CHAPTER IV - Summary of South Pacific and South Indian Ocean Tropical Cyclones

1. GENERAL

This is the first year that Southern Hemisphere tropical cyclones are included in the Annual Tropical Cyclone Report. In retrospect, the JTWC area of responsibility (AOR) was expanded on 1 October 1980 to include the Southern Hemisphere from 180 degrees longitude westward to the east coast of Africa. Details on tropical cyclones in this region for the July 1980 to June 1982 are contained in Diercks et al, (1982). For the July 1982 through June 1984 period, reference the NOCC/JTWC TECH NOTE 86-1. As in earlier reports, data on tropical cylones forming in, or moving into, the South Pacific Ocean east of 180 degrees, which is the Naval Western Oceanography Center (NAVWESTOCEANCEN) AOR, are included for completeness.

JTWC provides the sequential numbering for all South Pacific and South Indian Ocean significant tropical cyclones. The current convention (as stated in USCINCPACINST 3140.1 (series)) for labelling tropical cyclones that develop in the South Indian Ocean (west of 135 degrees east longitude) is to add the suffix "S" to the assigned tropical cyclone number, while those originating in the South Pacific Ocean (east of 135 degrees east longitude) receive a "P" suffix. The "P" suffix also applies to significant tropical cyclones which form east of the 180 degrees in the South Pacific Ocean. Also, it should be noted that to encompass the Southern Hemisphere tropical cyclone season, which occurs from January through April, the limits of each tropical cyclone year are defined as 1 July to 30 June. Thus, the 1985 Southern Hemisphere tropical cyclone year is from 1 July 1984 to 30 June 1985. (This is in contrast to the convention for labelling Northern Hemisphere tropical cyclones which is based on the calendar year - 1 January to 31 December - to include the seasonal activity from May through December.)

TABLE 4-1. SOUTH PACIFIC AND SOUTH INDIAN OCEAN

1985 SIGNIFICANT TROPICAL CYCLONES

TROPICAL CYCLONE	PERIOD OF WARNING	CALENDAR DAYS OF WARNING	NUMBER OF WARNINGS ISSUED	MAXIMUM SURFACE WINDS - KT(M/S)	ESTIMATED MSLP - MB	BEST TRACK DISTANCE TRAVELED - NM(KM)
01S ----------	11 NOV - 14 NOV	4	9	50 (26)	987	2026 (3752)
02S BOBALAHY	03 DEC - 07 DEC	5	10	55 (28)	983	1208 (2237)
03S EMMA	10 DEC - 12 DEC	3	6	45 (23)	990	1375 (2547)
04P ----------	12 DEC - 13 DEC	2	4	35 (18)	996	845 (1565)
05S FRANK	23 DEC - 27 DEC	5	10	75 (39)	968	569 (1054)
06P ----------	26 DEC - 27 DEC	2	2	45 (23)	990	464 (859)
07P MONICA	27 DEC - 29 DEC	3	5	65 (33)	971	1322 (2448)
08P ----------	29 DEC - 31 DEC	3	5	45 (23)	990	948 (1756)
09P DRENA	11 JAN - 13 JAN	3	6	50 (26)	988	612 (1133)
10S CELESTINA	12 JAN - 21 JAN	10	20	65 (33)	975	1692 (3134)
11P ERIC	14 JAN - 18 JAN	5	8	100 (51)	950	3030 (5612)
12S ----------	15 JAN - 17 JAN	3	4	35 (18)	996	874 (1619)
13P NIGEL	16 JAN - 19 JAN	4	8	105 (54)	937	2414 (4471)
14P ODETTE	17 JAN - 22 JAN	6	11	100 (51)	942	1701 (3150)
15S DITRA	27 JAN - 31 JAN	5	9	70 (36)	971	1154 (2137)
16P FREDA	28 JAN - 30 JAN	3	6	75 (39)	966	2035 (3769)
17S GERTIE	30 JAN - 31 JAN	2	4	55 (28)	985	432 (800)
18P ----------	02 FEB - 06 FEB	5	9	35 (18)	996	941 (1743)
19S ESITERA	05 FEB - 10 FEB	6	11	50 (26)	987	1612 (2985)
20S HUBERT	12 FEB - 17 FEB	6	11	55 (28)	983	2408 (4460)
21S FELISKA	14 FEB - 19 FEB	6	11	50 (26)	987	511 (946)
22S ISOBEL	14 FEB - 21 FEB	8	15	50 (26)	987	1416 (2622)
23S GERIMENA	14 FEB - 25 FEB	12	23	65 (33)	981	1298 (2404)
24S ----------	19 FEB - 20 FEB	2	4	35 (18)	996	756 (1400)
25S JACOB	19 FEB - 26 FEB	8	15	75 (39)	966	2422 (4486)
26P PIERRE	20 FEB - 22 FEB	3	6	45 (23)	990	978 (1811)
27P GAVIN	05 MAR - 07 MAR	3	5	55 (28)	983	1539 (2850)
28S KIRSTY	07 MAR - 14 MAR	8	17	115 (59)	930	1389 (2572)
29S LINDSAY	08 MAR - 10 MAR	3	5	55 (28)	970	579 (1072)
30P HINA	13 MAR - 17 MAR	5	10	135 (69)	920	2469 (4573)
31P SANDY	20 MAR - 25 MAR	6	12	120 (62)	920	2391 (4428)
32P TANYA	29 MAR - 01 APR	4	10	60 (31)	979	935 (1732)
33S HELISAONINA	11 APR - 16 APR	6	12	110 (57)	932	1769 (3276)
34S GRETEL	11 APR - 14 APR	4	6	45 (23)	988	483 (895)
35S MARGOT	12 APR - 17 APR	6	11	70 (36)	970	1111 (2058)
1985 TOTALS:		98*	320			

*OVERLAPING DAYS INCLUDED ONLY ONCE IN SUM.

NOTE: NAMES OF CYCLONES GIVEN BY REGIONAL WARNING CENTERS (NANDI, BRISBANE, DARWIN, PERTH AND MAURITIUS) AND APPENDED TO JTWC WARNINGS, WHEN AVAILABLE.

2. SOUTH PACIFIC AND SOUTH INDIAN OCEAN TROPICAL CYCLONES

The 1985 year (1 July 1984 through 30 June 1985) was unusually active, with 35 tropical cyclones (see Table 4-1 and pages 142 through 146) reaching warning status. This exceeded the total of 30 tropical cyclones for 1984 (1 July 1983 - 30 June 1984) and proved to be the busiest year to date for JTWC. Six tropical cyclones occurred in the South Pacific east of 165 degrees east longitude, which matched the long term mean. The Australian area (105 to 165 degrees east longitude) accounted for 15 tropical cyclones as compared to the climatological mean of 10.3 - five more than normal. Fourteen tropical cyclones developed in the South Indian Ocean, which is almost twice the long term mean of 8.4 cyclones (See Tables 4-2 and 4-3). This represents the highest total for this area since at least the 1958-1959 season (Gray, 1979). In this regard, meteorological satellite surveillance of tropical cyclones has been updating climatologies since the early 1960s. (This meteorological watch from space detects tropical cyclones that might have previously gone undetected over the conventional data sparse oceanic areas.) Thus, tropical cyclone climatologies should benefit from increased surveillance from space in some areas, for example, the South Indian Ocean.

Caveat: Intensity estimates for southern hemisphere tropical cyclones are derived primarily from satellite imagery evaluation (Dvorak, 1984) and from intensity estimates reported by other regional warning centers. Only, in very rare instances are the intensity estimates based on surface observational data. Estimates of the minimum sea-level pressure are usually derived from the Atkinson and Holliday (1977) relationship between the maximum sustained one-minute surface wind and the minimum sea-level pressure (Table 4-4). This relationship has been shown to be representative for tropical cyclones in the western North Pacific and is also used by the Australian regional warning centers to provide intensity estimates. However, since these pressure estimates are usually based on wind intensities that were derived from interpretation of satellite imagery, considerable caution should be exercised when using these resultant pressure values in future tropical cyclone work.

TABLE 4-2. FREQUENCY OF TROPICAL CYCLONES BY MONTH AND YEAR FOR SOUTH PACIFIC AND INDIAN OCEAN

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
(1959 - 1978) AVERAGE*	---	---	---	0.4	1.5	3.6	6.1	5.8	4.7	2.1	0.5	---	24.7
1981	0	0	0	1	3	2	6	5	3	3	1	0	24
1982	1	0	0	1	1	3	9	4	2	3	1	0	25
1983	1	0	0	1	1	3	5	6	3	5	0	0	25
1984	1	0	0	1	2	5	5	10	4	2	0	0	30
1985	0	0	0	0	1	7	9	9	6	3	0	0	35
(1981 - 1985) AVERAGE	0.6	0	0	0.8	1.6	4.0	6.8	6.8	3.6	3.2	0.4	0	27.8
CASES	3	0	0	4	8	20	34	34	18	16	2	0	139

* (GRAY, 1979)

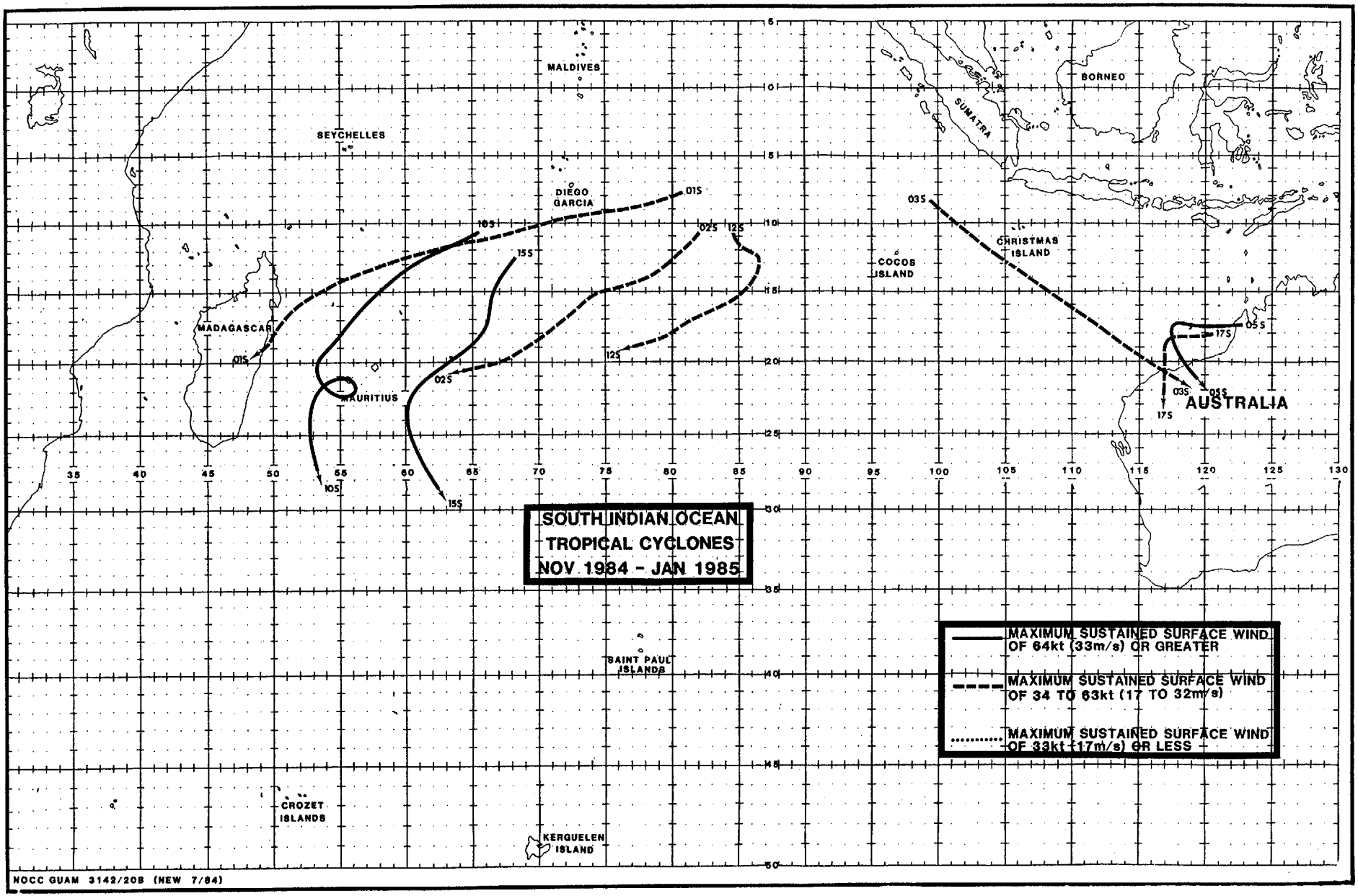
TABLE 4-3. YEARLY VARIATION OF TROPICAL CYCLONES BY OCEAN BASIN

YEAR	(105E WESTWARD) SOUTH INDIAN	(105E-165E) AUSTRALIAN	(165E EASTWARD) SOUTH PACIFIC	TOTAL
(1959 - 1978) AVERAGE*	8.4	10.3	5.9	24.6
1981	13	8	3	24
1982	12	11	2	25
1983	7	6	12	25
1984	14	14	2	30
1985	14	15	6	35
(1981 - 1985) AVERAGE	12.0	10.8	5.0	27.8
CASES	60	54	25	139

* (GRAY, 1979)

TABLE 4-4. MAXIMUM SUSTAINED SURFACE WIND VERSUS MINIMUM SEA-LEVEL PRESSURE (ATKINSON AND HOLLIDAY, 1977).

MAXIMUM SUSTAINED SURFACE WIND (KT)	EQUIVALENT MINIMUM SEA-LEVEL PRESSURE (MB)
30	1000
35	997
40	994
45	991
50	987
55	984
60	980
65	976
70	972
75	967
80	963
85	958
90	953
95	948
100	943
105	938
110	933
115	927
120	922
125	916
130	910
135	904
140	898
145	892
150	885
155	879
160	872
165	865
170	858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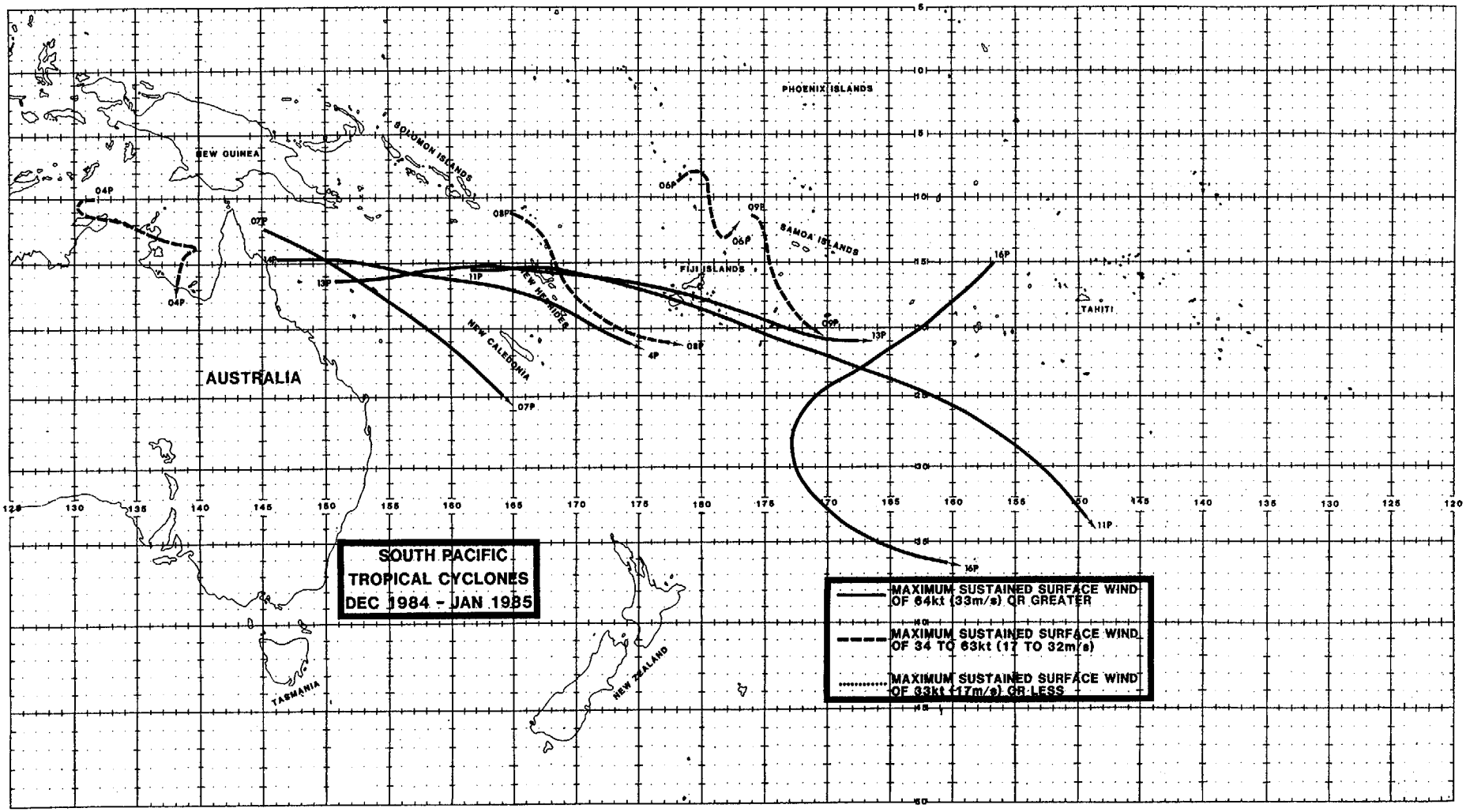
DIEGO GARCIA
MADAGASCAR
MAURITIUS
SUMATRA
BORNEO
CHRISTMAS ISLAND
COCOS ISLAND
AUSTRALIA
SAINT PAUL ISLANDS
CROZET ISLANDS
KERGUELEN ISLAND
SOUTH INDIAN OCEAN
TROPICAL CYCLONES
NOV 1984 - JAN 1985
MAXIMUM SUSTAINED SURFACE WIND OF 64kt (33m/s) OR GREATER
MAXIMUM SUSTAINED SURFACE WIND OF 34 TO 63kt (17 TO 32m/s)
MAXIMUM SUSTAINED SURFACE WIND OF 33kt (17m/s) OR LESS
NOCC GUAM 3142/208 (NEW 7/84)



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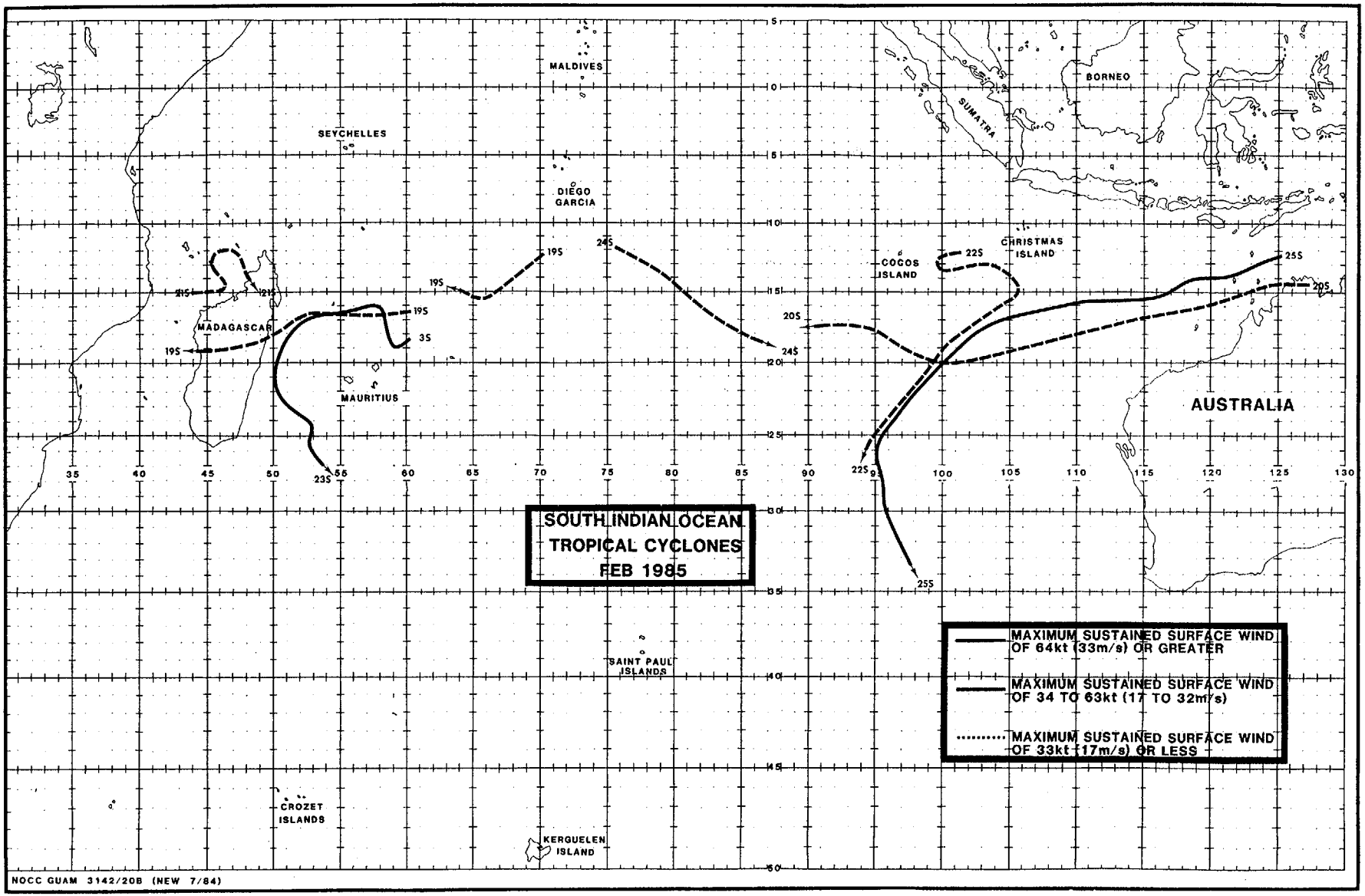
MALDIVES
SEYCHELLES
DIEGO GARCIA
BORNEO
SUMATRA
CHRISTMAS ISLAND
COCOS ISLAND
MADAGASCAR
MAURITIUS
AUSTRALIA
SAINT PAUL ISLANDS
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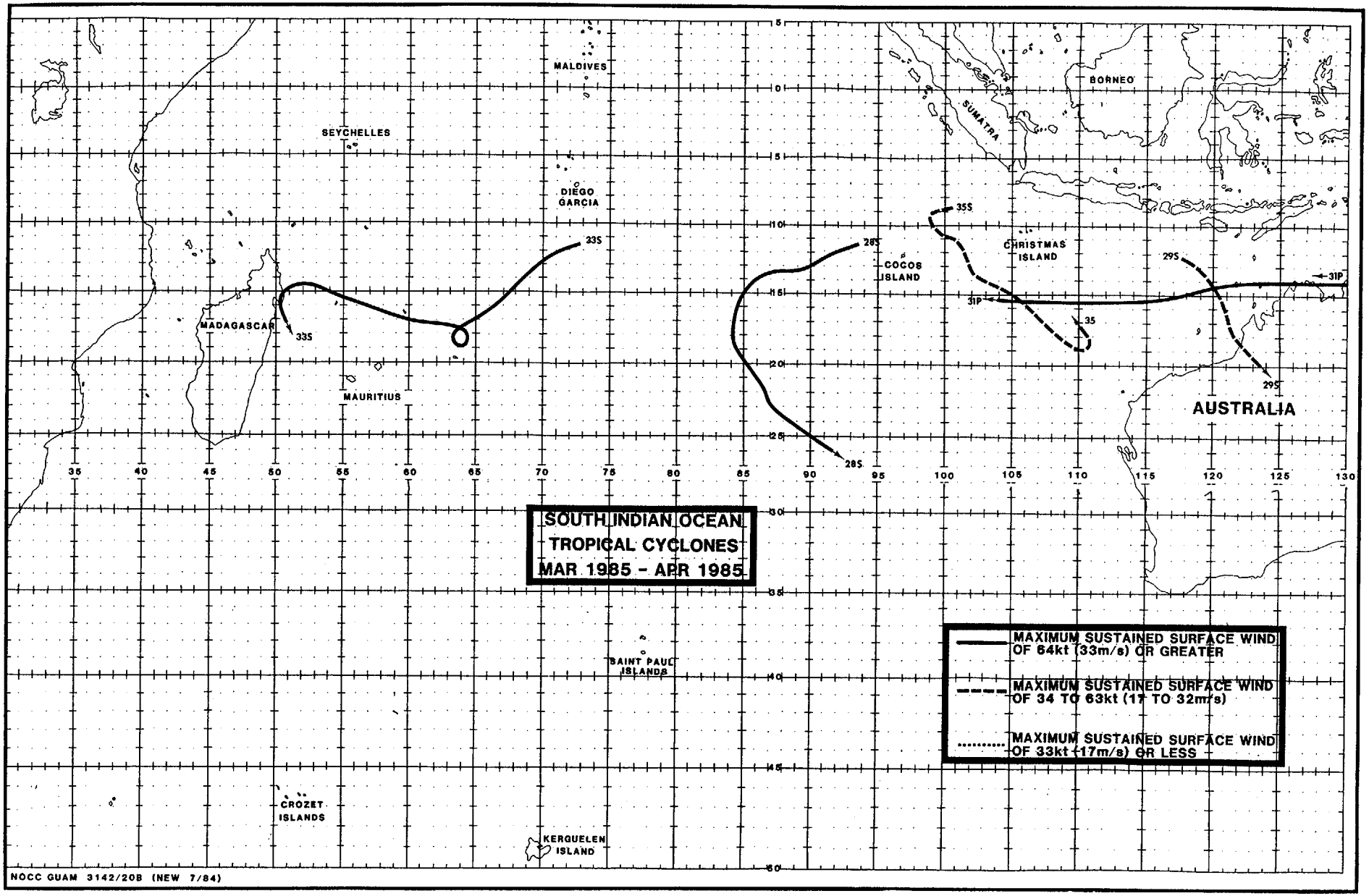
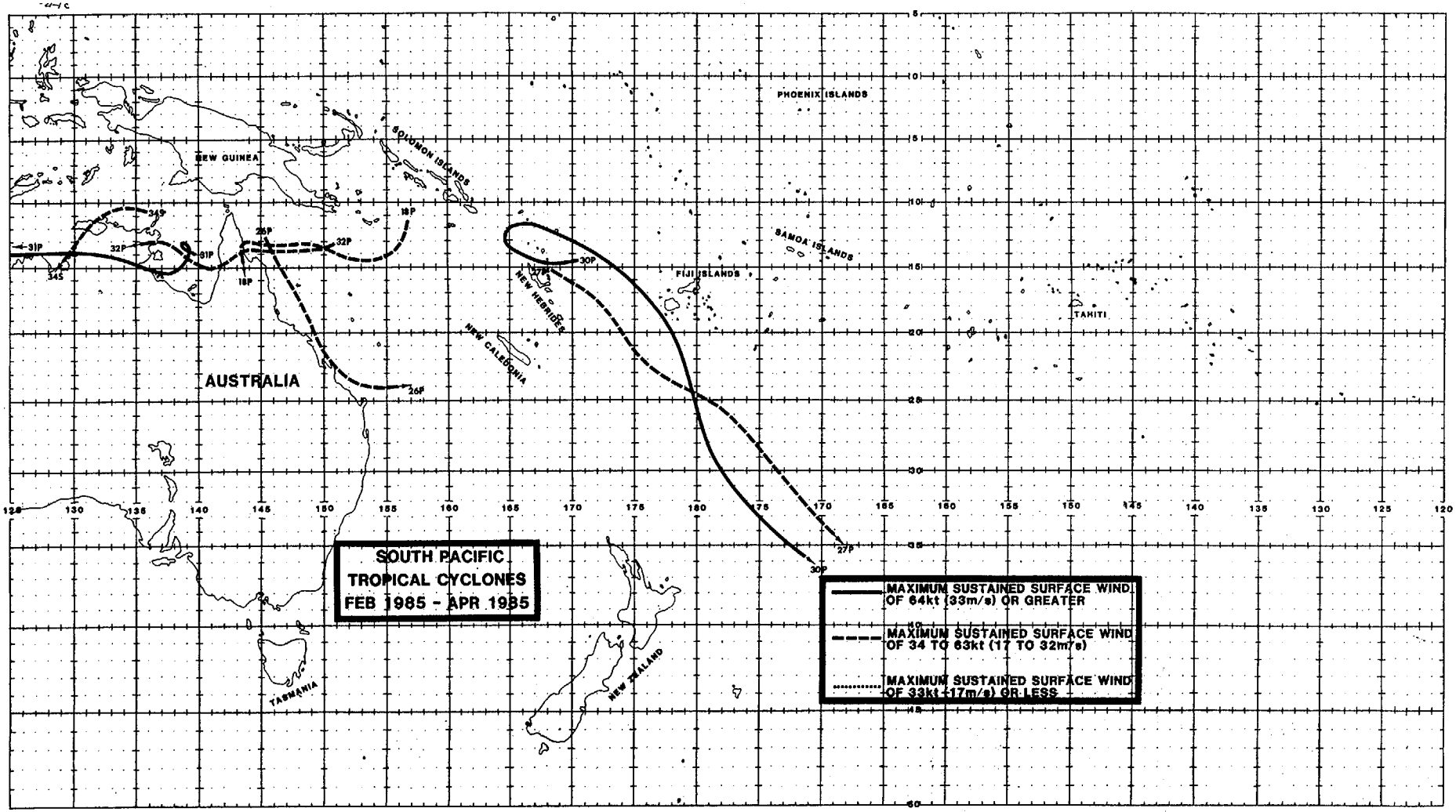
SOUTH INDIAN OCEAN
TROPICAL CYCLONES
FEB 1985
MAXIMUM SUSTAINED SURFACE WIND OF 64kt (33m/s) OR GREATER
MAXIMUM SUSTAINED SURFACE WIND OF 34 TO 63kt (17 TO 32m/s)
MAXIMUM SUSTAINED SURFACE WIND OF 33kt (17m/s) OR LESS
NOCC GUAM 3142/20B (NEW 7/84)


MALDIVES
SEYCHELLES
DIEGO GARCIA
MADAGASCAR
MAURITIUS
BORNEO
SUMATRA
CHRISTMAS ISLAND
COCOS ISLAND
AUSTRALIA
SAINT PAUL ISLANDS
CROZET ISLANDS
KERGUELEN ISLAND
33S
28S
35S
31P
29S
SOUTH INDIAN OCEAN
TROPICAL CYCLONES
MAR 1985 - APR 1985
MAXIMUM SUSTAINED SURFACE WIND OF 64kt (33m/s) OR GREATER
MAXIMUM SUSTAINED SURFACE WIND OF 34 TO 63kt (17 TO 32m/s)
MAXIMUM SUSTAINED SURFACE WIND OF 33kt (17m/s) OR LESS
NOCC GUAM 3142/20B (NEW 7/84)



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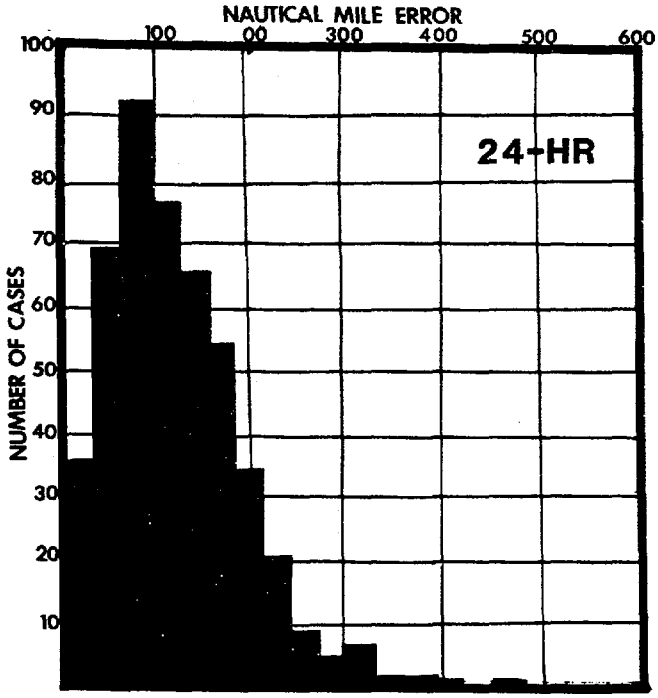

Figure 5-2. Frequency distribution of the 24-, 48-, and 72-hour forecast errors in 30 nm increments for all significant tropical cyclones in the western North Pacific during 1985.

FORECAST ERRORS (nm)

	24-HR	48-HR	72-HR
MEAN:	117	231	367
MEDIAN:	107	202	296
STANDARD DEVIATION:	72.6	153.3	254.5
CASES:	477	356	241