

Tropical Cyclone Isobel 09/03/1974 to 17/03/1974

(i) General

"Isobel" was the ninth cyclone of the season, and like its immediate predecessor "Helen", "Isobel" went through its life cycle without crossing land. However unlike "Helen" this cyclone did not pose a serious threat to communities in the northwestern part of Australia. At its closest approach to the continent "Isobel" was some 880 km to the west.

Satellite photographs and a small number of ship reports indicated that "Isobel" was a compact tropical cyclone of moderate intensity. Maximum winds close to the centre are estimated to have reached speeds of about 125 km/h on 12 and 13 March but the radius of gale force winds was probably no more than 130 km.

(ii) Development

While cyclone "Helen" was in its decaying stages a belt of low pressure existed in the eastern Indian Ocean and the Australia region between latitudes 10°S and 20°S. North of this zone a moderate westerly flow persisted and to the south a moderate easterly stream. On 9 March cyclone "Isobel" had its genesis in this region of lower pressure at about longitude 115°E where an area of convective activity had developed over the previous two days. Sferics were detected in this vicinity at 081300 GMT. Most of the data pertaining to the development and movement of "Isobel" was deduced from satellite photographs.

"Isobel" followed a fairly typical development curve becoming a mature cyclone on 13 March four days after it was first detected. Over the next four days it underwent a steady weakening while still located over tropical waters.

The minimum sea level pressure attained by "Isobel" was estimated by means of the Dvorak technique to be 973 mb on 13 March.

On that day the first anticyclonically curved isobar was 1010 mb.

(iii) Features of the Track (Fig. 9.1)

"Isobel" was an active system for seven days and during that time travelled about 2900 km. In its developing stages it moved at about 7 km/h but after reaching its maximum intensity on 13 March it increased its speed of motion to about 23 km/h.

The track displayed no unusual features. Its movement was generally southwestward until 15 March when during its decay phase the cyclone began moving towards the west and eventually westnorthwest.

The synoptic situation prevailing during the life cycle of "Isobel" was dominated by the sub-tropical high pressure ridge which was located near 40°S in the Australian longitudes. The ridge to the south of the cyclone had weakened on 13 and 14 March but on 15 March an increase in pressure again occurred. This coincided with the veering of the cyclone's path to the westnorthwest.

The few indications of the state of the middle atmosphere suggest that no low pressure troughs moved through the area while "Isobel" was operating. This is consistent with the lack of recurvature to the southeast. The upper level winds deduced from aircraft reports peripheral to the cyclone area possessed a westerly component so that high level steering does not provide an explanation of "Isobel's" movement.

(iv) Rainfall

Because it operated well away from land areas no record of the rainfall associated with "Isobel" is available.

(v) Winds

Little is known of the wind regime about cyclone "Isobel" as few reports from near the centre are available. Reports of winds exceeding gale force are noted in Table 9.1. The reports from the ships "Fernie" and "Primaking" were at times near the period of the cyclone's peak intensity. The implication from these reports is that the strong winds around the cyclone were very limited in area. Analysis of the cloud photographs using Dvorak's method suggests that winds of about 125 km/h were probably being generated near the centre at about that time.

(vi) Seas and Swell

Seas and swell associated with "Isobel" had become significant by 12 March. At 120400 GMT the vessel "Anchises" reported moderate to rough seas and a moderate to heavy swell. The 6 m swell experienced by "Fernie" at 130000 GMT was the highest reported during "Isobel's" lifetime. By 15 March the swell was subsiding but still heavy since the ship "Agamemnon" at 150000 GMT when some 170 km north of the cyclone centre reported a swell of 4.5 m.

(vii) Satellite Analysis

Most of the knowledge of "Isobel's" development and movement was gained by interpreting cloud photographs from the ESSA 8 and NOAA 2 satellites.

In an area off the northwest coast of Australia which had previously been cloud free a small mass of convective cloud was apparent on the photographs of 7 March. Over the next four days this cloud mass expanded and became more organised. This area of activity coincided with a low level cyclonic circulation the existence of which was deduced from surface weather reports. On the ESSA 8 photograph of 100214 GMT the system was analysed as T 2 in the Dvorak classification, the cloud system centre being defined by curved cloud bands outside the dense overcast.

Thereafter the system centre moved under the central dense overcast (CDO) which gradually became better defined until 13 March. In the ESSA 8 photograph of 140154 GMT weakening had obviously occurred with the CDO being broken and less bright thus indicating a diminished area of convective activity. Degeneration continued until by 17 March the system had decayed.

In both its developing and weakening stages "Isobel" followed the typical intensity change curves depicted in the Dvorak technique. A summary of the satellite photographic information is given in Table 9.2.

Table 9.1

Selected Ship Reports

Ship's Name	Position		Date/time (GMT)	Direction/Distance from centre (km)	Wind (km/h)	Sea (m)	Swell (m)	Weather	Pressure (mb)
	°S	°E							
Primaking	16.3	108.5	120600	350/90	090/69	Rough	Heavy	Rain squalls	997.5
Fernie	18.5	108.6	130000	120/120	040/69	3	NNE 6	Mod. rain	1001.5
Amstelreen	21.8	102.8	140600	270/90	250/65	3	SE 3	Mod. rain	1002.0

Table 9.2

Data from Satellite Photographs

Satellite Name	Orbit Number	Date/Time (GMT)	Estimated posn. of centre		Final T No.	Min. Sea Level Pressure (mb)
			°S	°E		
ESSA 8	23971	090317	12	111.5	<1.5	-
	23984	100214	13	110.5	2	1003
	23996	110304	14	109	3	999
	24008	120207	15	108.5	4	981
	24021	130258	17	106.5	4.5	973
	24033	140154	21.5	104.5	3.5	988
	24046	150245	24.0	99.5	3	994
	24059	160336	23.0	95.3	2	1003
	24072	170427	21.5	91	1.5	1006