

Tropical Cyclone Helen 28/02/1974 to 08/03/1974

(i) General

"Helen" was the eighth tropical cyclone of the 1973/74 season to develop in the Western Australian Region; and it was the fifth to have some direct effect on the Australian continent. Although it did not recurve to cross the Australian coast, for about 60 hours it continually nosed that threat as it moved approximately parallel to the coast some 130 km from it. The centre of the developing cyclone passed almost directly over two oil rigs, the "Glomar Tasman" and the "Ocean Digger", operating on the Northwest Shelf about 250 km apart.

No reports of damage attributable to cyclone "Helen" were received. At its most intense "Helen" was well west of the continent and travelling westward.

(ii) Development

Because cyclone "Helen" developed near the northwest coast of Western Australia and subsequently moved through a region which was frequented by shipping and which was being explored by drilling ships for undersea petroleum bearing deposits its early developmental history has been catalogued better than many others which occurred in this season. Its later changes in characteristics were monitored using satellite imagery relayed from the weather satellites ESSA 8 and NOAA 2.

The centre of the developing disturbance passed within a few kilometres of the oil rig "Glomar Tasman" between 010200 and 010230 GMT. The minimum pressure recorded at that time was 988.9 mb. Twenty hours later at 012230 GMT the eye passed over another oil rig "Ocean Digger". The pressure at the time was not reported but at 012200 GMT it was 985 mb and falling. These differences in atmospheric pressure in the "eye" are synoptic indications that deepening was occurring. Evidence from the satellite cloud photographs confirmed this development and once the centre of the system was west of Australian longitudes these photographs provided almost the only evidence of the development and decay curve of cyclone "Helen".

The system reached its peak intensity estimated at about 973 mb on 4 March after developing at a relatively slow rate. From 6 March degeneration occurred at about the typical rate.

The value of the first anti-cyclonically curved isobar at maturity was 1008 mb on 4 March.

(iii) Features of the Track

During the eight days that "Helen" was a distinguishable system it travelled a distance of about 3400 km. The path displayed no unusual features but was characterised by its rather steady westerly direction.

The speed of movement of cyclone "Helen" was relatively constant at about 17 km/h. The more noticeable departures were on 4 March when it travelled at about 26 km/h and on 5 March when it moved quite slowly and averaged about 6 km/h for the 24 hours.

(iv) Rainfall and Flooding

Only light to moderate falls of rain were reported during the period that cyclone "Helen" was located off the northwest coast. The rains were apparently not general but the result of thunderstorm activity; hence significant variation in the reported amounts occurred. Between 28 February and 3 March most stations reported totals of less than 20 mm.

However at few locations in the Fortescue 24 hour rainfall totals ending at 9 am 2 Larch exceeded 30 mm. These stations and their reports are Mt Stuart 65 mm, Roebourne 45 mm and Peedamulla 36 mm.

No reports of flooding or damage were received.

(v) Winds and Associated Damage

The first report of winds exceeding gale force was received from the oil rig "Glomar Tasman" at 010200 GMT. At about that time the wind which had been blowing from the southeast at about 65 km/h rapidly backed to the northeast at about 55 km/h as the system centre passed over the rig. Table 8.1 gives a summary of reports from the "Glomar Tasman".

Reports from the "Ocean Digger" were consistent with the other evidence that the cyclone was continuing to deepen. From 011300 GMT until 012200 GMT the wind gradually backed from southwesterly to easterly and increased in strength from about 65 km/h to a maximum of about 100 km/h reported at 012200 GMT just before the centre passed over the rig. In the north-easterlies to the rear of cyclone "Helen" the maximum speed reported by the "Ocean Digger" was 55 km/h. A summary of reports from the "Ocean Digger" is given in Table 8.1.

Few other ships were affected by gale force winds. The only reports received are given in Table 8.1.

The strongest wind reported from a land station while "Helen" was moving over the northwest Shelf was 55 km/h from Roebourne at 011600 GMT and 111900 GMT.

Winds as reported from the "Glomar Tasman" and "Ocean Digger" are consistent with those expected using the Dvorak technique. On 4 March the winds probably reached their maximum strength the mean wind being estimated at about 125km/h.

No wind damage was reported.

(vi) Seas and Swell

Table 3.i also contains information regarding the seas and swells generated by cyclone "Helen". In the earlier reports, those of the Glomar Tasan, seas of about 1.0 m were usual and the swell was less than 4 m. However by the time "Helen" was affecting the "Ocean Digger" seas of 3.5 m were being constantly reported and the swell had increased to a maximum of 10 m.

(vii) Satellite Analysis

The meteorological satellites ESSA 8 and NOAA 2 provided photographic information regarding the cloud mass associated with cyclone "Helen".

A summary of the satellite data is contained in Table 8.2.

While the system was in its developing stages the photographs did not display the cloud structure particularly well but observations from ships and land stations allowed the developmental changes and the system's movement to be determined reasonably accurately. Estimates of the minimum sea level pressure using the Dvorak technique were higher than those determined from other evidence. In Table 8.2 these latter values, when available, are shown in brackets. During its mature and dissipating stages the cloud photographs were more useful for determining estimates of the cyclone location and intensity.

Table 8.1 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							
Glomar Tasman	18.8	117.9	281300	-	340/30	0.6	W1.5	Thunderstorms	1000.1
Glomar Tasman	18.8	117.9	010200	0	140/65 max. 74 then rapidly			-	988.9
Glomar Tasman	18.8	117.9	010400	040/30	360/65	1.2	3.7	-	991.4
Glomar Tasman	18.8	117.9	010700	040/50	340/59	1.2	3.1	-	992.5
Glomar Tasman	18.8	117.9	011000	060/100	360/44	1.0	NW 3.3	Rain	995.9
Ocean Digger	19.9	115.5	011300	240/100	220/46 max. 74	-	-	Rain squalls	994
Ocean Digger	19.9	115.5	011600	230/70	180/65 max. 74	S 2-3	S 7-9	Squally	992
Ocean Digger	19.9	115.5	011800	230/45	160/72 max. 102	SSE 3.5	S 6-9	Rain squalls	989.5
Ocean Digger	19.9	115.5	011900	230/30	160/72 max. 89	SSE 3.5	S 7-9	Rain squalls	988
Ocean Digger	19.9	115.5	012000	230/22	160/89 max. 107	SSE 3.5	SSE 6-9	-	987
Ocean Digger	19.9	115.5	012100	230/14	160/89 max. 120	SSE 3.5	SSE 6-9	-	987
Ocean Digger	19.9	115.5	012200	230/5	090/104 max. 113	E 3.5	6-10	Squalls	985
Ocean Digger	19.9	115.5	020030	080/40	040/56 max. 65	NE 3.0	NNE 6-8	Squalls	993
Ocean Digger	19.9	115.5	020400	080/80	040/46 max. 65	NE 3.0	NE 6-9	Rain squalls	995
Kohjwan Maru	18.7	117.7	010600	040/45	320/74	NW	NW 3.5	-	991.0
Stirling Bridge	20.5	112.7	021200	270/70	180/74	S3	S4	-	1000.5
Stirling Bridge	21.7	103.8	040001	230/380	130/65	SE 2		Drizzle	1006.9

Table 8.2

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	23857	280123	17.5	122.4	2	1003 (1006)
	23870	010214	18.7	117.8	3	994 (988)
	23882	020116	20.0	116.8	3.5	988 (982)
	23895	030207	19.4	110.6	4	981
	23908	040252	20.0	106.5	4.5	973
	23921	050349	21.8	101.2	4	981
	23933	060245	22.0	100.0	3	994
	23946	070336	21.5	96.0	2.5	999
	23959	080427	21.0	91.5	1.5	1005