# CHAPTER IV - SUMMARY OF SOUTH PACIFIC AND SOUTH INDIAN OCEAN TROPICAL CYCLONES

## 1. GENERAL

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 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 cyclones forming in, or moving into, the South Pacific Ocean east of 180 degrees Longitude, which is the Naval Western Oceanography Center's (NAVWEST-OCEANCEN) 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 USCINC-PACINST 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 180 degrees Longitude in the South Pacific Ocean. Also, it should be noted that to encompass the southern hemisphere tropical cyclone season, which

TABLE 4-1. SOUTH PACIFIC AND SOUTH INDIAN OCEANS 1987 SIGNIFICANT TROPICAL CYCLONES

| TROPICAL CYCLONE | PERIOD OF WARNING | CALENDAR DAYS OF WARNING | NUMBER WARNINGS ISSUED | MAXIMUM SURFACE WINDS - KT (M/S) | ESTIMATED MSLP - MB |
|---|---|---|---|---|---|
| 01S -------- | 01 AUG - 03 AUG | 3 | 4 | 40 (21) | 994 |
| 02P OSEA | 22 NOV - 25 NOV | 4 | 7 | 55 (28) | 984 |
| 03P PATSY | 14 DEC - 18 DEC | 5 | 8 | 55 (28) | 984 |
| 04P RAJA | 23 DEC - 01 JAN | 10 | 18 | 90 (46) | 953 |
| 05P SALLY | 28 DEC - 04 JAN | 8 | 16 | 65 (33) | 976 |
| 06S -------- | 07 JAN - 09 JAN | 3 | 5 | 45 (23) | 991 |
| 07S -------- | 10 JAN - 12 JAN | 3 | 5 | 55 (28) | 984 |
| 08P TUSI | 16 JAN - 20 JAN | 5 | 10 | 100 (51) | 943 |
| 09S ALININA | 16 JAN - 20 JAN | 5 | 8 | 75 (39) | 967 |
| 09S ALININA* | 22 JAN - 23 JAN | 2 | 4 | 65 (33) | 976 |
| 10S CONNIE | 17 JAN - 20 JAN | 4 | 6 | 55 (28) | 984 |
| 11P IRMA | 19 JAN - 20 JAN | 2 | 3 | 30 (15) | 1000 |
| 12S DAMIEN | 01 FEB - 05 FEB | 5 | 9 | 50 (26) | 987 |
| 13P -------- | 04 FEB - 05 FEB | 2 | 4 | 40 (21) | 994 |
| 14P UMA | 05 FEB - 09 FEB | 5 | 9 | 80 (41) | 963 |
| 15P JASON | 07 FEB - 13 FEB | 7 | 13 | 65 (33) | 976 |
| 16P VELI | 08 FEB - 09 FEB | 2 | 3 | 30 (15) | 1000 |
| 17S CLOTILDA | 11 FEB - 16 FEB | 6 | 11 | 50 (26) | 987 |
| 18S ELSIE | 22 FEB - 25 FEB | 4 | 7 | 60 (31) | 980 |
| 19P -------- | 28 FEB - 01 MAR | 2 | 3 | 40 (21) | 994 |
| 20P WINI | 01 MAR - 06 MAR | 6 | 9 | 65 (33) | 976 |
| 21S DAODO | 03 MAR - 15 MAR | 13 | 25 | 75 (39) | 967 |
| 22P YALI | 08 MAR - 12 MAR | 5 | 8 | 65 (33) | 976 |
| 23P KAY | 08 APR - 16 APR | 9 | 17 | 65 (33) | 976 |
| 24S -------- | 23 APR - 26 APR | 4 | 8 | 75 (39) | 967 |
| 25P ZUMAN | 23 APR - 26 APR | 4 | 8 | 55 (28) | 984 |
| 26S -------- | 24 APR - 26 APR | 3 | 5 | 45 (23) | 991 |
| 27P BLANCHE | 22 MAY - 25 MAY | 4 | 7 | 55 (28) | 984 |
| 28S -------- | 25 JUN - 27 JUN | 3 | 5 | 35 (18) | 997 |
| 1987 TOTALS: | | 94 ** | 245 | | |

* REGENERATED
** OVERLAPPING DAYS INCLUDED ONLY ONCE IN SUM.

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

TABLE 4-2.

FREQUENCY OF CYCLONES BY MONTH AND YEAR

| 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 |
| 1986 | 0 | 0 | 1 | 0 | 1 | 1 | 9 | 9 | 6 | 4 | 2 | 0 | 33 |
| 1987 | 0 | 1 | 0 | 0 | 1 | 3 | 6 | 8 | 3 | 4 | 1 | 1 | 28 |
| (1981 - 1987) AVERAGE | 0.4 | 0.1 | 0.1 | 0.6 | 1.4 | 3.4 | 7.0 | 7.3 | 3.9 | 3.4 | 0.7 | 0.1 | 28.6 |
| CASES | 3 | 1 | 1 | 4 | 10 | 24 | 49 | 51 | 27 | 24 | 5 | 1 | 200 |

occurs from January through April, the limits of each tropical cyclone year are defined as 1 July to 30 June. Thus, the 1987 southern hemisphere tropical cyclone year is from 1 July 1986 to 30 June 1987. (This is in contrast to the convention of 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 4-3. YEARLY VARIATION OF TROPICAL CYCLONES BY OCEAN BASIN

| YEAR | SOUTH INDIAN (105 E WESTWARD) | AUSTRALIAN (105 E - 165 E) | SOUTH PACIFIC (165 E EASTWARD) | TOTAL |
|---|---|---|---|---|
| (1959 - 1978) AVERAGE* | 8.4 | 10.3 | 5.9 | 24.7 |
| 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 |
| 1986 | 14 | 16 | 3 | 33 |
| 1987 | 9 | 8 | 11 | 28 |
| (1981 - 1987) AVERAGE | 11.9 | 11.1 | 5.6 | 28.6 |
| CASES | 83 | 78 | 39 | 200 |

* (GRAY, 1979)

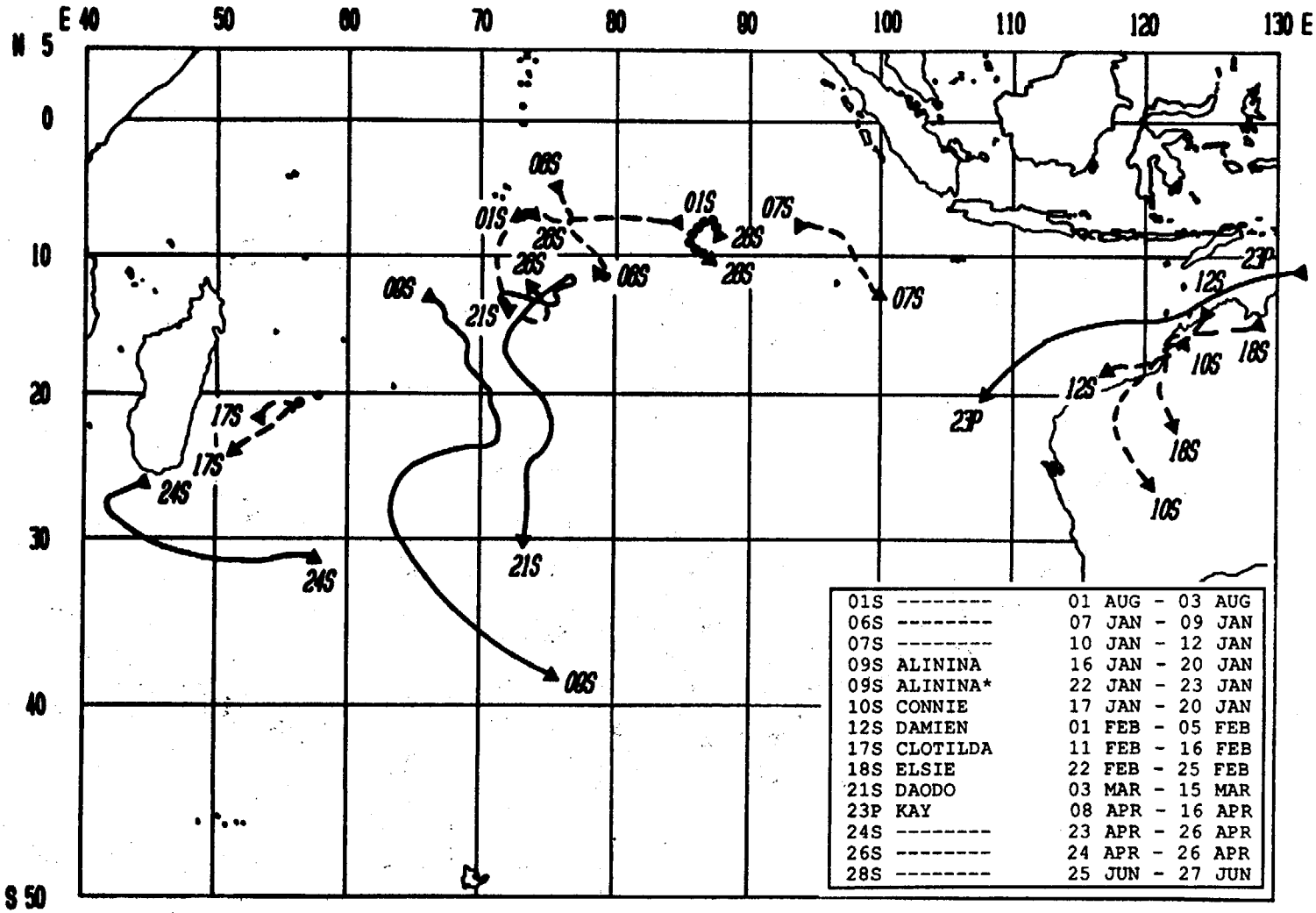
TABLE 4-4. MAXIMUM SUSTAINED SURFACE WINDS VERSUS MINIMUM SEA-LEVEL PRESSURE (ATKINSON AND HOLLIDAY, 1977)

| 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 | 954 |
| 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 |

## 2. SOUTH PACIFIC AND SOUTH INDIAN OCEAN TROPICAL CYCLONES

The 1987 year (1 July 1986 through 30 June 1987) was active, with 28 significant tropical cyclones (see Table 4-1) reaching warning status. This did not exceed the total of 33 tropical cyclones for 1986 (1 July 1985 - 30 June 1986). Eleven tropical cyclones occurred in the South Pacific, east of 165 degrees East Longitude, which is about twice the long-term mean. The Australian area (105 to 165 degrees East Longitude) accounted for eight tropical cyclones compared to the climatological mean of 10.3 - two less than normal. Nine tropical cyclones developed in the South Indian Ocean, which is about one more than the long-term mean of 8.4 cyclones (see Tables 4-2 and 4-3). 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 continue to 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 centers. Only, in extremely 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.


E 40
50
60
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80
90
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120
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N 5
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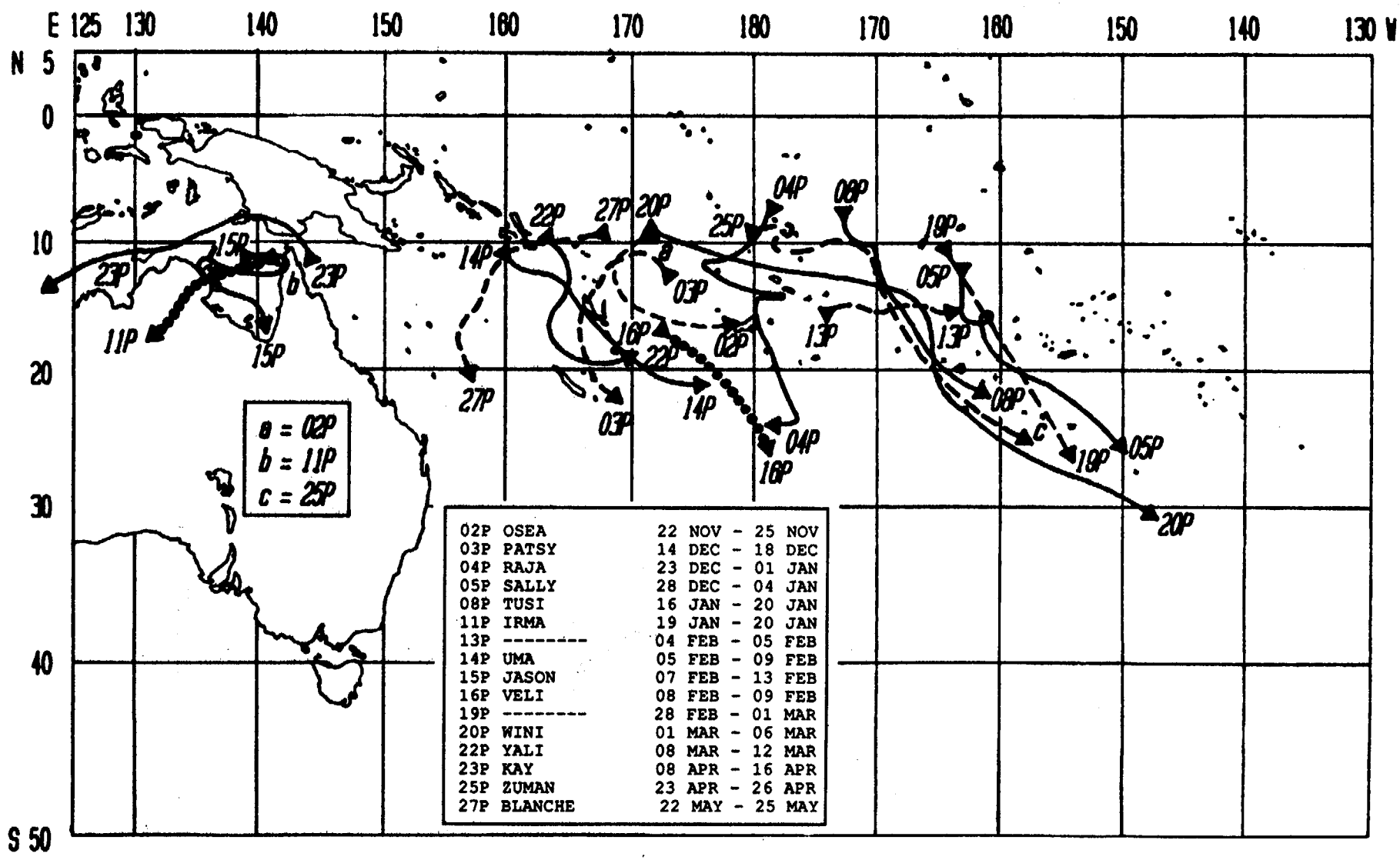
S 50
01S
06S
07S
09S ALININA
09S ALININA*
10S CONNIE
12S DAMIEN
17S CLOTILDA
18S ELSIE
21S DAODO
23P KAY
24S
26S
28S
01 AUG - 03 AUG
07 JAN - 09 JAN
10 JAN - 12 JAN
16 JAN - 20 JAN
22 JAN - 23 JAN
17 JAN - 20 JAN
01 FEB - 05 FEB
11 FEB - 16 FEB
22 FEB - 25 FEB
03 MAR - 15 MAR
08 APR - 16 APR
23 APR - 26 APR
24 APR - 26 APR
25 JUN - 27 JUN


E 125 130 140 150 160 170 180 170 160 150 140 130 W
N 5
0
10
20
30
40
S 50
a = 02P
b = 11P
c = 25P
02P OSEA 22 NOV - 25 NOV
03P PATSY 14 DEC - 18 DEC
04P RAJA 23 DEC - 01 JAN
05P SALLY 28 DEC - 04 JAN
08P TUSI 16 JAN - 20 JAN
11P IRMA 19 JAN - 20 JAN
13P --------- 04 FEB - 05 FEB
14P UMA 05 FEB - 09 FEB
15P JASON 07 FEB - 13 FEB
16P VELI 08 FEB - 09 FEB
19P --------- 28 FEB - 01 MAR
20P WINI 01 MAR - 06 MAR
22P YALI 08 MAR - 12 MAR
23P KAY 08 APR - 16 APR
25P ZUMAN 23 APR - 26 APR
27P BLANCHE 22 MAY - 25 MAY