



Australian Government
Bureau of Meteorology

Severe Tropical Cyclone *Abele*
1 December – 4 December 2010

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A. Summary

A tropical low pressure system formed in the central Indian Ocean on 29 November and drifted slowly south before intensifying into a tropical cyclone on 1 December. The tropical low was named *Abele* by the La Reunion Tropical Cyclone Warning Centre (TCWC). *Abele* intensified into a Category 3 cyclone on 2 December, before increasing wind shear and cooler sea surface temperatures caused the cyclone to weaken on 3 December, as it was entering the Perth Area of Responsibility (AOR). By 4 December, *Abele* had weakened below cyclone intensity, although gales continued on the southern side of the low due to a strong pressure gradient between the remnants of *Abele* and a high pressure system to the south.

Abele remained over open waters throughout its lifetime, and had no direct impact on Australian territories.

B. Meteorological Description

Intensity analysis

The initial low pressure system developed into a tropical cyclone at 12 UTC (2000 Australian Western Standard Time (AWST) as AWST=UTC+8hours) on 1 December to the west of the Perth AOR. *Abele* then proceeded to intensify into a Category 3 cyclone under favourable environmental conditions while still in the La Reunion AOR.

By the time *Abele* entered the Perth AOR, increasing vertical wind shear and Sea Surface Temperatures (SST) of around 26 degrees Celsius (°C) were causing the cyclone to weaken. Dvorak analysis at 8am on 3 December using a sheared pattern gave a Data T-number (DT) of 3.0 with the Current Intensity (CI) held at 3.5 as the cyclone underwent weakening. The nearest Advanced Scatterometer (ASCAT) pass showed maximum winds of 40-45 knots (kn, 1 kn = 1.852 kilometres/hour) with a reasonably symmetrical structure around the low level centre.

Abele continued its weakening trend during 3 December under the influence of 20 to 30 kn of west to northwesterly shear and decreasing SSTs and by 18 UTC on 4 December. Dvorak analysis gave a Data T-number (DT) of 2.0 and a Current Intensity (CI) number of 2.5. However, an ASCAT pass just prior to this time showed winds of around 35 kn around the centre, and so the intensity of the system was still classified as a tropical cyclone at this point. *Abele* was then downgraded to below

cyclone strength at 8 am on 4 December. By this stage the low level centre was completely exposed and an ASCAT pass just after this indicated that gales were only located to the south of the centre. Gales continued to the south of the system during 4 December, due to the tightening pressure gradient caused between the low centre and a high pressure system to the south.

Motion

A mid-level trough to the south of *Abele* steered the system in a south-easterly direction on 3 December. The low level centre continued to move in a general south-easterly direction on 4 December after the cyclone had weakened, before taking a more easterly track on 5 December while being cradled by a high pressure system to the south.

Structure

By the time *Abele* entered the Perth AOR, it was being affected by increasing vertical wind shear. [Cooperative Institute for Meteorological Satellite Studies \(CIMMS\)](#) analyses showed 20 to 30 kn of west northwest shear on 3 December, and satellite imagery showed convection predominantly in the southeast quadrant (see Figure 2). Shear increased to 30 to 40 kn on 4 December, and with SSTs as low as 23°C, *Abele* weakened below cyclone intensity.

C. Impact

Abele had no direct impact on Australian territories.

D. Observations

Abele remained almost 1000 kilometres (km) away from Cocos Island, the nearest site with routine weather observations. No significant wind gusts or rainfall was reported.

E. Forecast Performance

The first forecast issued by the Perth TCWC was at 06 UTC on 3 December, with Warnings for Shipping and Forecast Track Maps being produced. By this stage *Abele* was a Category 1 system and continuing to weaken. The forecast was for the cyclone to continue moving in a south-easterly direction and to weaken below cyclone intensity on the morning of 4 December, although with gales persisting on the southern side.

Table 1. Best track summary for Severe Tropical Cyclone *Abele* (note: operational track data from La Reunion TCWC shown for prior to 00 UTC December 2)
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	Radius Max. Wind (RMW)
2010	11	29	00	11.4	86.4	30	25	45	1000			
2010	11	29	06	11.5	86.1	30	25	45	1000			
2010	11	29	12	11.7	86	40	25	45	1000			
2010	11	29	18	12.1	85.9	60	25	45	1000			
2010	11	30	00	12.7	86.1	40	25	45	998			
2010	11	30	06	12.4	85.8	30	30	45	997			35
2010	11	30	12	13.1	85.4	N/A	30	45	998			35
2010	11	30	18	13.8	85.3	40	30	45	998			35
2010	12	1	00	14.2	85.5	40	30	45	997			30
2010	12	1	06	14.7	85.7	30	30	45	997			30
2010	12	1	12	15.3	85.9	20	45	65	988	20		30
2010	12	1	18	15.7	86.2	N/A	50	70	982	40	20	30
2010	12	2	00	16.1	86.7	30	50	70	984	40	20	30
2010	12	2	06	16.6	87.3	20	55	75	980	80	20	35
2010	12	2	12	17.1	88.6	20	70	100	973	80	30	35
2010	12	2	18	17.7	89.5	20	65	90	975	75	30	35
2010	12	3	00	18.4	90.5	20	50	70	987	80	30	35
2010	12	3	06	19.1	91.5	30	45	65	990	80		35
2010	12	3	12	20	92.8	30	40	55	992	80		40
2010	12	3	18	20.8	93.3	30	40	55	992	65		40
2010	12	4	00	21.7	93.7	30	40	55	995	80*		
2010	12	4	06	22.4	93.9	30	40	55	998	90*		
2010	12	4	12	22.8	94.5	30	40	55	998	150*		
2010	12	4	18	23.8	95.9	40	40	55	998	150*		

* Gales confined to southern side of the system by 00 UTC December 4, with the system no longer classified as a tropical cyclone.

Figure 1. Best track of TC *Abele*.

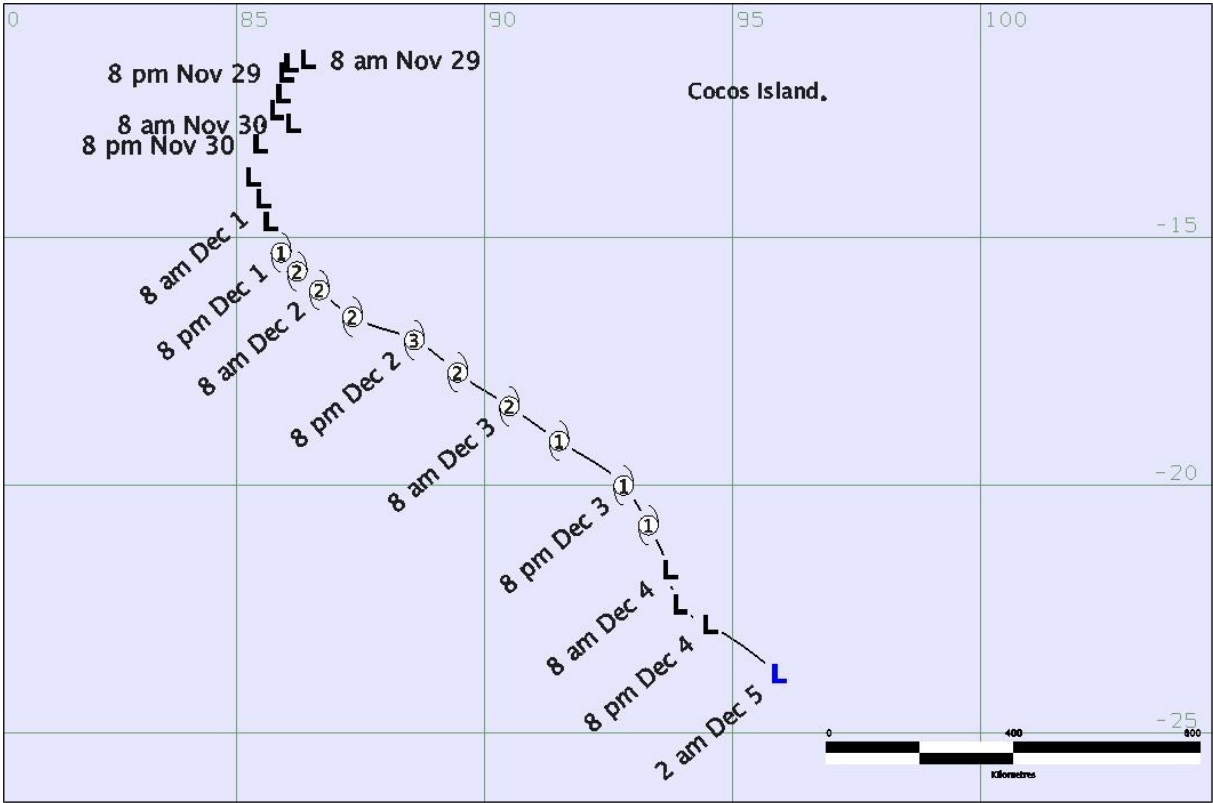


Figure 2. Visible image at 0130 UTC 3 December.

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

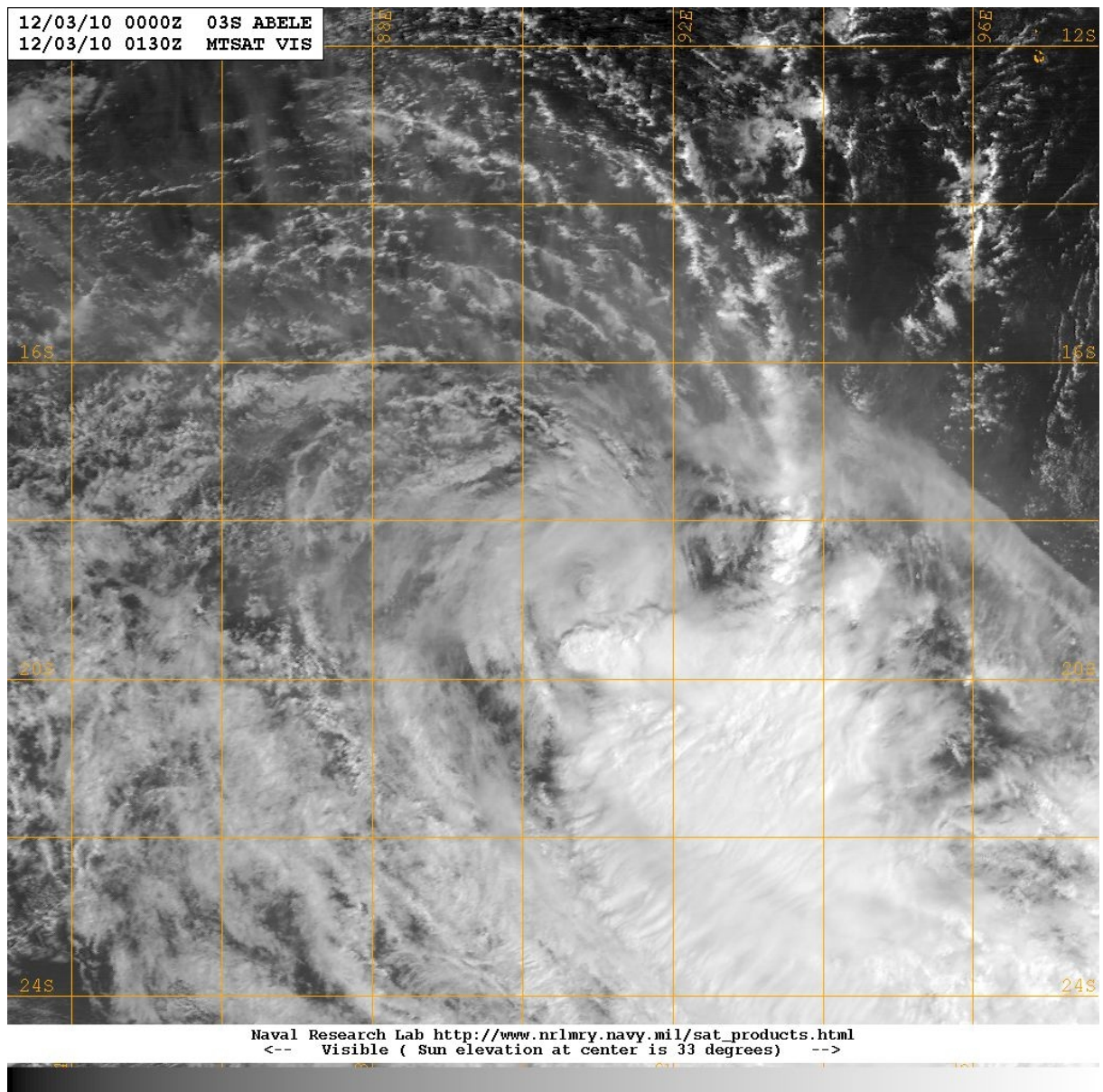


Figure 3. ASCAT image at 0244 UTC 3 December.

(image courtesy of NOAA: <http://manati.orbit.nesdis.noaa.gov/datasets/ASCATData.php/>)

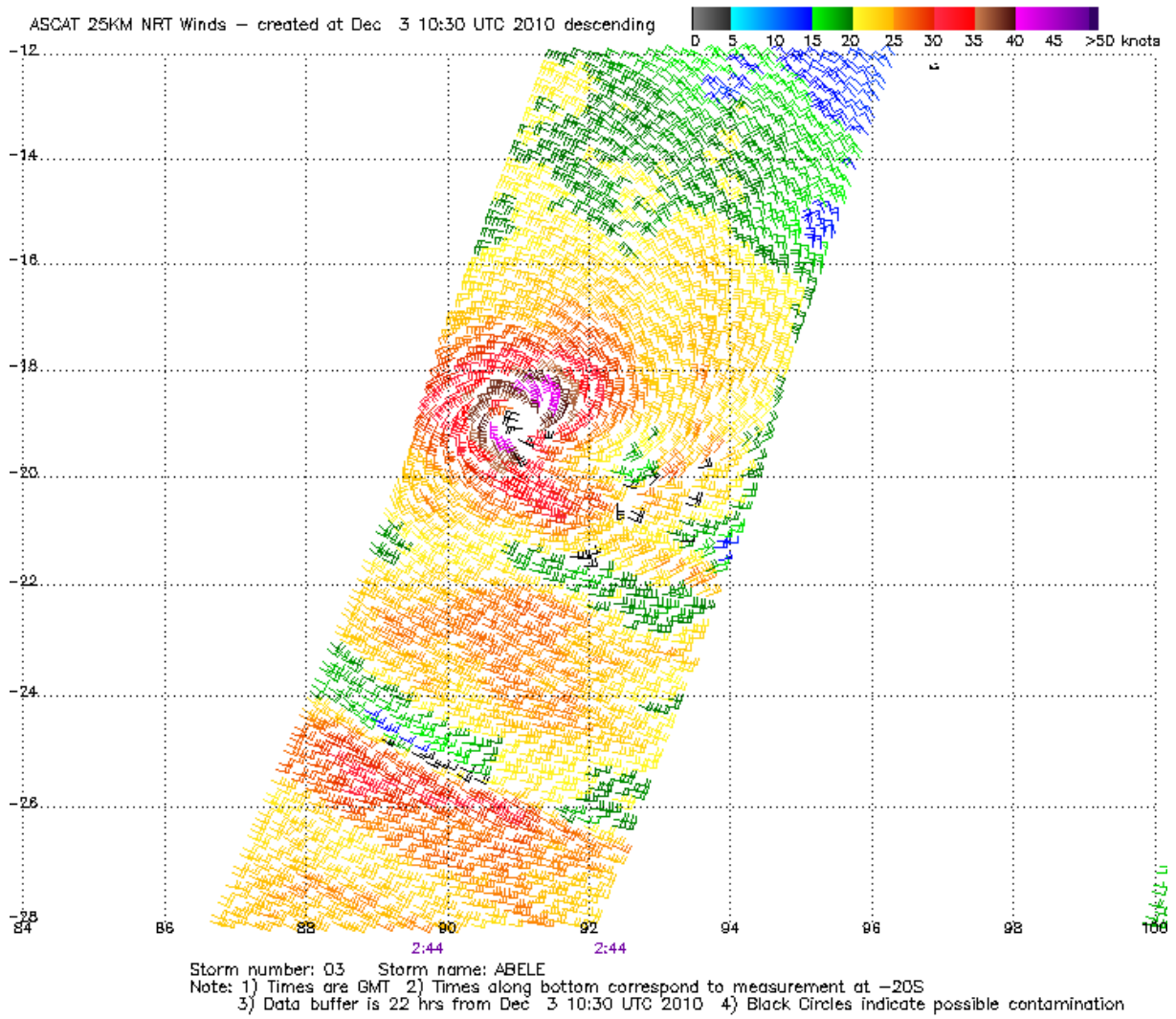


Figure 5. Comparison of objective and subjective intensity analysis techniques.

