

Tropical Cyclone Sam 12/12/1977 to 21/12/1977

(i) General

The first tropical cyclone of the 1977/78 season was "Sam". This cyclone only reached moderate intensity and spent its entire life over the tropical waters of the Indian Ocean. Most of the data relating to "Sam" comes from satellite photographs, however conventional ship reports suggest that the system's influence was of quite limited extent. Maximum winds of about 90 km/h were probably generated near the centre on 17 December.

(ii) Development

Apart from information received from meteorological satellites little is known of the development of tropical cyclone "Sam". A low pressure system was located to the northeast of Cocos Island and to the northwest of Christmas Island on 12 December. As the depression drifted northwest and then westsouthwest its influence on Cocos Island was minimal. The winds slowly backed from southeast to east and the mean sea level pressure at no time fell below 1009.7 mb.

Satellite photographs indicate that "Sam" became a tropical cyclone on 14 December and then continued to develop slowly reaching its maximum intensity on 17 December. "Sam" was a small tropical cyclone of only moderate intensity. It is estimated that the minimum pressure reached at the centre was 990 mb. The lowest pressure reported was 1008.0 mb from the ship "Abel Tasman" at 170900 GMT when it was located 460 km north of the centre.

After reaching maturity on 17 December "Sam" began to weaken while still over tropical waters. A temporary redevelopment occurred on 20 December but within 24 hours the system had weakened markedly.

On 20 December the weakening system moved into the Mauritius warning area where it was renamed "Celimene" for a few hours.

(iii) Features of the Track (Fig. 1.1)

"Sam" spent its whole lifetime over the tropical waters of the central Indian Ocean. It travelled about 2400 km in the eight days of its existence.

From an initial position, about 300 km north of Cocos Island, the developing low pressure system moved westsouthwestward at about 35 km/h. As it developed into a tropical cyclone on 14 December its rate of movement decreased to about 15 km/h. From 16 to 20 December its direction of movement was southwesterly at speeds varying between 3 km/h and 10 km/h. On 20 December "Sam" began a more rapid movement to the west as it de-generated.

(iv) Winds

Satellite photographs suggest that the maximum winds circulating about "Sam" would have reached about 90 km/h on 17 December. Gale force winds are estimated to have been present from 16 to 18 December.

(v) Seas and Swell

Although rough seas and a heavy swell were probably generated close to the cyclone centre, the highest swell reported was southsoutheasterly 2.5 m from the ship "Abel Tasman" at 170600 and 170900 GMT when 520 and 460 km to the north of the cyclone respectively.

(vi) Satellite Analysis

A summary of the data taken from the NOAA 5 satellite photographs is given in Table 1.1.

On 12 December a mass of convective cloud was evident north of latitude 10°S between longitudes 95°E and 105°E. By 13 December some signs of organisation of the cloud mass were present. In the photograph from NOAA 5 140140 GMT orbit 6218 a small central dense overcast (CDO) was present with a wide feeder band surrounding it. The system was designated T 2 in Dvorak's classification. During the next 72 hours the CDO became slowly larger but at no time was outer cloud banding significant. On 17 December the system reached T 3.5, its maximum stage of development. At this time there was upper level shear across the cyclone and it seemed to be moving into a stratocumulus field. Over the next 48 hours the cyclone weakened but in the photograph of 190150 GMT orbit 6280 the upper level shear across the cyclone was no longer apparent and it had moved through the stratocumulus field. Some redevelopment occurred within the following 24 hours but this was to be only temporary as the upper level shear was re-established and rapid weakening of the cyclone occurred by 21 December.

Table 1.1 Data from Satellite Photographs

Satellite Name	Orbit Number	Date/ Time	Estimated posn. of centre		Final T No	Min. Sea Level (mb)
			°S	°E		
NOAA 5	6206	130224	7.6	96.0	1	1006
	6218	140140	9.5	90.0	2	1003
	6230	150253	10.3	87.0	2.5	999
	6243	160205	10.8	85.5	3	994
	6255	170121	12.4	84.3	3.5	990
	6268	180234	13.0	83.8	2.5	999
	6280	190150	13.5	83.2	2	1003
	6292	200305	14.8	82.2	2.5	999
	6305	210218	15.0	78.0	1	1006