

Tropical Cyclone Madge 08/03/73 – 18/03/73

(i) General

The seventh tropical cyclone to affect the Western Australian Region was “Madge”. As did “Leah” some days previously this cyclone also entered the Western Region after first developing in the Northeastern Region and then travelling through the Northern region. However on this occasion the low pressure system was centred over the continent. “Madge” crossed into the pressure system was centred over the continent. “Madge” crossed into the region in the vicinity of Wyndham, moved in a generally westsouthwestward direction through the North and West Kimberley and then crossed the coast near Cape Leveque. On passing once again over the warm tropical waters the low immediately began reintensifying. From 12th to 13th March “Madge” was a very intense storm with an estimated minimum central pressure of 954 mb. By 14th march some weakening had occurred and this continued until the system had completely dissipated on the 18th March.

Although winds associated with cyclone “Madge” are estimated to have reached about 200 km/h during its most intense period no actual damage was reported. Evacuation of personnel from Ocean Digger and Big John, two oil rigs operating on the Northwest Shelf, was effected on 10th March.

(ii) Development

One of the main characteristics of cyclone “Madge” was its redevelopment into an intense storm after crossing the Kimberley region of Western Australia. The low moved into the Western Australian region as a weak rain depression in the Joseph Bonaparte Gulf on the morning of 7th March. By 071000. GMT the low was near the coast some 110 km northeast of Wyndham and moving westsouthwest at about 14 km/h. While the low was located over the land the central pressure remained steady at about 998 mb. On crossing King Sound redevelopment began with pressures rapidly falling to 990 mb by 091600 GMT and winds gradually increasing. Intensification was not significantly retarded during the few hours that the low took to cross the land area south of Cape Leveque before passing over open tropical waters again at 100001 GMT.

Deepening took place quite rapidly, for by 111200 GMT the cyclone had apparently reached maturity when the central pressure is estimated to have fallen below 955 mb. “Madge” remained an intense storm during 12th and 13th March while travelling in a generally direction. By 14th March the cyclone was filling slowly. This trend continued until 18th March when the cyclone had degenerated completely.

The first anticyclonically curved isobar outside the storm at maturity was 1008 mb at 111600 GMT.

(iii) Features of the Track (fig. 7.1)

“Madge” was active in the area for 11 days. In that time it travelled a distance of 5000 km in a generally westsouthwesterly direction. This unusually long track was the second outstanding feature associated with “Madge” while in the Northwestern Australian Region.

The cyclone travelled at a relatively constant speed between 10 and 15 km/h during its passage through the North and West Kimberley. After the cyclone moved over the ocean however, as well as developing rapidly, its speed of movement increased to 20 to 30 km/h. From 100100 GMT to 120100 GMT the direction of motion was generally westsouthwest. It slowed temporarily during the next 24 hours to a minimum speed of about 13 km/h. From 120100 GMT until degenerating on 18th March, “Madge” moved generally westward at between 20 and 30 km/h. Temporary decelerations and directional variations from the track occurred in the periods 130400-140001 GMT and 160001-170001 GMT.

During

“Madge’s” lifetime there was no major upper trough activity in the Western Australian Region. The continual westerly movement of the cyclone occurred while a subtropical ridge persisted near the surface at about latitude 35°S.

(iv) Rainfall and Flooding

During the period that it was over the Kimberley “Madge” caused very heavy rain. Fig. 7.2 shows the cumulative rainfall associated with the cyclone for the period 7th to 11th March 1973. The highest cumulative falls were Kununurra 189 mm, Drysdale River 249 mm, Cockatoo Island 315 mm, Mitchell Plateau 249 mm and Kuri bay 241 mm. The highest daily totals in the 24 hours to 0900 WST on the days mentioned were Kuri Bay 205 mm on 9th, Cockatoo Island 207 mm on 9th, Drysdale River 161 mm on 9th, Wyndham 141 mm on 8th, Kununurra 132 mm on 8th, Gibb River 128 mm on 8th and Napier Downs 173 mm on 10th.

Flooding which occurred on 8th March 1973 cut the Great Northern Highway between Wyndham and Hall’s Creek, and the Duncan Highway between Kununurra and Hall’s Creek. Roads in the Derby area were also damaged by the heavy rain. No reports of widespread flooding were received although it is probable that areas other than those mentioned were affected.

(v) Winds

“Madge” was a severe storm; hurricane force winds were reported on several occasions from ships near its centre. Winds exceeding gale force were reported as far as 440 km from the centre.

While the low pressure system was centred over the land reported winds were less than 37 km/h until 081900 GMT when Cape Leveque reported a westnorthwesterly wind at

55 km/h. At 082200 GMT gale force winds were reported from that station. These continued for about 30 hours, the maximum wind reported being 83 km/h at 100400 GMT. Cape Leveque was the only land station to report winds exceeding gale force but the automatic weather stations located to the north, Scott Reef, Browse Island, Ashmore Island, consistently reported winds between 28 and 46 km/h in the westnorthwesterly stream.

The first ship to experience gale force winds was the “Takuyomaru” which reported 78 km/h winds at 101500 GMT. The ship was then about 55 km east of the centre. At 102300 GMT the “Narottammorajee” when about 55 km from the centre, estimated the wind speed at 139 km/h from the southeast. Several other ships farther away reported winds exceeding gale force at about that time. At 110600 GMT the “Narottammorajee”

When about 55 km from the centre, estimated the wind speed at 139 km/h from the southeast. Several other ships farther away reported winds exceeding gale force at about that time. At 110600 GMT the “Narottammorajee” was on the northern side of the cyclone at a distance of about 70 km. It then reported 148 km/h, the strongest reported wind associated with “Madge”. Winds exceeding gale force persisted until at least 130600 GMT when the “Alkuwait” reported 93 km/h. After that occurrence all observations were distant from the cyclone and less than gale force. A selection of ship reports is presented in Table 7.1.

(vi) Sea, Swell Storm Surges and Related Damage

Rough seas and a heavy swell were reported by many ships on 11th March but there were few ship reports available after 12th march. Satellite evidence indicates that “Madge” was at its most intense during 12th march. Consequently rough seas and a heavy swell were probably being continuously generated throughout that period. The “Takuyomaru” reported the highest sea of 5 m at 101500 GMT when the ship was 55 km to the west of the centre. The heaviest swell reported was 6 to 8 m by the ship “Lady Sarah” at 110600 GMT when 160 km to the southwest of the centre.

A water level gauge record taken at the Dampier Service Jetty shows that the tide increased above the predicted levels on 11th and 12th March. The predicted and recorded heights of the high and low waters for those days and their differences are displayed in table 7.2. The greatest increase occurred during high water at 0247 WST 12th march when the measured tide was about 0.5 m above the predicted level. At that time cyclone “Madge” was 380 km to the northwest.

No damage attributable to sea wave, swell or storm surge was reported.

(vii) Radar

For a short period from 101930 GMT to 110350 GMT cyclone “Madge” was just within range of the Port Hedland weather radar.

The position and movement as indicated by the radar fixes closely correlate with those determined using other data.

(viii) Satellite Photo Analysis

Photographs from daily passes of the ESSA 8 satellite supplemented by a less complete set of NOAA 2 photographs aided the description of “Madge’s” track, development and decay. Data from the ESSA 8 photographs are shown in Table 7.3.

While the low pressure system which had been cyclone “Madge” was located over the Kimberley all the characteristics of imminent seedling development were apparent in the ESSA 8 and NOAA 2 photographs of 8th and 9th march. On crossing King Sound, development evidently did occur, for in the ESSA 8 photograph of 100054 GMT very tight banding outside 3° dense overcast was visible. The system gradually became a well developed storm with a T-number of 5.5 on 12th march. By 14th March the cloud system had begun to degenerate. This weakening progressed slowly but steadily until 17th March when the T-number was less than 2. By 18th March “Madge” had almost completely dissipated.

Table 7.1 Selected Ship Reports

Ship	Position °S °E	Date/ Time GMT	Bearing/ Distance From centre (km)	Wind (km/h)	Sea (m)	Swell	Weather	Pressure (mb)
Takuyomaru	118.4 118.8	101500	260/ 55	230/ 78	5	ENE/5	Heavy showers	1004.5
Narottam- morarjee	18.4 117.8	102300	030 / 55	140/139			Continuous Rain	998.6
Amber Pacific	17.4 117.0	110100	320/ 85	260/ 96			Torrential Rains	998
Narottam- morarjee	17.9 117.5	110200	220/ 20	150/111			Continuous Rain	974.1
BP Endeavour	18.7 117.2	110511	120/ 60	100/111				986.0
Narottam- morarjee	18.1 117.3	110600	050/ 70	320/148			Continuous Rain	994.2
BP Endeavour	18.6 117.2	110600	130/ 55	070/111		8		992.8
Lady Sarah	19.7 116.3	110600	200/160	110/ 96	SE 3/4	ESE 6/8		1003
BP Endeavour	18.5 117.5	111000	080/140	040/ 96		NE/7		994.2
Andromeda	15.8 116.8	120400	010/345	320/ 69				995
Senator	22.5 108.3	120600	210/440	160/ 83				1009
Al-Kuwait	18.5 105.6	130600	030/120	310/ 93			Continuous drizzle	993.0

Table 7.2

Date	Time (WST)	Predicted Hts of High & Low waters P(m)	Measured Hts of High & Low waters M(m)	Variations M-P (metres)
11	0210	3.5	3.5	0
	0814	0.9	1.0	+0.1
	1419	4.0	4.1	+0.1
	2105	0.8	1.2	+0.4
	0247	3.1	3.6	+0.5
	0841	1.2	1.5	+0.3
	1458	3.6	3.60	0

Table 7.3 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	19375	080106	16	127.4	2	1001
	19388	090158	18	124.5	2	1001
	19400	100054	16.5	122.5	3	992
	19413	110145	17.8	117.5	4.5	973
	19426	120236	18.7	111.5	5.5	954
	19439	130322	20.2	104.8	5	954
	19451	140224	20.7	103.0	4	964
	19464	150315	20.5	97.3	2.5	987
	19477	160406	19.8	92.8	2	997
	19489	170303	20.0	91.6	1.5	1004
	19502	180357	20	86		