



Australian Government  
Bureau of Meteorology

# Tropical Low 08U (*Peta*) 20 – 23 January 2013

Perth Tropical Cyclone Warning Centre  
Bureau of Meteorology

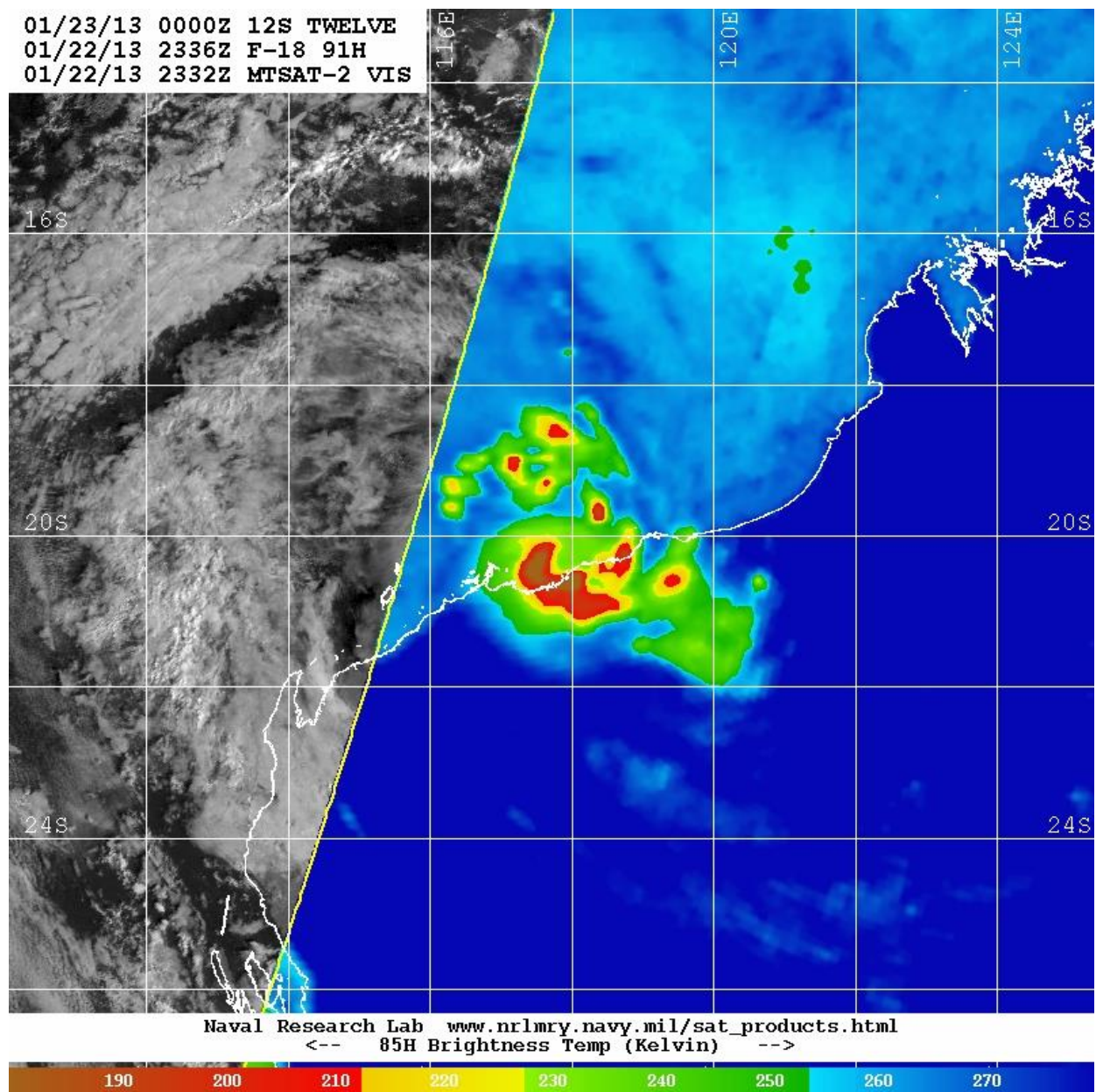


Image courtesy of NOAA NRL: <http://www.nrlmry.navy.mil/>

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## Summary

A tropical low (08U) formed over land in the west Kimberley on 20 January. The tropical low moved southwest, passing to the south of Broome, and reached open water early on 21 January. The low then moved west southwest, parallel to the Pilbara coast until 23 January when it turned south and crossed the Pilbara coast about 18 kilometres (km) to the east of Roebourne around 0500 Universal Time Coordinated ( 1300 AWST=UTC + 8 hours)

Operationally the tropical low was named Tropical Cyclone *Peta* at 0300 UTC 23 January. Post analysis has determined that while it is possible 08U may have had sustained gale force winds wrapping more than half way around the centre as it approached the Pilbara coastline, it is not likely they were sustained for at least 6 hours. Therefore, *Peta* does not meet the definition of a tropical cyclone in the Australian region and has been downgraded in post-analysis to a tropical low.

The proximity of the path of 08U to the Pilbara coast caused disruptions to shipping and offshore industries. There was also significant rainfall along parts of the Pilbara coastline and in the Fortescue catchment with Hooley recording its wettest day on record in the 24 hours to 9 am AWST 24 January and Mount Florence its wettest January day on record for the same period. There was minor catchment flooding reported.

## Meteorological Description

### Intensity analysis

An initial Dvorak classification of Data T-number (DT) number 1.5 could be made at 0300 UTC 21 January as convection developed to the southwest of the low-level cloud centre (LLCC) while 08U moved from land to water. The curvature and length of spiral banding increased during the afternoon and the DT number was increased to 2.0 by 1200 UTC. By 1800 UTC the DT number had further increased to 2.5. From 1800 UTC the spiral band became difficult to define with no DT number assigned at 0000 UTC 22 January.

During 22 January, the curvature of convection decreased, and the DT was dropped to 2.0. The Port Hedland radar showed a poorly defined C shaped band with no complete convective band evident until around 1200 to 1400 UTC when the circulation appeared better defined. The tropical low passed close to Bedout Island which has an Automatic Weather Station (AWS) located on it. The observations are incomplete and missing the period when the tropical low passed very close to the Island around 0600 UTC 22 January. The 10-minute data that was recorded showed wind speeds around 30 knots (kn) (56 kilometres per hour (km/h)). Observations were received from the ship "Pacific Triangle" at 1200 UTC and 1300 UTC 22 January as the tropical low passed over the ship. The 1200 UTC observation showed the wind from the east at 10 kn (18 km/h) and a barometric mean sea level (MSL) pressure of 991 Hectopascals (hPa) when the ship was located very close to the centre of the tropical low. The ship was located to the east of the tropical low by 1300 UTC when the 10- minute mean wind jumped to 35 kn and the MSL pressure rose to 996.6 hPa. The Port Hedland radar at this time showed a curved band of enhanced convection to the east of the centre and it was likely this squall line caused the strong winds the Pacific Triangle experienced. Based on this a mean wind of 35 kn was assigned in the northeast and southeast quadrants only.

From around 1500 UTC through until 2100 UTC the radar showed a poorly defined circulation with weak, open spiral banding. Dvorak pattern T numbers were in the range 2.0 to 2.5 which equates to 10- minute wind speeds of between 25 and 30 kn (46 – 56 km/h). From 2100 UTC radar returns began to strengthen in the southwest quadrant though through this period no Dvorak pattern could be applied, the CI number was based on Model Expected T-number (MET) and Pattern T-number (PAT) numbers of 2.5. The circulation was very small with a diameter measured by radar of the order of 30 to 40 nm (56 – 74 km). The only objective intensity estimate available was a 2000 UTC 22 January Satellite Consensus (SATCON) estimate of 36 kn (67 km/h) (1- minute wind) based on a Cooperative Institute for Meteorological Satellite Studies (CIMSS) Advanced Microwave Sounding Unit (AMSU) pass and Advanced Dvorak Technique (ADT), weighted towards the AMSU pass. This would indicate that intensity was possibly around 30 kn (56 km/h) but the very small size of the 08U means neither AMSU or ADT intensity estimates would be as reliable as usual.

During the morning of 23 January surface wind observations from a private recording instrument near Cape Lambert showed sustained gales for a period of between 3 and 5 hours. At around 0300 UTC the 10- minute mean wind briefly peaked at 50 kn (93 km/h)(of the order of half an hour or less). The sensor is at an elevation of 15 metres (m) rather than the international standard of 10 m. Hence, using a conversion factor of 0.92166 to calculate the wind at 10 m gives a 10- minute mean wind about 46 kn. The Port Hedland radar (located approximately 110 km to the east of the tropical low) image at this time showed a stronger though very small circulation with an intense convective band on the southern side of 08U with the strongest returns in the southwest quadrant. As the tropical low continued moving southwards, the wind observations near Cape Lambert dropped below gale force within an hour of the peak wind being recorded. No surrounding Bureau of Meteorology observing stations recorded gale force winds. It is estimated that 08U may have had gales wrapped more than half way around the centre during this period, but it is not likely that gales persisted for more than 6 hours, and hence 08U does not meet the criteria for being defined as a tropical cyclone.

08U crossed the Pilbara coast to the east of Roebourne at around 0500 UTC 23 January and weakened rapidly.

### Motion

08U was initially located to the north west of the 500 hPa ridge and consequently was steered in a generally west southwesterly direction around the periphery of the ridge. During 23 January a mid-level trough to the west pushed 08U to the south until it crossed the Pilbara coast.

## **Structure**

Initially 08U was a tropical low in an active monsoon trough over land and once it moved over water it showed improved curved banding. The tropical low was very small over its entire lifetime. When it was located near Bedout Island a ship observation indicated gales in the northeast quadrant with a radius to gales of around 20 to 25 nm (37 – 46 km). The tropical low became less defined to the north and west of Port Hedland until late on 22 January. Then the structure improved, and gales were most likely present in the western quadrants with a radius to gales of around 30 to 35 nm (55 – 65 km) and a radius to maximum winds (RMW) in the 5 to 10 nm (9 – 18 km) range at 0000 23 January. At 0300 UTC gales could have been wrapping around 08U and gale radius was estimated at around 30 nm (55 km) with RMW of 8 nm (15 km). By 0600 UTC gales were estimated to be in southern quadrants only with RMW of 8 nm (15 km). By 0900 UTC 23 January, the mean wind was estimated at 30kn (55 km/h) and 08U was poorly defined on radar and satellite imagery.

## Impact

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Although 08U was short-lived and weak, its proximity to the coast resulted in disruptions to shipping and offshore industries. There were significant rainfall along parts of the Pilbara coastline and in the Fortescue catchment, leading to minor catchment flooding. The heaviest falls in the Fortescue catchment occurred in the vicinity of the Hamersley Ranges between Mt Florence and Wittenoom.

## Observations

### Wind

Sustained gale force winds were experienced at a private observing site near Cape Lambert for a period of about 3 to 5 hours with the peak 10- minute mean wind (at 15 m elevation) reaching 50 kn (93 km/h) for a very short time.

### Pressure

The ship Pacific Triangle recorded a pressure of 991 hPa at 1200 22 January 21013.

Roebourne AWS recorded a minimum pressure of 995.1 hPa at 0620 UTC 23 January 2013.

### Rainfall

In the 24 hours to 9 am WST 24 January, Hooley recorded 261.6 millimetres (mm) which was the wettest day on record. Mt Florence recorded 220 mm which was the wettest January day on record. Coolawanyah recorded 178 mm, Hammersley 122.2 mm and Wittenoom 122 mm.

In the 24 hours to 9 am WST 25 January, Wittenom recorded 228 mm, Hooley 115.4 mm and Coolawanyah 109.4 mm.

Refer to Figure 3 for weekly rainfall analysis.

## Forecast Performance

Most model guidance from 0000 UTC 21 January, when the tropical low was moving from land to water near Broome, suggested that 08U would remain weak and track west southwest, parallel to the Pilbara coast and weaken to the west of Exmouth. The 1200 UTC 21 January European Centre for Medium -Range Weather Forecasts (ECMWF) model run was the first model to indicate a coastal crossing near Roebourne at around 0000 UTC 24 January. Each subsequent run continued to indicate this scenario though the strength of 08U varied from run to run and the timing of the coastal crossing got progressively earlier to match the actual crossing time by the 0000 UTC 23 January run. The Global Forecast System (GFS) model didn't indicate a coastal crossing of 08U until the 1200 UTC 22 January run and the Australian Community Climate and Earth-System Simulator (ACCESS-G or AG) model until the 0000 UTC 23 January run.

It is probable the small size of the tropical low meant the GFS model and particularly the AG model had trouble resolving 08U and accurately portraying the intensity. The AG model did not ever represent 08U as intense as the ECMWF or the GFS. This may be why the AG model did not indicate a coastal crossing until 0000 UTC 23 January and even then, it had only a weak low drifting inland some six hours after the actual crossing time.

Operationally 08U was named a tropical cyclone at 0300 UTC 23 January as it approached the Pilbara coast. This was based on the gale force wind observations received from Cape Lambert. Given the possible threat to lives and property this was an entirely reasonable and appropriate strategy. It is only during post analysis that we can examine in greater detail whether the tropical low reached tropical cyclone strength and whether it met the criteria defined by the Australian Bureau of Meteorology. It is likely that if 08U had remained over water for another 6 hours it would have met the criteria of persistence and remained a tropical cyclone in post analysis. During real-time it would be a high-risk strategy to forecast the early demise of 08U and so naming the tropical low until it had weakened completely was the more appropriate course of action.



**Table 1. Best track summary for Tropical Low 08U (*Peta*)**

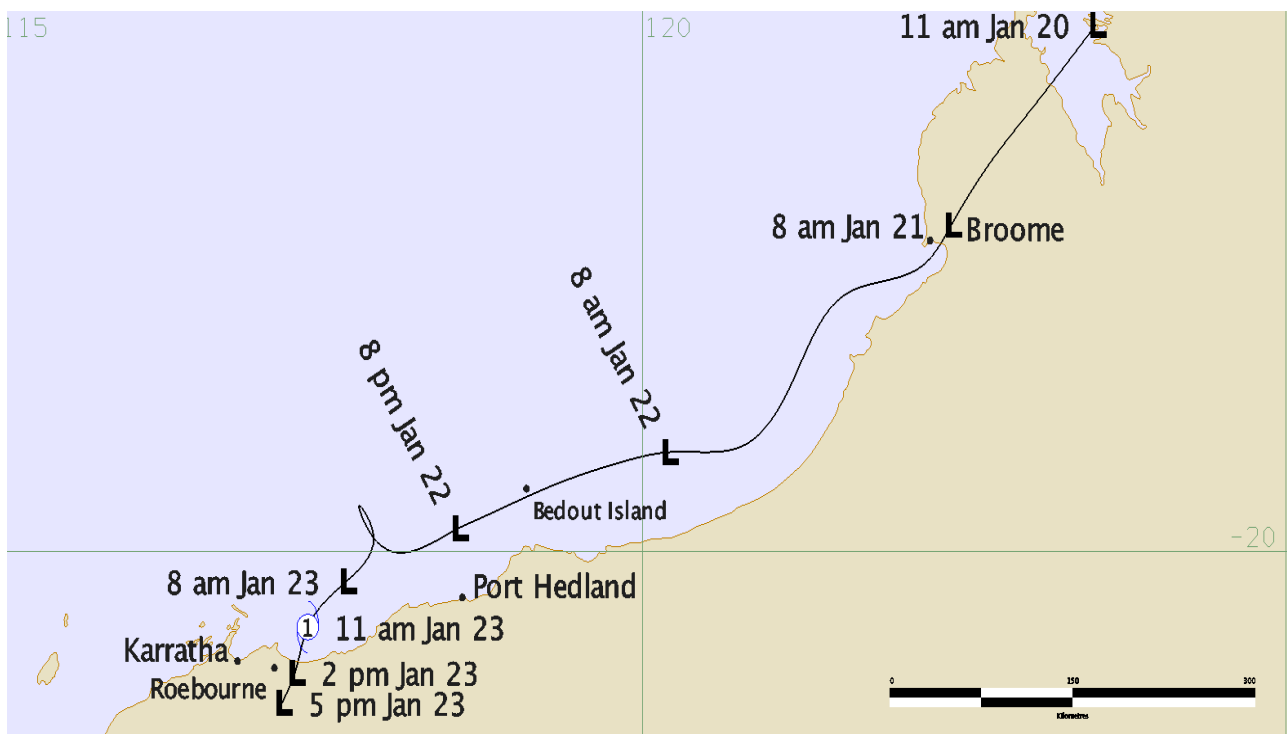
Refer to the Australian Tropical Cyclone database for complete listing of parameters.

Year	Month	Day	Hour UTC	Pos. Lat. S	Pos. Long. E	Position Accuracy nm	Max wind 10min knots	Max gust knots	Central Pressure hPa	Rad. of Gales nm (NE/SE/SW/NW)	Radius Max. Wind (RMW)
2013	1	20	03	16.4	123.5	60	15	45	1001		
2013	1	20	06	16.9	123.2	60	15	45	1001		
2013	1	20	12	17.1	123.0	60	15	45	1001		
2013	1	20	18	17.4	122.7	60	15	45	1001		
2013	1	21	00	17.9	122.4	30	20	45	1001		
2013	1	21	06	18.3	121.6	30	25	45	1001		
2013	1	21	12	19.0	121.1	30	25	45	1001		
2013	1	21	18	19.3	120.8	30	30	45	999		
2013	1	22	00	19.3	120.2	30	30	45	996		
2013	1	22	06	19.6	119.3	25	30	45	994		
2013	1	22	12	19.8	118.6	20	35	50	991	20/25/0/0	12
2013	1	22	15	19.9	117.9	25	30	45	991		
2013	1	22	18	19.7	117.8	30	30	45	991		
2013	1	22	21	19.8	117.9	25	30	45	991		
2013	1	23	00	20.2	117.7	20	35	50	991	0/0/35/30	8
2013	1	23	03	20.5	117.4	15	45	65	989	0/30/30/3	8
2013	1	23	06	20.8	117.3	20	40	55	988	0/20/20/0	8
2013	1	23	09	21.0	117.2	25	30	45	994		

Additional positions available due to 08U being tracked by radar.

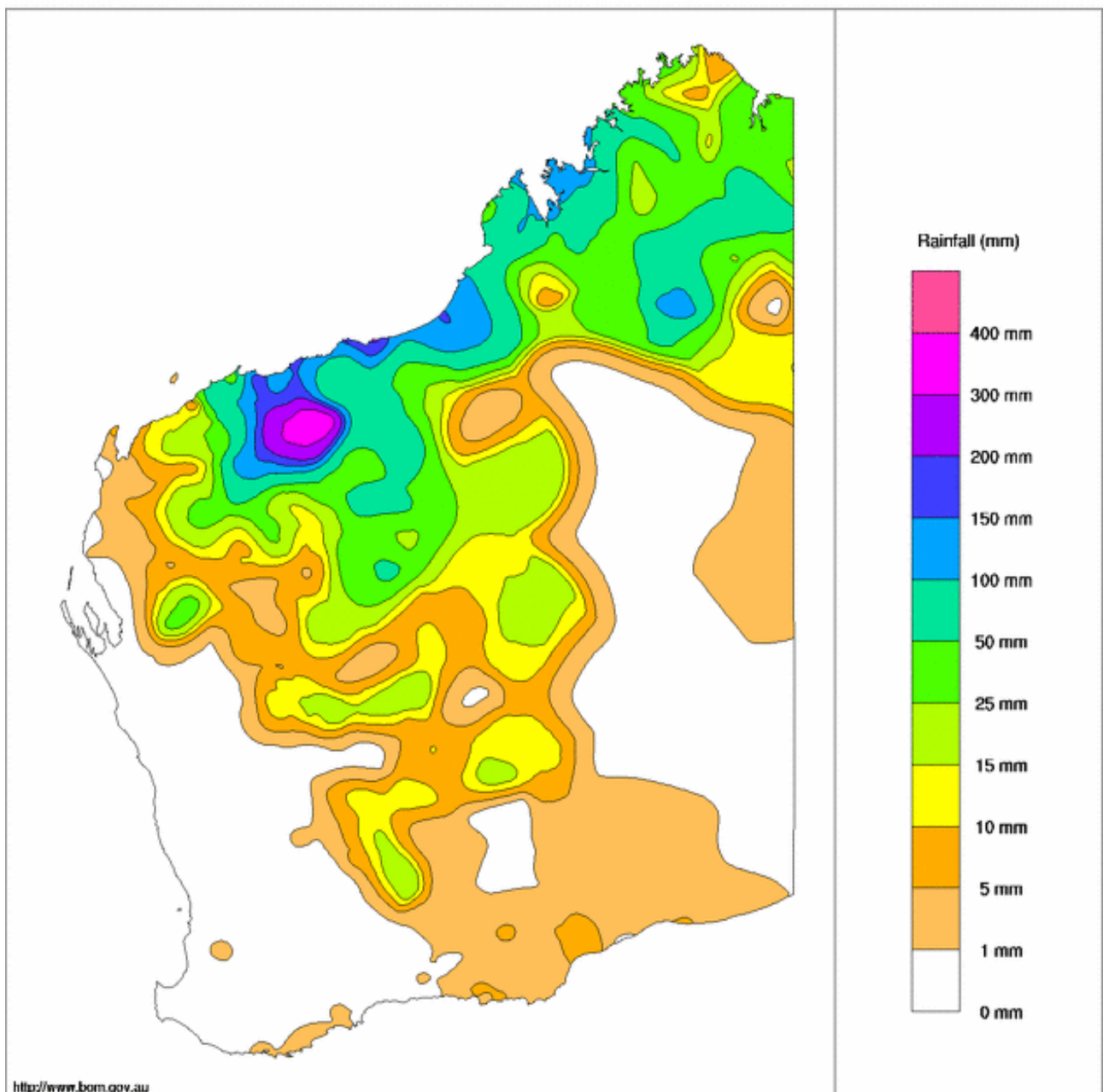
**Figure 1. Best track of Tropical Low 08U (*Peta*) 20 – 23 January 2013.**

\*The tropical low was classified as a tropical cyclone at 0300 UTC 23 January but did not meet the criteria of maintain gales more than half way around the centre for more than 6 hours. Times in AWST=UTC+8 hours.



**Figure 3. Western Australian rainfall totals in mm for the week ending 25 January 2013.**

Western Australian Rainfall Totals (mm) Week Ending 25th January 2013  
Product of the National Climate Centre



<http://www.bom.gov.au>

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