Tropical Cyclone Marcelle 29/04/1973 – 09/05/1973

(i) General

"Marcelle" was the eleventh and last tropical cyclone of the season. It was also the latest occurring cyclone in the Northwestern Australian Region for seventeen years. As well as having the longest track of any cyclone plotted in this region there were other aspects which made "Marcelle" unique.

After forming over waters southsoutheast of Ceylon, "Marcelle" was located eight days later 1200 km west of cape Leeuwin and interacting with a southern cold frontal system as it approached the West Australian coast at 65 km/h. Having crossed the coast it brought relatively little rain, but winds were strong enough to blow cattle over and bury them in drifting sand.

In the southeastern wheat belt paddocks were stripped of freshly germinated crops and denuded of soil to such an extent that the entire Shire of Ravensthorpe was declared a wind damaged area.

In this latter phase the wind speed was estimated at 160 km/h at Cape Naturaliste where the anemometer could not register above 130 km/h.

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(ii) Development

During the last week of April several amorphous areas of convective cloud were detected by satellite in the region bounded by the equator and latitude 10°S between longitudes 85°E. By 29th April one cloud mass near 9°S 89°E had become organised And most of the remaining cloud had dissipated. At approximately 300400 GMT, satellite evidence indicated that this system had become a tropical cyclone. Two hours later a ship 560 km to the southeast of the system centre reported 50 km/h easterly winds, continuous moderate rain, and a barometer reading of 1006.2 mb. Other than satellite photographic evidence there were no reports confirming the existence of the cyclone over the next few days. During this period it is estimated that the central pressure in "Marcelle" fell to about 973 mb as the cyclone developed.

At the time of its maximum development "Marcelle" was moving southward at about 28 km/h and, on passing over cooler waters at higher latitudes, rapidly became extratropical in structure. On 6th May its central pressure had risen to about 1001 mb and at that time the low began interacting with an approaching frontal system. Deepening of this new more complex system occurred as it moved rapidly eastwards between longitudes 105°E and 115°E. This behaviour was related to the upper thermal structure. The minimum central pressure reached during this redevelopment was about 976 mb attained just prior to the system's moving across the coast between Cape Naturaliste and Cape Leeuwin at 072100 GMT.

For the next six hours "Marcelle" was over land. Although its central pressure gradually rose, exceptionally strong winds were experienced over a wide area of southwest Western Australia. At about 080400 GMT the low crossed the south coast near Bremer

Bay and moved rapidly southeastwards into the Southern Ocean south of latitude 45°S. It was still an intense system when it moved out of the Perth area of responsibility.

The recurvature and the southward movement of cyclone “Marcelle”coincided with a general meridional pattern which existed at about longitude 80°E at the end of April and the beginning of May. Ridging to the south of the cyclone was minimal. On reaching higher latitudes the system was influenced by the higher level westerlies, its behaviour then resembling that of a depression of southern origin.

The first anticyclonically curved isobar outside the mature tropical system was 1008 mb on May

(iii) Features of the Track (fig. 11.1)

“Marcelle” had a lifetime of ten days and in that period travelled 8000 km. An unusual feature of its track was the early recurvature.

Forming slightly north of latitude 9°S near 87°E it travelled west for two days before gradually changing to a southerly course during 1st may. By 2nd May it was crossing the northern boundary of Mauritius’ area of responsibility and was named “Marcelle”.

Not until 3rd May when the cyclone was moving southsoutheast and moving into the Perth TCWC area of responsibility did its speed exceed 18 km/h.

“Marcelle” gradually accelerated as it moved into higher latitudes, and its course gradually became more easterly. By the time the system reached the Western Australian coast it was travelling east at 65 km/h.

On moving over the land the system briefly decelerated to about 37 km/h. Six hours later the low, moving to the southeast, crossed the south coast and accelerated to about 90 km/h.

(iv) Rainfall

Nothing is known of the rainfall associated with “Marcelle’ while it operated over the sea. Over the land rain directly attributable to the cyclone is impossible to determine for the total system was extremely complex. Mt Yokine recorded the maximum 24 hour fall – 26 mm on 8th May. Manjimup and Jarrahdale both recorded 18 mm in the 48 hours ending at 0900 WST on 9th May. Many places reported less than 4 mm in the same period and a few had no rain at all. Fig. 11.2 illustrates the rainfall in the Southwest Division in the 48 hours ending 0900 WST 9th May 1973.

(v) Winds and Associated Damage

No winds exceeding gale force were reported while “Marcelle” was a tropical storm, however from satellite information it is estimated that the winds exceeded 115 km/h on 2nd may when the storm was near its peak intensity.

At 71200 GMT the ship “Scots Park” near 30.9°S 107.7°E and some 260 km from the system centre reported winds of 93 km/h. This occurred when the low was re-developing.

By 071900 GMT 74 km/h northnortheast gales were recorded at Cape Naturaliste. At 072150 GMT wind strengths increased abruptly. The Head Keeper at the Cape Naturaliste lighthouse reported that the anemometer which only resisters to 130 km/h was hard against the upper stop so that he estimated the wins speed to be 157 km/h and from the northwest and westnorthwest. This strong wind lasted for an hour during which time it did not fall below 93 km/h.

There were several reports of similar wind strengths throughout the day. Even at Bremer Bay near the low’s exit point from the continent winds reached 130 km/h.

Very little rain accompanied the wind which was described as “hot and dry”. Consequently it was not surprising that sand and dust were raised. In the Jerdacuttup area alone a Department of Agriculture survey found that 2700 ha were affected by the cyclone. Soil was stripped from 13000 ha, 800 ha of crop were lost, 33 catchment areas were completely covered by sand which also blocked 2 km of road.

At Munglinup where visibility was reduced to a few meters, dust reached a height of 2000 m.

A report from Ravensthorpe district estimated that all topsoil was gouged from a strip 160 km and 25 to 35 km wide. Sand stripped paint from vehicles. It also cut off freshly germinated crops at ground level over a very large area. From Erinair came a report that stock in poor condition were blown over and buried alive. A similar fate befell sheep at Jerramungup in the fleeces that it was impossible for the sheep to stand.

Over a region perhaps 160 km wide beginning from the western beaches as far north as Mandurah and following a curved path on the northern side of the cyclone’s track, buildings and sheds were damaged or destroyed and fences were brought down by blowing debris.

Overall the damage was of such an unusual magnitude that the State Government declared the entire State of Ravensthorpe a wind damaged area and rendered special assistance.

(vi) Seas, Swell, Storm Surges and Related Damage

Rough seas and a heavy swell were reported between Kalbarri and Esperance for some days following 7th May. After 8th May these conditions were attributable to southern ocean storms. A number of small boats at several anchorages along the coast were damaged after being torn from or dragging their moorings. Beaches were not noticeably eroded by the sea action.

No storm surges were reported from coastal stations.

(vii) Satellite Analysis

Photographs received from the ESSA 8 and NOAA 2 satellites provided information regarding the existence and behaviour of tropical cyclone “Marcelle”.

From 27th – 29th April several amorphous masses of cloud were apparent in the area between the equator and 10°S and between 85°E. On 29th April one of these cloud masses appeared to be more organised than the others. Post analysis using the Dvorak method indicates that it was at this time a T-2 tropical low with ongoing development indicated. Over the next few days deepening did proceed at about the typical rate with the cyclone reading a maximum final T-number 4.5 on 2nd May. As “Marcelle” moved towards higher latitudes ongoing weakening occurred until 6th May when the now extra-tropical cyclone became associated with a southern cold front at about altitude 30°S.

This complete system appeared on satellite photographs of 7th and 8th May in a form similar to that of a cold front with a wave included wave. The fragmented nature of the cloud structure in this system correlates with the lack of widespread heavy rain but does not indicate the low pressures involved and the severity of the winds.

Table 11.1 Data from Satellite Photographs

Satellite Name	Orbit Number	Date/Time (GMT)	Estimated posn. of centre °S	Estimated posn. of centre °E	Final T No.	Min. Sea Level Pressure (mb)
ESSA 8	20029	290323	9.0	88.5	2	1001
	20042	300414	7.5	84.0	3	992
	20067	020402	10.2	79.0	4.5	973
	20092	040349	17.3	81.0	3	982
	20104	05051	23.7	82.7	2	992