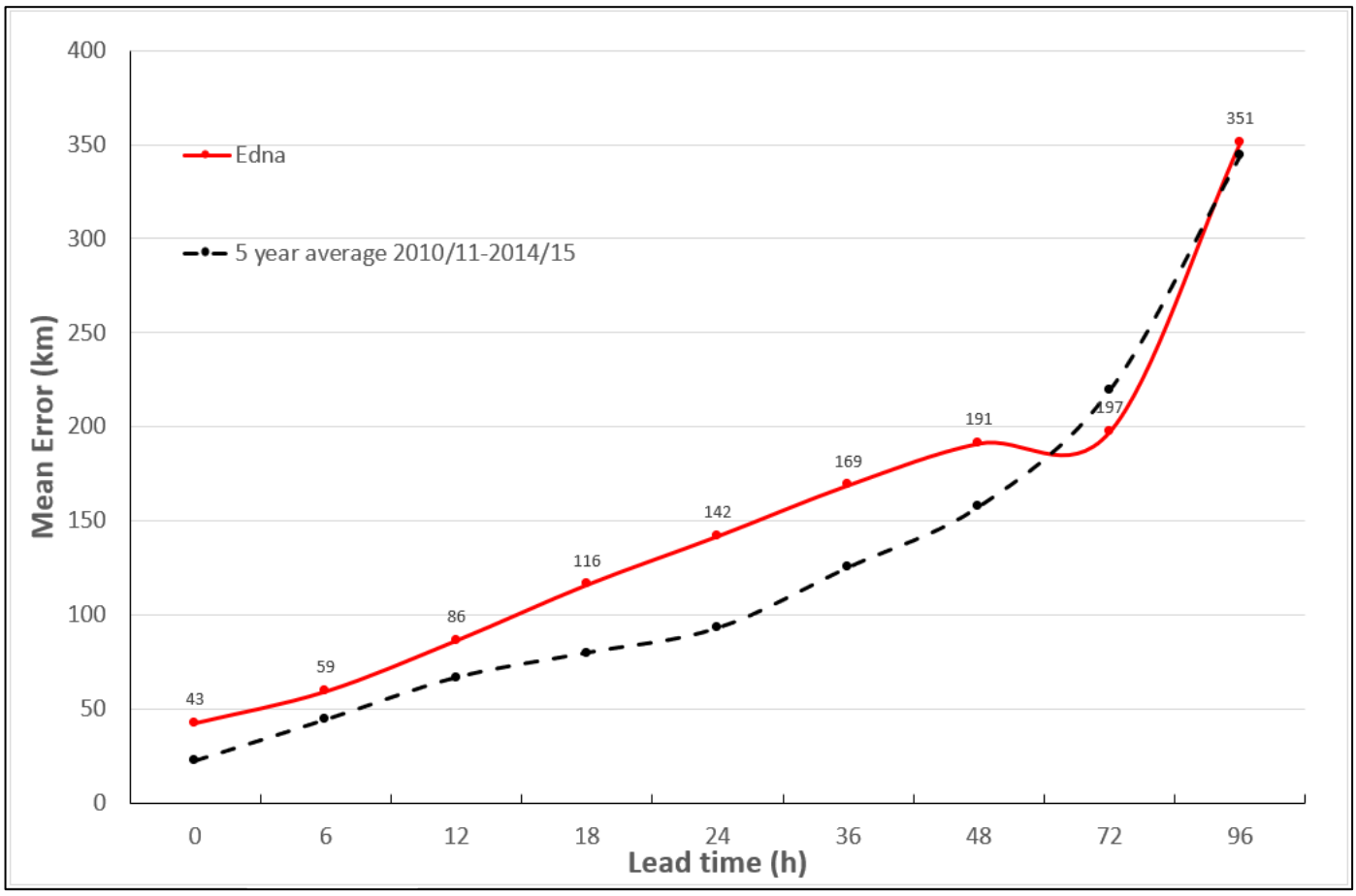
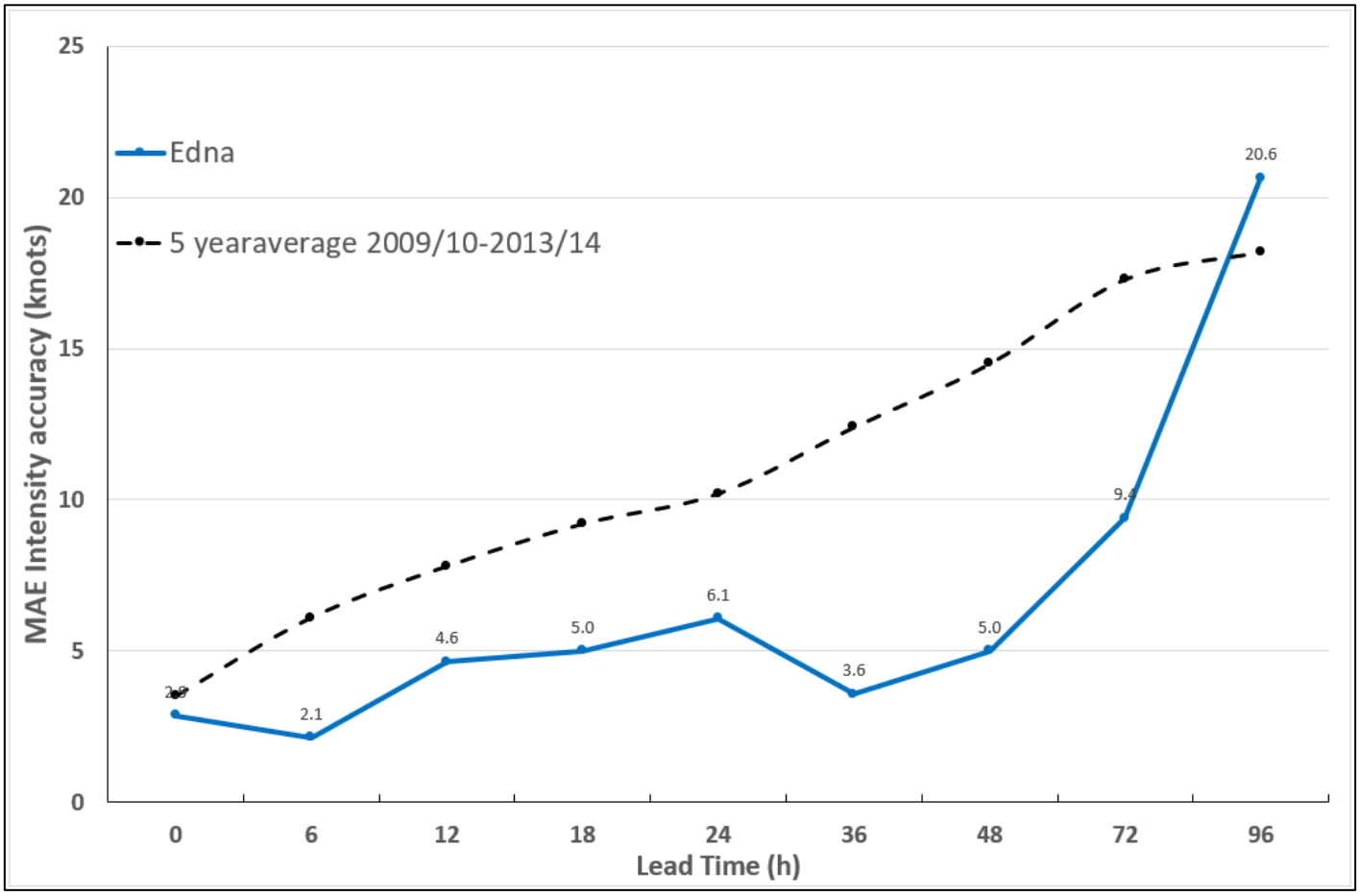


Figure 6. Intensity accuracy figures for Tropical Cyclone Edna.

Note: no data presented for 120h lead time as insufficient data.



6. Appendix: List of abbreviations

ADT	Advanced Dvorak Technique	km/h	kilometres per hour
ACST	Australian Central Standard Time	kn	knot
AEST	Australian Eastern Standard Time	LLCC	low level cloud centre
AMSR2	Advanced Microwave Scanning Radiometer	MET	Model Expected T-number
ASCAT	Advanced Scatterometer	METOP	Meteorological Operational Satellite
ATMS	Advanced Technology Microwave Sounder	MJO	Madden-Julian Oscillation
AWS	automatic weather station	mm	millimetres
AWST	Australian Western Standard Time	MSLP	mean sea level pressure
C	Celsius	nm	nautical mile
CI	Current intensity	NOAA	National Oceanic and Atmospheric Administration
CIMSS	Cooperative Institute for Meteorological Satellite Studies (USA)	NRL	Navy Research Lab (USA)
CIRA	Cooperative Institute for Research in the Atmosphere (USA)	PAT	Pattern T-number
EIR	Enhanced InfraRed	RH	relative humidity
ERC	eyewall replacement cycle	RMW	radius of maximum winds
FNMOC	Fleet Numerical Meteorology and Oceanography Centre (USA)	RSMC	Regional Specialised Meteorological Centre
FT	Final T-number	SAR	Synthetic Aperture Radar
GCOM	Global Change Observation Mission	SATCON	satellite Consensus
GHz	Gigahertz	SMAP	Soil Moisture Active Passive
GMI	Global Precipitation Measurement Microwave Imager	SMOS	Soil Moisture and Ocean Salinity
h	hour	SSMIS	Special Sensor Microwave Imager/Sounder
hPa	hectopascal	TC	Tropical Cyclone
HSCAT	Hai Yang 2 Scatterometer (HY-2B, HY-2C)	TCWC	Tropical Cyclone Warning Centre
km	kilometres	UTC	Universal Time Co-ordinated