Australian Government
Bureau of Meteorology

Tropical Cyclone *Sean*

20 - 25 April 2010

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A. Summary

Tropical Cyclone *Sean* developed south of Bali well east of Christmas Islands in late April and reached cyclone intensity at 1800 UTC 22 April as it moved to the southwest. *Sean* peaked at 55 knots intensity at 1800 UTC 23 April but subsequently weakened rapidly on 24 and 25 April to increasing northwesterly wind shear. *Sean* is estimated to have weakened below cyclone intensity at 0000 UTC 25 April by which stage it had begun tracking to the west.

TC *Sean* remained over open waters in the Indian Ocean and had no known impact.

B. Meteorological Description

Intensity analysis
Despite the absence of broadscale forcing associated with a Madden Julian Oscillation event or Equatorial Rossby Wave, convection became active along the monsoon trough between 100-120°E in mid-April. Convection was initially focussed about a weak low near 10°S 105°E near Christmas Island, but became more evident further east along the trough towards 120E on in the vicinity of 115°E on 18-19 April.

Initial (Dvorak) classification was estimated at 0600 UTC 20 April following an overnight increase in convection near 10°S 117°E. Subsequent development in the following 48 hours was only gradual with convection near the low level circulation centre (LLCC) failing to consolidate and fluctuating diurnally.

Ascat at 0157 UTC 22 April showed a circulation with an area of 20-25 knots on the eastern and southern sides, and the 2330 UTC 21 April SSMIS microwave images showed some improvement in organisation.

However, convection was only scattered about the LLCC until about 0800 UTC when a more well-defined convective band developed. The Dvorak DT at 0900 UTC was estimated at 3.0, however the FT/CI was held at 2.5, as the 0600 UTC estimate was only at 2.0. Although the banding is not as evident at 1200 UTC, again the FT/CI was held at 2.5. Ascat at 1431 UTC 22 April showed 30-35 knots on the southern side, which would support a 2.5 classification.

Tropical cyclone intensity is estimated at 1500-1800 UTC; see 1729 UTC AMSRE 89 GHz in Fig. 2. This is consistent with the Satcon estimate of 41 knots (1-minute) at 17-18 UTC.

The 2318 UTC SSMIS 37 GHz shows an improving low level flow and visible imagery showed a 0.7 degree curved band pattern with convection being strongest on the western side of the LLCC. The curved band reached 0.8 by 0600 UTC suggesting that category 2 intensity had been reached, although the band was quite broad and less evident on microwave imagery (Satcon intensity at 51 knots (1-minute mean)).

Overnight from 23-24 April the circulation definitely improved and the microwave SSMIS 91 GHz image at 2204 UTC 23 April showed an emerging eye pattern, However, the centre location on the corresponding 37 GHz image was about 20-25 nm further to the north indicating that the vortex was tilted.

Dvorak reached T4.0 at 1800 UTC 23 April, although this was based on MET/PAT given the difficulty in allocating a DT to the covered centre pattern. The centre was embedded in white giving DT=5.0 using the embedded centre technique which is known to give higher than expected T number estimates.

Peak intensity is estimated at 55 knots at 1800 UTC. This is consistent with Satcon which peaked at 59 knots (1-minute mean). In general ADT estimates were higher than those from AMSU-B, apart from the weakening phase, as apparently is often the case with sheared systems. Ascat at 0118 UTC 24 April showed a well-defined circulation and maximum winds of about 45 knots, however this does necessarily discount winds to 55 knots.

During 24 April the circulation failed to develop further and convection collapsed in dramatic fashion from 1200 UTC. Ascat at 1347 UTC 24 April showed gales mainly on the southern side of the centre. This is in response to NW wind shear that increased from ~15 knots at 0000 UTC to ~30 knots at 1200 UTC 24 April.

Although Dvorak CI was held at 3.5 at 1800 UTC the actual intensity is estimated lower at 40 knots given that deep convection had been absent for over 4 hours. *Sean* is estimated to have weakened below cyclone intensity at 0000 UTC 25 April although gales persisted on the southern side until 0600 UTC 26 April. Convection flared briefly to the southeast of the low between 0600 and 1500 UTC on 25 April but otherwise was suppressed.

Motion

Sean moved on a general southwest track for much of its lifetime being steered by a weak mid-level ridge to the southeast ahead of a high amplitude mid-level trough to the west. On 24 April the 500 hPa flow was more northerly, however as *Sean* became more affected by shear, the low level circulation was steered by winds lower than 500 hPa which accounted for the more westerly track from 1200 UTC.

Structure

Sean was a compact system with convection often displaced to the southwest of the LLCC. The radius of gales was estimated to be asymmetric, typically extending only 40-50 nm in northern quadrants and 70-80 nm in southern quadrants. The radius of maximum winds was estimated at about 15 nm.

C. Impact

TC *Sean* remained over open waters in the Indian Ocean and had no known impact.

D. Observations

There were no surface observations available near the centre of TC *Sean*.

Table 1. Best track summary for TC *Sean,* April 2010.
Refer to the Australian Tropical Cyclone database for complete listing of parameters.

Year	Month	Day	Hour (UTC)	Position Latitude S	Position Long. 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)
2010	4	20	06	10.0	117.5	30	20	45	1006			
2010	4	20	12	10.0	117.4	30	20	45	1006			
2010	4	20	18	10.0	117.2	35	20	45	1005			
2010	4	21	00	10.0	117.0	30	25	45	1004			
2010	4	21	06	10.2	116.8	30	25	45	1004			
2010	4	21	12	10.6	116.5	30	25	45	1002			
2010	4	21	18	11.2	116.2	30	25	45	1002			
2010	4	22	00	11.9	115.9	25	25	45	1002			
2010	4	22	06	12.3	115.6	25	25	45	1002			
2010	4	22	12	12.7	115.3	25	35	50	1000			
2010	4	22	18	13.2	114.7	30	40	55	996	50		20
2010	4	23	00	13.5	114.3	25	45	65	994	55		20
2010	4	23	06	14.0	114.0	25	50	70	990	65	20	20
2010	4	23	12	14.5	113.7	20	50	70	990	65	20	20
2010	4	23	18	15.1	113.3	20	55	75	988	65	20	15
2010	4	24	00	15.7	113.1	20	55	75	988	65	20	15
2010	4	24	06	16.5	112.8	25	55	75	988	65	20	15
2010	4	24	12	17.1	112.6	25	50	70	990	50	15	15
2010	4	24	18	17.3	111.9	25	40	55	996	50		15
2010	4	25	00	17.5	111.3	20	35	50	998			
2010	4	25	06	18.1	110.5	15	30	45	1000			
2010	4	25	12	18.3	109.7	15	30	45	1002			
2010	4	25	18	18.3	108.3	15	30	45	1002			
2010	4	26	00	18.3	107.0	15	25	45	1004			
2010	4	26	06	18.2	105.5	15	25	45	1004			
2010	4	26	12	18.2	104.3	15	25	45	1004			

Figure 1. Track of Tropical Cyclone *Sean*, 20-26 April 2010. Times in WST (subtract 8 hours to convert to UTC).

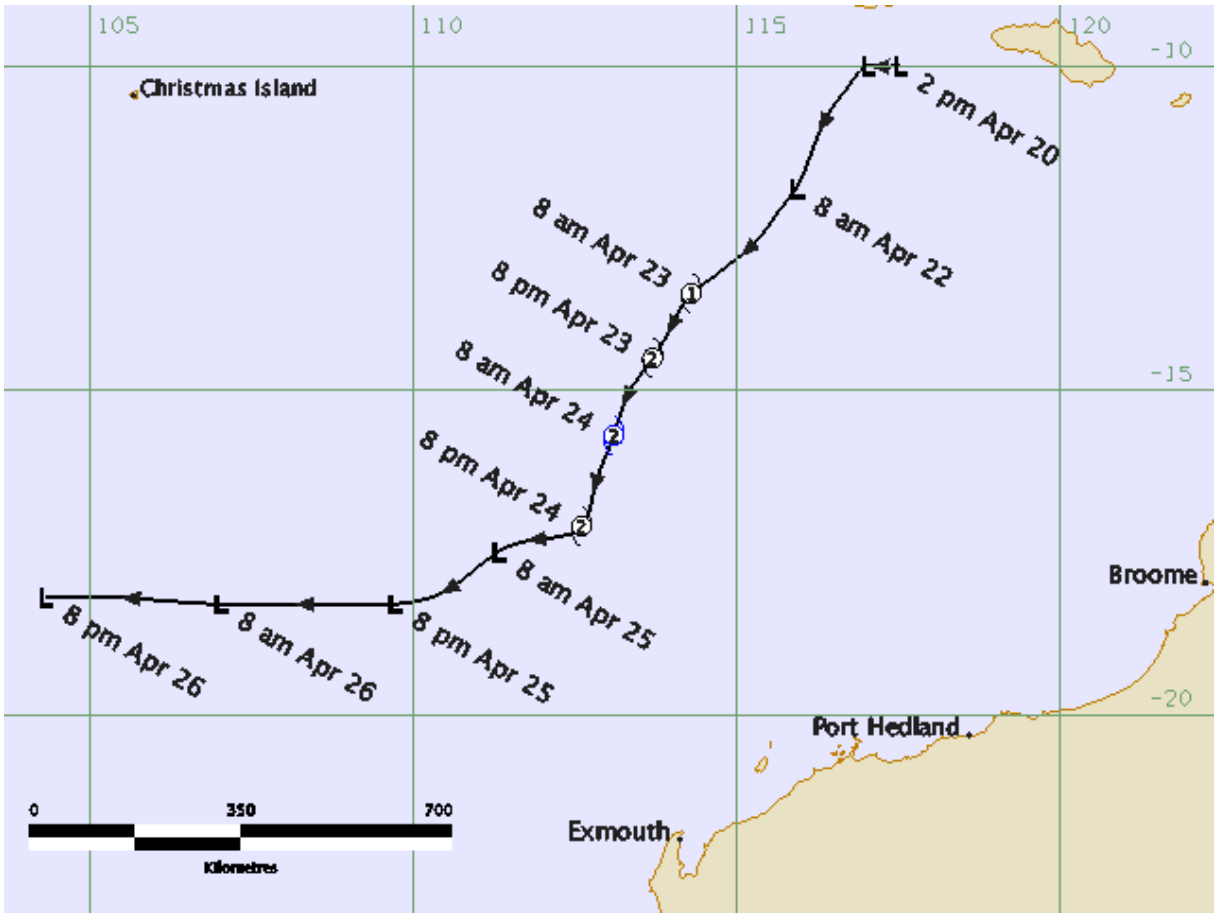

Figure 2. Microwave image (89 GHz AMSRE) at 1729 UTC 22 April near the time of initial cyclone intensity (image courtesy of US NRL: http://www.nrlmry.navy.mil/).

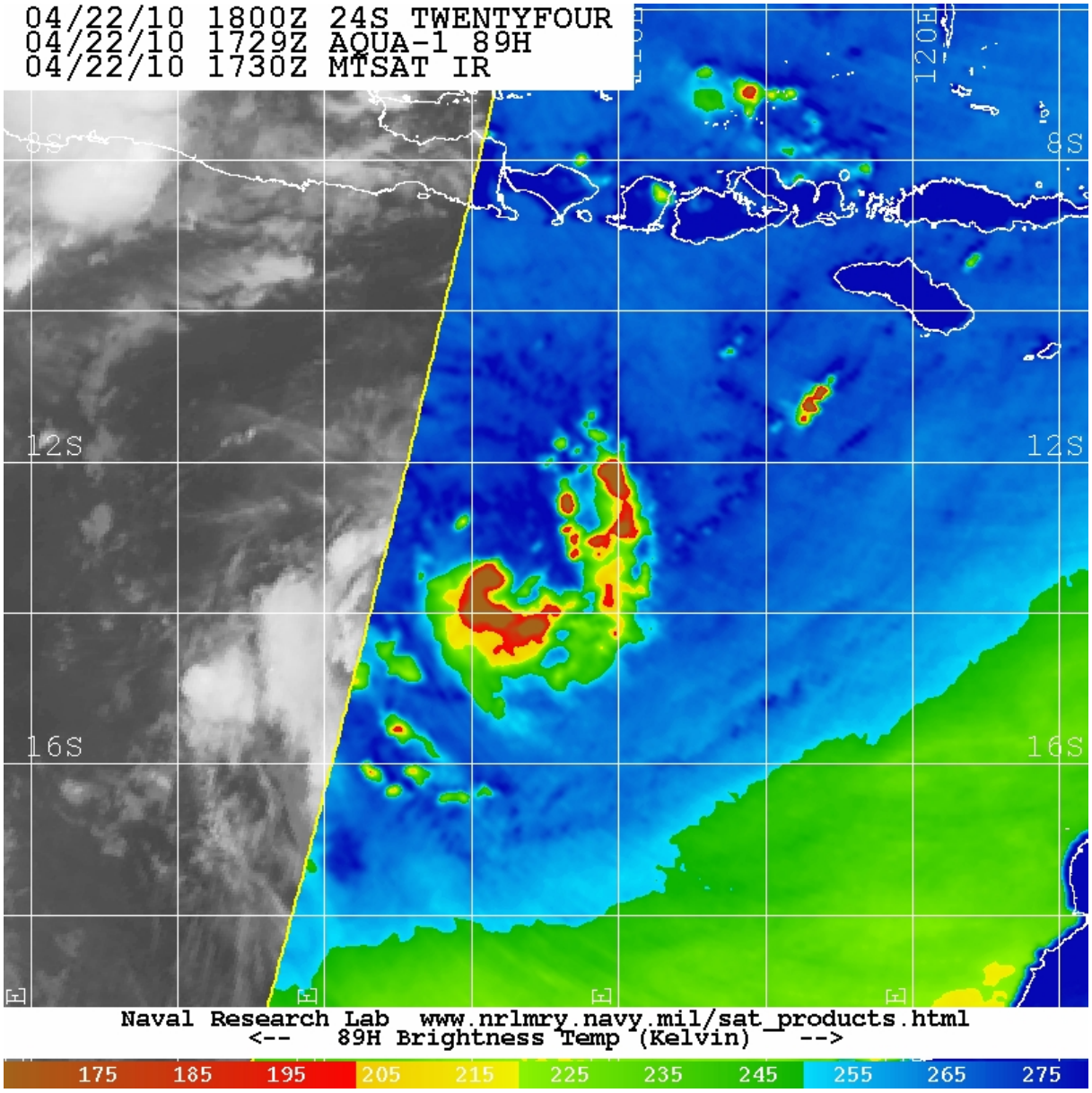

Figure 3. Microwave image (91GHz SSMIS) of Tropical Cyclone *Sean* at 2204 UTC 23 April 2010 near peak intensity (image courtesy of US NRL: http://www.nrlmry.navy.mil/).