Australian Government
Bureau of Meteorology

Tropical Cyclone *Melanie*

27 December 2007 – 2 January 2008

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A. Summary

A developing low formed near Sumba Island on December 27 and moved southwards. The low reached tropical cyclone intensity at 0900 WDT 28 December 2007 and reached category 2 at 0300 WDT 28 December 2007. After its initial southerly motion *Melanie* turned to the west southwest and moved parallel to the Pilbara coastline until 31 December 2007. The system weakened to category 1 as it turned more southerly and finally weakened to below cyclone strength early on 2 January 2008, dissipating over the ocean well offshore from Exmouth later that day.

Throughout the event forecasts indicated the most likely track would have *Melanie* remain off the coast, although at times the uncertainty area did indicate that landfall was possible. It was for this reason that Advices were issued for a period while *Melanie* was offshore from the Pilbara coastline. However based on Bureau advice Emergency Management authorities did not issue community alerts for coastal communities.

Melanie did remain far enough offshore to not to have any direct impact on the WA coast. However, there was a significant economic impact to industry resulting from port closures, production shut downs and evacuations from offshore installations. Preliminary information suggests these costs amounted to hundreds of millions of dollars.

B. Meteorological Description

Intensity analysis

An active monsoon trough was evident on satellite imagery across northern Australia towards the end of December. Persistent convection along the trough to the southwest of Indonesia showed no low or middle level circulation until 26 December. Initially the circulation appeared in the mid-levels and during 27 December microwave and satellite imagery showed increasing curvature. By early 28 December a low level circulation with deep convection in the south western quadrant was clearly evident on microwave imagery. Despite the development of *Melanie* being inhibited by moderate to strong northerly shear, analysis showed it had developed into a tropical cyclone and Quickscat passes showed some 30 to 35 knot winds evident in southern quadrants by 0000UTC 28 December.

Overnight 28 December convection increased and wrapped around the low level circulation centre (LLCC) and an eye became apparent on microwave imagery by early 29 December. *Melanie* reached peak intensity at about 1200 WDT 29 December and by the evening 28 December the system became more strongly sheared again with the LLCC displaced to the east of the cold convection. This intensity was maintained for about 24 hours and then *Melanie* began to weaken further under the effects of vertical shear. By 2100 WDT 30 December cold convection decreased and microwave imagery showed the low to mid level circulation becoming larger in diameter.

During 31 December and 1 January *Melanie* remained sheared with deep convection persisting in the south western quadrant and an exposed broad LLCC. By late on 1 January *Melanie* weakened below cyclone strength as it moved over colder sea surface temperatures (SST's) and under increasing vertical shear associated with the approach of a mid-latitude trough to the southwest.

Motion

Initially *Melanie* was steered by a northerly flow associated with a mid-level trough laying back from eastern Australia to Indonesia. By 29 December a mid-level ridge became established over eastern Australia and *Melanie* began to move in a west southwesterly direction, parallel to the Western Australian coastline. *Melanie* eventually moved in a southwesterly direction around the shoulder of the ridge during 1 January but quickly weakened to below cyclone strength with the low level centre drifting of in a westerly direction and dissipating.

Structure

Melanie was an average sized system at peak intensity with a radius of gales of about 180 kilometres but for most of its lifetime it was very asymmetric with the strongest winds in the southwest and northwest quadrants.

C. Impact

Melanie remained far enough offshore to not to have any direct impact on the WA coast. However, there was a significant economic impact to industry resulting from port closures, production shut downs and evacuations from offshore installations. Preliminary information suggests these costs amounted to hundreds of millions of dollars.

D. Observations

Wind/Pressure
Gales were recorded at Rowley Shoals Automatic Weather Station (AWS) for a period of about 3 hours from midnight – 0300 WDT 29 December 2007 as *Melanie* passed within 180 kilometres of the AWS at its closest point.

Melanie passed close to Buoy No 56520 located near 18.6 S 112.0 E at 0300 WDT 31 December where the minimum hourly pressure of 982.8 hPa was recorded.

E. Forecast Performance

Throughout the event forecasts indicated the most likely track would have *Melanie* remain off the coast, although at times the uncertainty area did indicate that landfall was possible. It was for this reason that Advices were issued for a period while *Melanie* was offshore from the Pilbara coastline. However based on Bureau advice Emergency Management authorities did not issue community alerts for coastal communities.

A Tropical Cyclone Watch was initiated for coastal areas between Broome and Exmouth as *Melanie* initially moved south. At 1000 WDT 29 December a Tropical Cyclone Warning was declared for coastal areas from Mardie to Wallal [including Port Hedland and Karratha/Dampier] with a watch extending to the remaining areas between Broome and Coral Bay and inland to Nanutarra and Marble Bar. The warning area was adjusted westwards as *Melanie* took a more southwesterly track and the warning was finalised at 4pm Sunday 30 December when *Melanie* moved away from the coast on a general southwest track. A summary is provided in Table 2.

Shipping warnings and Information Bulletins were continued until 1000 WDT 2 January when operationally Tropical Cyclone *Melanie* was downgraded to a low.

Table 1. Best track summary for *Melanie,* December 2007 – January 2008.

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	Radius Max. Wind (RMW)
2007	12	26	06	10.0	117.0	60	20	40	1000			
2007	12	26	12	10.7	117.0	60	20	40	1000			
2007	12	26	18	11.5	117.0	60	25	45	1000			
2007	12	27	00	12.2	117.0	60	25	45	998			
2007	12	27	06	13.0	117.1	60	25	45	998			
2007	12	27	12	13.4	117.4	60	25	45	994			
2007	12	27	18	13.7	117.7	40	30	45	990			
2007	12	28	00	13.9	117.8	30	35	50	986	90		25
2007	12	28	06	14.4	117.9	30	40	55	982	90		25
2007	12	28	12	15.1	118.0	30	45	65	976	90		20
2007	12	28	18	16.3	117.9	20	50	70	970	90	30	20
2007	12	29	00	16.7	117.6	20	55	80	962	90	30	20
2007	12	29	06	17.3	116.8	20	60	85	962	90	30	15
2007	12	29	12	17.7	116.0	20	60	85	962	90	30	15
2007	12	29	18	18.0	115.0	20	55	80	964	90	30	15
2007	12	30	00	18.4	113.9	20	55	80	964	90	30	20
2007	12	30	06	18.7	113.2	20	55	80	964	90	30	20
2007	12	30	12	18.8	112.8	20	55	80	964	90	30	20
2007	12	30	18	18.8	112.4	20	50	70	972	90	30	20
2007	12	31	00	18.8	112.0	20	50	70	972	90	30	20
2007	12	31	06	18.8	111.7	20	45	65	976	90		30
2007	12	31	12	19.0	111.3	20	45	65	976	90		30
2007	12	31	18	19.2	111.1	20	40	55	984	90		30
2008	1	1	00	19.7	110.7	20	40	55	984	90		30
2008	1	1	06	20.4	110.4	20	40	55	984	90		30
2008	1	1	12	21.3	110.0	20	35	50	986	60		30
2008	1	1	18	21.9	109.3	20	30	45	990			
2008	1	2	00	22.5	108.4	20	25	45	992			
2008	1	2	06	22.9	107.8	20	25	45	992			

Table 2. Tropical Cyclone Advice summary for TC *Melanie.*

Date/Time (WDT)	Action	Location
4 pm 28/12/2007	TC Watch issued.	Exmouth to Broome
10 am 29/12/2007	Warning issued.	Mardie to Wallal
4 pm 29/12/2007	Warning area changed	Exmouth to Port Hedland
10 pm 29/12/2007	Warning area changed	Exmouth to Whim creek
4 am 30/12/2007	Warning area changed.	Exmouth to Karratha
7 am 30/12/2007	Warning area changed.	Coral Bay to Mardie
1 pm 30/12/2007	Warning area changed.	Coral Bay to Onslow
4 pm 30/12/2007	Warning and Watch cancelled	

Figure 1. Track of Tropical Cyclone *Melanie* 27 December 2007 – 2 January 2008.