



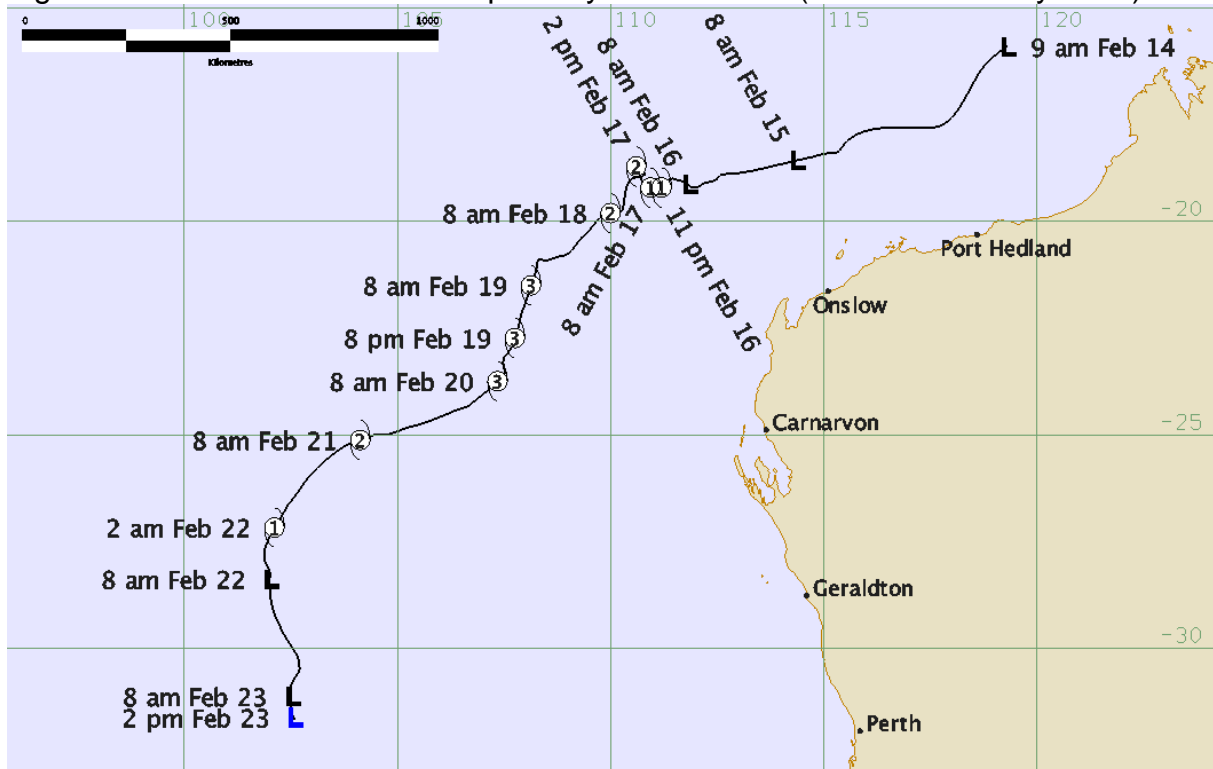
Severe Tropical Cyclone *Dianne*
14 – 22 February 2011

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A. Summary

A tropical low formed in an active monsoon trough during 14 February, well to the west of the Kimberley coast. The low moved in a west-southwest direction, parallel to the Pilbara coast and slowly intensified. It reached tropical cyclone intensity late on 16 February and then drifted slowly north. The tropical cyclone was then steered in a general southwesterly direction, away from the West Australian coastline. *Dianne* peaked at Category 3 intensity before weakening early on 20 February as it moved over cooler waters and experienced increased wind shear. *Dianne* weakened below tropical cyclone intensity early on 22 February. Though Tropical Cyclone Advises were issued for parts of the Pilbara and Gascoyne coastline, *Dianne* did not cause any damage to Western Australian communities.

Figure 1: Best track of Severe Tropical Cyclone *Dianne* (14 – 23 February 2011)



B. Meteorological Description

Intensity analysis

Some weak cloud bands were apparent on visible (VIS) satellite imagery early on 14 February. Within 24 hours the bands had become more organised with stronger curvature evident. During the overnight period 15-16 February the cloud patterns appeared sheared with a sharp temperature gradient evident on infrared (IR) imagery. The Cooperative Institute for Meteorological Satellite Studies (CIMSS) wind shear product indicated about 10-20 knots (kn) (19 – 37 kilometres per hour (km/h)) of easterly shear present over the tropical low. During 16 February the low level circulation centre (LLCC) was well separated from the cold convection. Overnight the separation decreased and by 1500 UTC (Universal Time Coordinated) (2300 WST = UTC+8 hours) 16 February the tropical low reached tropical cyclone strength.

During 17 and 18 February *Dianne* was hindered by approximately 20 kn (37 km/h) of easterly shear and intensity remained steady. Early on 19 February *Dianne* began to intensify and an eye pattern became apparent. CIMSS analyses showed wind shear had decreased to less than 10 kn (19 km/h) at this time but unusually, the system was located over water cooler than 26°C (refer Figure 3). *Dianne* reached a peak intensity of 75 kn (139 km/h) 10-minute mean wind at 1200 UTC 19 February (refer Figure 2). Dvorak re-analysis showed the tropical cyclone reached a peak Dvorak Data T-Number (DT) of 5.0 (Off-white (OW) eye in Light Grey(LG) surround with no adjustment) as late as 1000 UTC 20 February. The 24 hour trend being applied at this time was slight weakening, the pattern looked similar but there was less cold cloud present than previously. When consideration was given to other intensity analysis estimates such as (Satellite Consensus (SATCON) and Advanced Microwave Sounding Unit (AMSU) the final intensity assigned at this time was adjusted down (refer Figure 4).

As *Dianne* moved further south over cooler waters and experienced increased wind shear it weakened quickly. The eye pattern disappeared about 1700 UTC 20 February and *Dianne* was downgraded below tropical cyclone strength by 0000 UTC 22 February. By this time there was an exposed LLCC with a large separation from a small amount of cold convection in the south-western quadrant.

Motion

Dianne was initially steered west-southwest by a mid-level ridge which was located through central parts of Australia. During 16 February the ridge split as a high latitude trough moved south of Australia and the tropical cyclone drifted slowly west before executing a loop during 17 February. *Dianne* appeared to be under the influence of the remains of the high latitude trough during 18 and 19 February with a narrow ridge located to the east. The tropical cyclone was steered in a general southwest direction. By 20 February the mid-level steering pattern was complicated with a ridge over central parts of Australia, a second developing tropical cyclone over the Kimberley and an intensifying mid-level low over the southwest corner of Western Australia. *Dianne* appeared to be pushed in a westerly direction during 20 February by a relative ridge between it and the deepening mid-level low. An approaching mid-level trough on 21 February steered *Dianne* in a southerly direction ahead of it until it weakened below tropical cyclone strength.

Structure

In the early stages *Dianne* was influenced by 20 to 30 kn (37 – 55 km/h) of easterly wind shear. Despite imagery showing a well developed curved band structure the low level centre was displaced to the east of the mid level system. Early on 19 February the tropical cyclone became vertical and symmetric with a clear eye pattern. The eye pattern was maintained until early on 21 February. Once *Dianne* moved over cooler waters and came under the influence of increasing wind shear the LLCC became exposed with cold convection confined to the south west quadrant.

C. Impact

Dianne had no direct impact on Western Australian communities. However, some of the outer spiral banding affected offshore island communities with Varanus Island recording a 49 kn (91 km/h) gust during 15 February.

D. Observations

No gales or significant rainfall were recorded.

E. Forecast Performance

The first Tropical Cyclone Advice was issued at 0700 UTC 15 February for coastal communities from Onslow to Coral Bay. By 0700 UTC 16 February this area had been extended south to Cape Cuvier. At 0100 UTC 17 February this was again extended to Overlander Roadhouse. This area was gradually contracted west until Tropical Cyclone Advices were cancelled at 1300 UTC 18 February.

Table 1. Best track summary for Severe Tropical Cyclone *Dianne*.
Refer to the Australian Tropical Cyclone database for complete listing of parameters.

Year	Month	Day	Hour (UTC)	Position Latitude S	Position Longitude E	Position Accuracy nm	Max wind 10min knots	Max gust knots	Central Pressure hPa	Rad. of Gales # nm	Rad. of storm force winds nm	Radius Max. Wind ^ (RMW) nm
2011	2	14	06	16.6	118.6	60	20	45	1000			
2011	2	14	12	17.8	117.5	60	20	45	1000			
2011	2	14	18	18.3	115.4	60	25	45	1000			
2011	2	15	00	18.6	114.4	60	25	45	1000			
2011	2	15	06	18.9	112.7	30	25	45	1000			
2011	2	15	12	19.1	112.2	30	25	45	1000			
2011	2	15	18	19.2	112.0	30	30	45	996			
2011	2	16	00	19.1	111.8	30	30	45	996			
2011	2	16	06	19.0	111.6	30	30	45	996			
2011	2	16	12	19.0	111.4	30	30	45	996			
2011	2	16	15	19.2	111.2	30	35	50	993	90		30
2011	2	16	18	19.2	111.1	15	40	55	990	90		20
2011	2	17	00	19.2	110.9	30	45	65	985	90		15
2011	2	17	06	18.7	110.6	15	50	70	983	90	20	15
2011	2	17	12	18.9	110.6	20	50	70	978	90	20	10
2011	2	17	18	19.5	110.3	30	50	70	978	90	20	20
2011	2	18	00	19.8	110.0	20	50	70	978	90	20	15
2011	2	18	06	20.3	109.4	10	50	70	978	90	20	10
2011	2	18	12	20.8	108.8	10	50	70	978	90	20	15
2011	2	18	18	20.9	108.3	15	55	75	976	90	20	15
2011	2	19	00	21.5	108.1	10	65	90	970	110	30	10
2011	2	19	06	22.2	107.9	10	70	100	966	110	30	10
2011	2	19	12	22.7	107.8	15	75	105	961	90	30	10
2011	2	19	18	23.2	107.5	10	75	105	960	120	30	10
2011	2	20	00	23.7	107.3	15	70	100	963	90	30	10
2011	2	20	06	24.2	106.8	10	70	100	963	90	25	10
2011	2	20	12	24.6	106.0	10	65	90	967	70	25	10
2011	2	20	18	24.9	105.1	10	65	90	968	70	25	10
2011	2	21	00	25.1	104.1	15	60	85	976	65	20	20
2011	2	21	06	25.8	103.1	15	50	70	983	70	15	20
2011	2	21	12	26.5	102.5	15	40	55	988	65		25
2011	2	21	18	27.2	102.1	20	35	50	990	65		30
2011	2	22	00	28.4	102.0	20	30	45	994			
2011	2	22	06	29.5	102.2	20	25	45	997			
2011	2	22	12	30.4	102.7	15	25	45	998			
2011	2	22	18	30.9	102.5	20	20	45	998			
2011	2	23	00	31.1	102.5	20	20	45	999			
2011	2	23	06	31.6	102.6	20	20	45	1000			

#Average of non-zero quadrants.

^Minimum distance to maximum mean wind in any quadrant.

Figure 2. Microwave (Tropical Cyclone Special Sensor Microwave Image Sounder 91GHz) image at 1058 UTC 19 February. Image courtesy of US NRL: <http://www.nrlmry.navy.mil/>

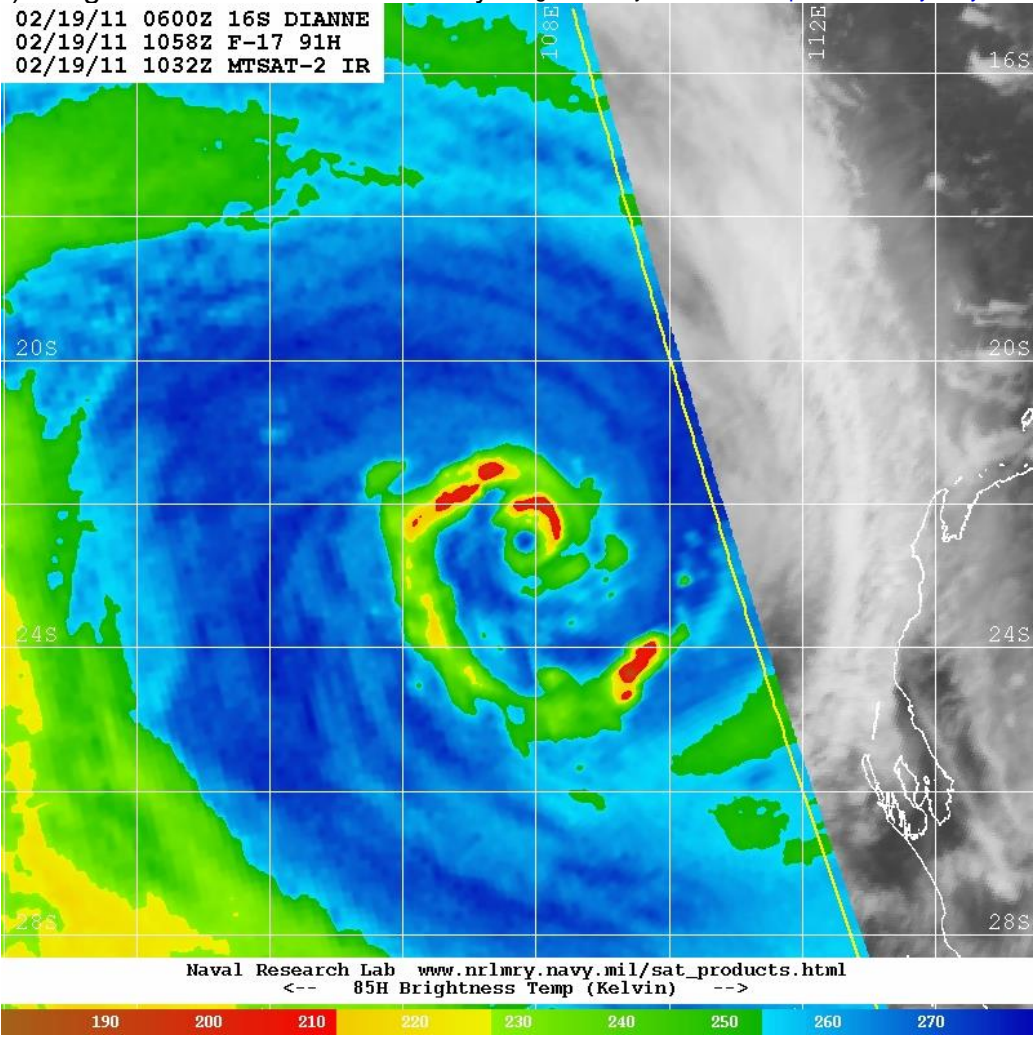


Figure 3. Sea surface Temperatures for 19 February 2011

(image courtesy of NOAA/AOML NRL: <http://www.aoml.noaa.gov/phod/dataphod1/work/HHP/NEW/2011050ausst.png>)

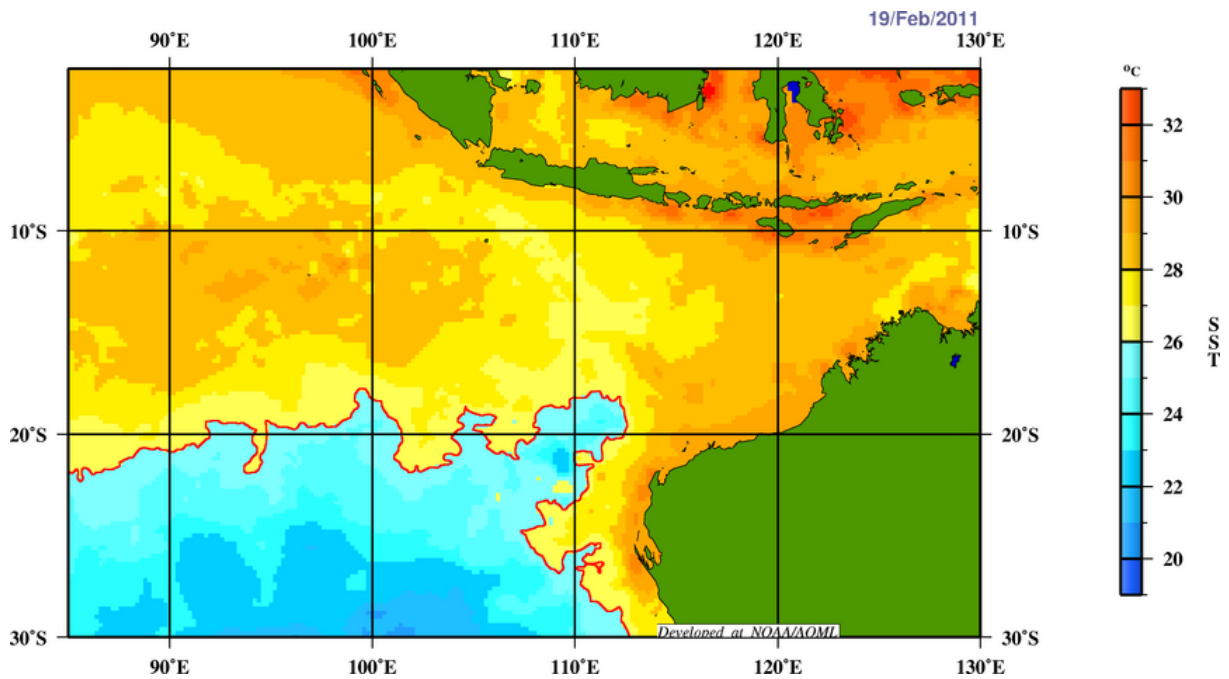


Figure 4. Comparison of objective and subjective intensity analysis techniques.

