



Australian Government
Bureau of Meteorology

Tropical Cyclone *Rosie*, 20-24 April 2008

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A. Summary

Rosie was a small cyclone that developed rapidly overnight from 21 to 22 April quickly reaching category 2 intensity before weakening as it passed near Christmas Island.

The most significant impact was the heavy swell at high tide at the port area of Christmas Island at about 0000 UTC on 22 April. The Harbour master reported waves of 5-7 m that damaged some facilities on the shore and tore a long-line mooring from its anchor.

This was the first tropical low monitored by the newly established Jakarta Tropical Cyclone Warning Centre (TCWC). While it was named by Perth TCWC once it moved south of 10°S, the reanalysis shows it reached cyclone intensity just north of 10°S in Jakarta TCWC's area of responsibility.

B. Meteorological Description

Intensity analysis

Convection about the monsoon trough was very active on 18 and 19 April with vigorous NW winds to the north. Quikscat showed an elongated trough during this period. Convection became more sustained and organised during 21 April and AScat at 0221 UTC showed 30 knot winds to the southwest, then the Quikscat at 1054 UTC showed gales evident to the southwest. The maximum intensity at 21/1200 UTC is given at 35 knots but system rated below TC intensity based upon the QScat evidence. Subsequently, a strengthening curved band pattern emerged and TC intensity is estimated at 21/1500 UTC when the Dvorak DT Curved Band pattern was estimated at 0.9 degree wrap on the IR image.

Development peaked at 22/0000 UTC when a clear eye became evident on microwave imagery (see Figure 2) and a ragged eye was briefly discernible on the 21/2330 UTC IR image. *Rosie* was estimated at 50 knot intensity on the basis of Dvorak FT=3.5 (category 2) and the 21/2327 UTC QScat image and AScat 22/0200 UTC. The estimated DT of 3.5 at 1800 UTC and 4.0 at 22/0000 UTC are 0.5 higher than the corresponding CI. Potentially *Rosie* was a case where the maximum winds increased faster than the Dvorak rules allow especially given its small size. It is also possible that the QScat could not resolve the maximum winds.

Gales were briefly observed at Christmas Island some 53 nm to the east of the LLCC. This corresponded with the high tide causing a considerable impact to the Port facilities as described below.

As dramatically as *Rosie* developed overnight, so did it weaken by day. During 22 April convection weakened dramatically and the low level circulation became devoid of convection.

The LLCC passed just south of Christmas Island just after 22/1200 UTC. Christmas Island registered just 33 knots at 22/1100 UTC but as the AWS is somewhat sheltered in northwesterlies it is likely that gales occurred at more exposed parts of the island. As winds shifted to the southwest a maximum of 36 knots was recorded (10-minute mean) just after 22/1600 UTC. Given that only hourly observations were available it is possible that higher winds occurred and hence the maximum intensity is estimated at 40 knots. The pressure fell to 994.8 hPa at 22/1200 UTC on the hourly observations. Given the close proximity of the LLCC at this time, this is in agreement with the derived 993 hPa pressure from the modified Knaff-Zehr wind-pressure relationship. In contrast the Atkinson-Holliday equivalent was 988 hPa for a 40 knot maximum wind intensity.

Convection subsequently redeveloped overnight after about 22/1500 UTC but failed to become sustained or organised. By 23/0000 UTC convection was displaced to the southeast of the centre. Gales were only evident in the SE quadrant and hence the system was downgraded below TC intensity despite Dvorak CI still rated at 3.0 and the maximum intensity estimated at 35 knots. At 23/0600 UTC, the LLCC was located under some sustained convection indicating that gales may extend more than 50 per cent about the centre.

The AScat 23/1413 UTC pass clearly does not show gales. By 23/1800 UTC convection was displaced to the east of the LLCC, and while the Dvorak CI is still maintained at 3.0 on the basis of the proximity of the LLCC to the convection (using shear pattern), the intensity is rated at 30 knots. During 24 April convection weakened and the circulation became ill-defined.

Motion

A low formed within an active monsoon trough on 20 April well to the north of Cocos Island and moved in a general east southeast direction in the following days reaching tropical cyclone intensity. The 500 hPa flow shows a vigorous NW flow associated with a deep mid-latitude low and the monsoon. Following peak intensity being attained early on 22 April *Rosie* slowed and moved to the east in response to a deeper steering level. Following subsequent weakening it then moved to the south southeast.

Structure

Rosie was a small TC with gales being only on the order of 40-70 nm from the centre. Initially the combination of the strong NW monsoon and storm motion combined to produce 30 knot winds some distance from the centre, however the gales were most evident in southern quadrants owing to the extent of the convection.

The combination of the tight low-level circulation with convection during the overnight period provided the impetus for rapid development. The radius of maximum winds was estimated at about 15 nm although this did increase during the weakening phase. At peak intensity microwave imagery indicated an eye diameter of about 15 nm. Being of small size, *Rosie* was prone to weakening with unfavourable upper level winds that appear to have occurred during 22 April.

C. Impact

The most significant impact was the heavy swell at high tide at the port area of Christmas Island. The Harbour master reported waves of 5-7m that damaged some facilities on the shore and tore a long-line mooring from its anchor. See Figure 3.

Fortunately *Rosie* weakened in intensity before it passed near to Christmas Island at 22/1200 UTC.

D. Observations

Wind/Pressure

Christmas Island AWS registered a minimum pressure of 994 hPa as *Rosie* passed by at 22/1200 UTC. Winds reached 33 knots prior to the passage. As the AWS is somewhat sheltered in northwesterlies it is likely that gales occurred at more exposed parts of the island. As winds shifted to the southwest a maximum of 36 knots was recorded (10-minute mean). Given that only hourly observations were available it is possible that higher winds occurred. Fortunately this coincided with a minimum in convection otherwise winds are likely to have been significantly higher.

Rainfall

Despite the potential for very heavy rainfall, Christmas Island registered only 33.2 mm between 21/1300 UTC to 22/0000 UTC and then another 19.6 mm from 22/1500 to 2300 UTC.

E. Forecast Performance

A watch was issued for Christmas Island at 15:00 WST 20 April when the tropical low was some 960 km to the west northwest. This was upgraded to a warning at 15:15 WST 21 April as the low moved closer and a Blue Alert was issued by the Christmas Island Emergency Management Committee. The alert was upgraded to Yellow when the tropical cyclone was named *Rosie* at 08:00 WST 22 April, at which stage large waves were impacting the island's port area. The warning was cancelled at 14:00 WST, although a Blue alert remained in force for some time later.

Operationally the system was not named *Rosie* until it moved south of 10S into Perth TCWC's area of responsibility at 22/0000 UTC. Prior to this time Jakarta TCWC (BMG) had official responsibility for the system.

Table 1. Best track summary for Tropical Cyclone *Rosie*.

Year	Month	Day	Hour (UTC)	Position Latitude S	Position Longitude E	Position Accuracy nm	Max wind 10-min knots	Max gust knots	Central Pressure hPa	Rad. of Gales nm	Rad. of storm force winds	Radius Max. Wind (RMW)
2008	4	20	12	8.5	97.7	60	25	45	1000			
2008	4	20	18	8.5	99.0	50	30	45	1000			
2008	4	21	00	8.7	100.3	40	30	45	998			
2008	4	21	06	8.8	101.6	30	30	45	998			
2008	4	21	12	9.2	102.8	25	35	50	997			15
2008	4	21	15	9.7	103.2	25	40	55	995	40		15
2008	4	21	18	10.0	103.9	25	45	65	992	50		15
2008	4	22	00	10.6	104.8	15	50	70	988	57.5	20	15
2008	4	22	06	10.6	105.1	20	50	70	988	47.5	17.5	15
2008	4	22	12	10.5	105.6	15	40	55	993	37.5		15
2008	4	22	18	10.7	106.1	25	40	55	993	37.5		15
2008	4	23	00	11.1	106.4	20	35	50	996			20
2008	4	23	06	11.6	106.6	25	35	50	996	30		20
2008	4	23	12	12.4	106.7	25	35	50	997			25
2008	4	23	18	13.0	106.4	25	30	45	999			
2008	4	24	00	13.7	105.9	25	30	45	999			
2008	4	24	06	14.9	105.8	40	25	40	1000			

Note: At 1200 UTC 21 April, 0000 UTC 23 April and 1200 UTC 23 April, the maximum wind is 35 knots, however no radius of gale value is entered as gales only occurred in one or two quadrants. As gales are required to extend more than half way around the centre to be called a tropical cyclone in the Australian region, the system is below tropical cyclone intensity at these times.

Table 2. Tropical Cyclone Advice summary for Tropical Cyclone *Rosie*.

Date/Time (WST)	Action	Location
20 April 1500 WST	TC Watch issued	Christmas Island
21 April 1515 WST	TC Warning issued	Christmas Island
22 April 1400 WST	TC Warning cancelled	Christmas Island

Figure 1. Track of Tropical Cyclone *Rosie*.

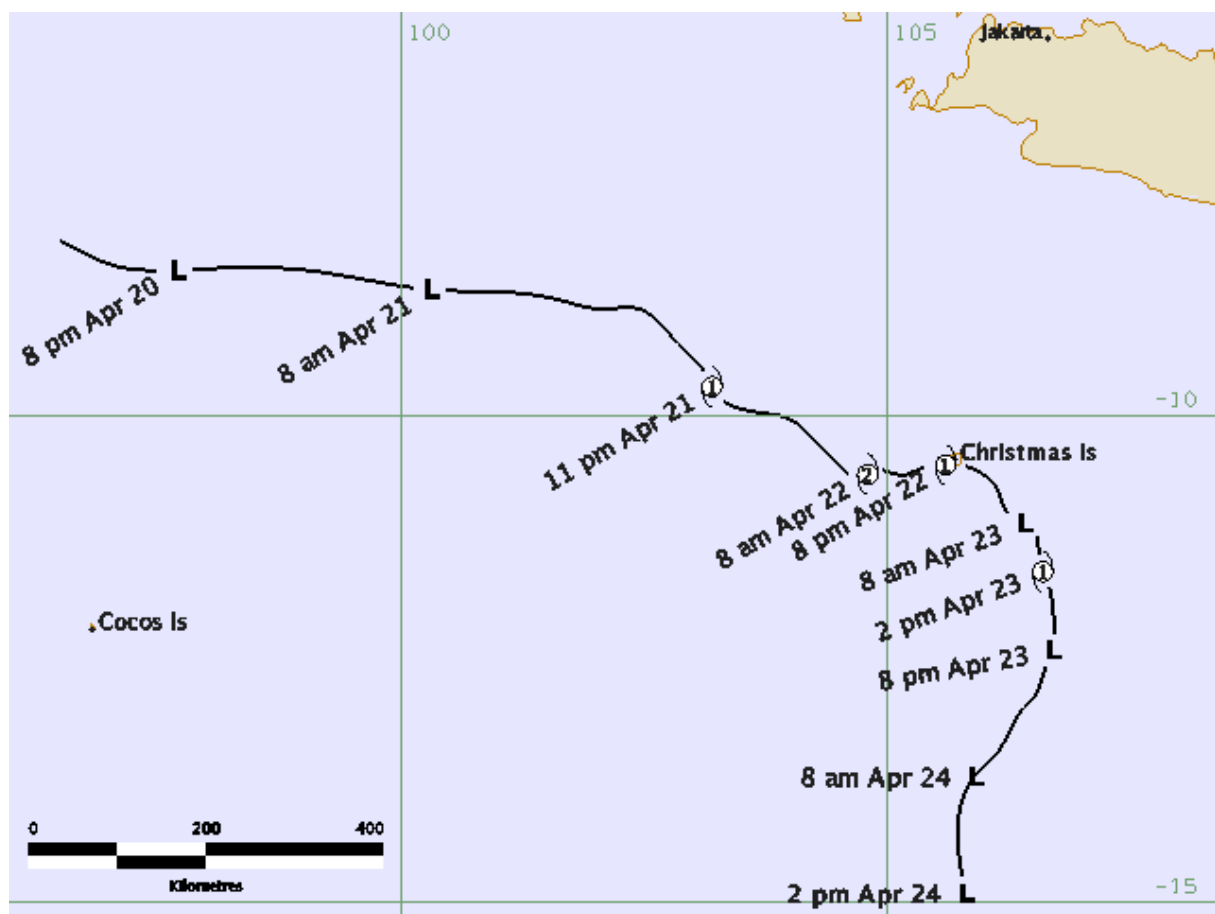


Figure 2. SSM/I 85GHz microwave image at 21/2354 UTC.

(image courtesy of US NRL: <http://www.nrlmry.navy.mil/>)

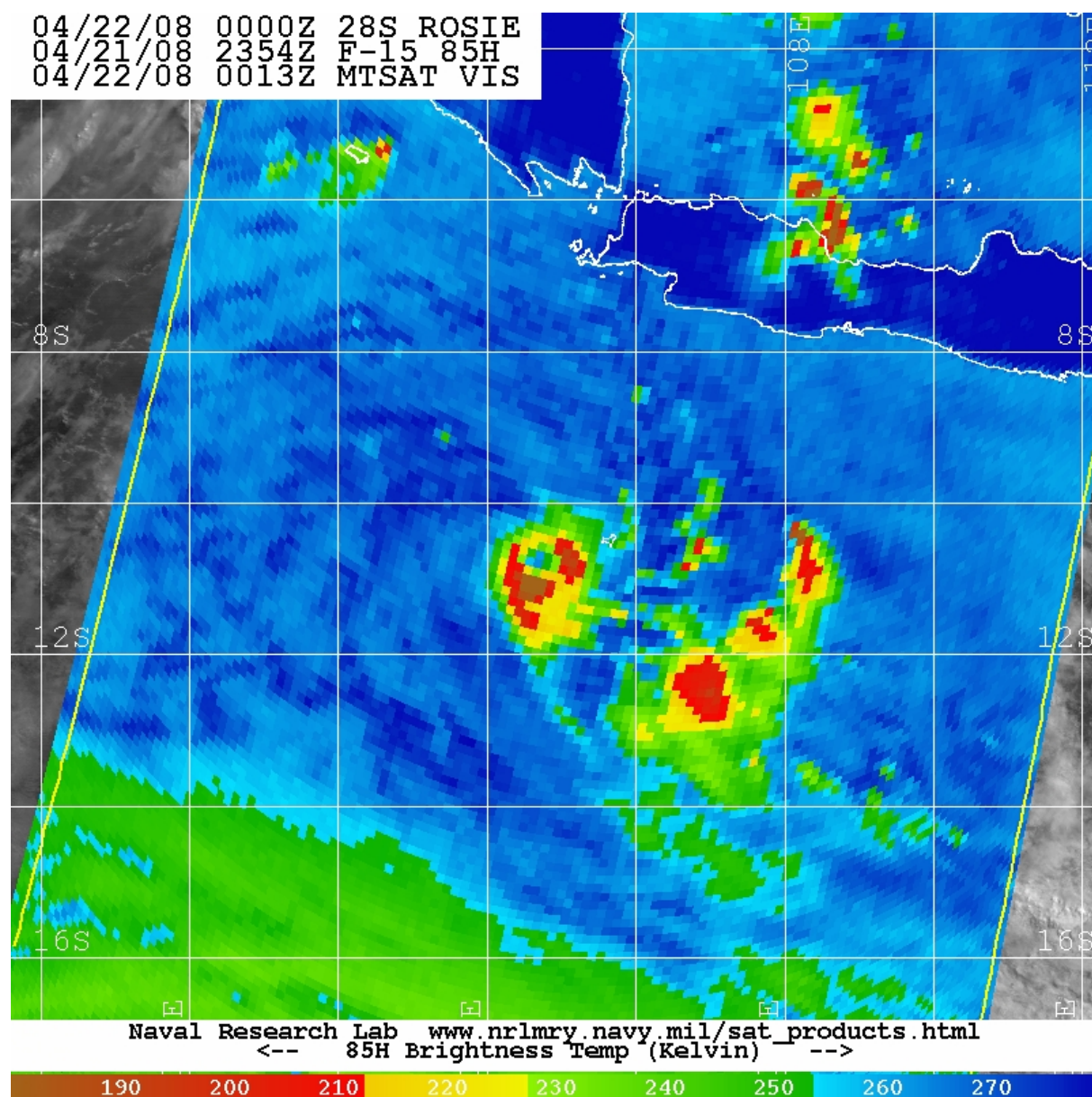


Figure 3. Large waves at the Christmas Island Port.
Photo provided by Dave Robertson, Harbourmaster, Christmas Island Port.

