

## 4. SUMMARY OF SOUTH PACIFIC AND SOUTH INDIAN OCEAN TROPICAL CYCLONES

### 4.1 GENERAL

On 1 October 1980, JTWC's area of responsibility (AOR) was expanded to include the Southern Hemisphere from 180° longitude, westward to the coast of Africa. Details on Southern Hemisphere tropical cyclones and JTWC warnings from July 1980 through June 1982 are contained in Diercks et al. (1982), and from July 1982 through June 1984 in Wirfel and Sandgathe (1986). Information on Southern Hemisphere tropical cyclones after June 1984 can be found in the applicable Annual Tropical Cyclone Report.

The NAVPACMETOCEN, Pearl Harbor, Hawaii issues warnings on tropical cyclones in the South Pacific, which are east of 180° longitude. In accordance with CINCPACINST 3140.1W, Southern Hemisphere tropical cyclones are numbered sequentially from 1 July through 30 June. This convention is established to encompass the Southern Hemisphere tropical cyclone season, which primarily occurs from January through April. There are two Southern Hemisphere ocean basins for warning purposes - the South Indian Ocean (west of 135° East longitude) and the South Pacific (east of 135° East longitude) - which are identified by appending the suffixes "S" and "P," respectively, to the tropical cyclone number.

Intensity estimates for Southern Hemisphere tropical cyclones are derived from the interpretation of satellite imagery using the Dvorak (1984) technique and, when available, from surface observations and radar data. The Dvorak technique relates specific cloud signatures to maximum

sustained one-minute average surface wind speeds. The conversion from maximum sustained winds to minimum sea-level pressure is obtained from Atkinson and Holliday (1977) (Table 4-1).

### 4.2 SOUTH PACIFIC AND SOUTH INDIAN OCEAN TROPICAL CYCLONES

The total number of significant tropical cyclones during the 1997 season (1 July 1996 - 30 June 1997; Table 4-2) was 38 which was approximately, more than the overall climatological mean for the previous 16 years as shown in Table 4-3. Looking at the annual variation of Southern Hemisphere Tropical Cyclones by ocean basins (Table 4-4), it becomes apparent that tropical cyclone activity was enhanced in the southern Indian Ocean and Australian regions, and remained slightly reduced in the South Pacific.

The JTWC warned on Southern Hemisphere tropical cyclones for 266 days of the 1997 season. This equates to roughly to 3 out of every 4 days of the 1997 Southern Hemisphere season having a tropical cyclone in active warning status. During 63 of the 266 days there were two or more Southern Hemisphere tropical cyclones in warning status at the same time.

A chronology of 1997 Southern Hemisphere tropical activity is provided in Figure 4-1. Composites of the tropical cyclone best tracks for the Southern Indian Ocean, the Australian Region, and the South Pacific Ocean, appear in Figures 4-2, 4-3, 4-4, 4-5, and 4-6 respectively.

**Table 4-1** MAXIMUM SUSTAINED 1-MINUTE MEAN SURFACE WINDS AND EQUIVALENT MINIMUM SEA-LEVEL PRESSURE RELATIONSHIP (ATKINSON AND HOLLIDAY, 1977)

WIND-KT	(M/SEC)	PRESSURE (MB)
30	(15)	.....1000
35	(18)	..... 997
40	(21)	..... 994
45	(23)	..... 991
50	(26)	..... 987
55	(28)	..... 984
60	(31)	..... 980
65	(33)	..... 976
70	(36)	..... 972
75	(39)	..... 967
80	(41)	..... 963
85	(44)	..... 958
90	(46)	..... 954
95	(49)	..... 948
100	(51)	..... 943
105	(54)	..... 938
110	(57)	..... 933
115	(59)	..... 927
120	(62)	..... 922
125	(64)	..... 916
130	(67)	.....910
135	(69)	..... 906
140	(72)	..... 898
145	(75)	..... 892
150	(77)	..... 885
155	(80)	..... 879
160	(82)	..... 872
165	(85)	..... 965
170	(87)	..... 858
175	(90)	..... 851
180	(93)	..... 844

**TABLE 4-2** SOUTHERN HEMISPHERE TROPICAL CYCLONES FOR 1997 (01 JULY 1996 - 30 JUNE 1997)

TROPICAL CYCLONE	PERIOD OF WARNING	NUMBERS OF ESTIMATED MAXIMUM		ESTIMATED MSLP (MB)	
		WARNINGS ISSUED	INTENSITY (M/SEC)		
01S LINDSAY	10 JUL - 11 JUL	2	35	(18)	997
02S -	17 AUG - 20 AUG	7	45	(23)	991
03S -	07 SEP - 09 SEP	9	40	(21)	994
04S ANTOINETTE	17 OCT - 21 OCT	10	65	(33)	976
05S MELANIE/BELLAMINE	29 OCT - 11 NOV	27	125	(64)	916
06P CYRIL	23 NOV - 26 NOV	7	50	(26)	987
07S CHANTELLE	24 NOV - 29 NOV	16	65	(33)	976
08S DANIELLA	02 DEC - 10 DEC	17	120	(62)	922
09S ELVINA	09 DEC - 14 DEC	12	55	(28)	984
10P NICHOLAS	13 DEC - 15 DEC	5	45	(23)	991
11S OPHELIA	14 DEC - 20 DEC	16	55	(28)	984
12P PHIL*	23 DEC-02 JAN/09-12 JAN	36	85	(44)	958
13P FERGUS	24 DEC - 30 DEC	14	90	(46)	954
14S FABRIOLA	02 JAN - 08 JAN	13	60	(31)	980
15S RACHEL	02 JAN - 08 JAN	16	80	(41)	963
16P DRENA	03 JAN - 10 JAN	16	120	(62)	922
17P EVAN♦	10 JAN - 16 JAN	0 (13)	70	(36)	972
18S -	11 JAN - 13 JAN	6	45	(23)	991
19S PANCO-HELINDA	19 JAN - 06 FEB	36	125	(64)	916
20S GRETELLE	20 JAN - 31 JAN	26	115	(59)	927
21S ILETTA	23 JAN - 28 JAN	11	75	(39)	968
22P FREDA*	26-30 JAN/31-02 FEB	18	65	(33)	976
23S JOSIE	08 FEB - 16 FEB	17	90	(46)	954
24P GILLIAN	10 FEB - 12 FEB	11	45	(23)	991
25S KARLETTE	16 FEB - 26 FEB	21	65	(33)	976
26P HAROLD	16 FEB - 21 FEB	15	55	(38)	984
27S -	19 FEB - 25 FEB	21	45	(23)	991
28P ITA♦	24 FEB - 24 FEB	0 (3)	35	(18)	997
29P -	26 FEB - 27 FEB	3	45	(23)	991
30S LIZETTE	27 FEB - 02 MAR	8	75	(39)	968
31P GAVIN	03 MAR - 12 MAR	23	115	(59)	927
32P JUSTIN	06 MAR - 25 MAR	77	90	(46)	954
33P HINA	13 MAR - 18 MAR	12	75	(39)	968
34P IAN♦	17 APR - 19 APR	0 (7)	55	(28)	984
35P JUNE	02 MAY - 05 MAY	12	65	(33)	976
36S RHONDA	10 MAY - 16 MAY	16	100	(51)	944
37P -	28 MAY - 30 MAY	5	35	(18)	997
38P KELI	10 JUN - 15 JUN	5 (6)	115	(59)	927
JTWC TOTAL		566			
♦ NPMOC TOTAL		(29)			
GRAND TOTAL		595			

\* REGENERATED

♦ WARNINGS ISSUED BY NPMOC

**Table 4-3** MONTHLY DISTRIBUTION OF SOUTH PACIFIC AND SOUTH INDIAN OCEAN TROPICAL CYCLONES

<u>YEAR</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>TOTAL</u>
(1958-1977)													
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
1988	0	0	0	0	2	3	5	5	3	1	2	0	21
1989	0	0	0	0	2	1	5	8	6	4	2	0	28
1990	2	0	1	1	2	2	4	4	10	2	1	0	29
1991	0	0	1	1	1	3	2	5	5	2	1	1	22
1992	0	0	1	1	2	5	4	11	3	2	1	0	30
1993	0	0	1	1	0	5	7	7	2	2	2	0	27
1994	0	0	0	0	2	4	8	4	9	3	0	0	30
1995	0	0	0	0	2	2	5	4	5	4	0	0	22
1996	0	0	0	0	1	3	7	6	6	4	1	0	28
1997	1	1	1	2	2	6	9	8	3	1	3	1	38
TOTAL	6	2	6	10	26	58	105	113	79	49	18	3	475
AVERAGE	0.4	0.1	0.4	0.6	1.5	3.4	6.2	6.6	4.6	2.9	1.1	0.2	28
(1981-1997)													

\* (Gray, 1978)

**Table 4-4** ANNUAL VARIATION OF SOUTHERN HEMISPHERE TROPICAL CYCLONES BY OCEAN BASINS

<u>YEAR</u> (1958-1977)	<u>SOUTH INDIAN</u> (WEST OF 105°E)	<u>AUSTRALIAN</u> (105°E - 165°E)	<u>SOUTH PACIFIC</u> (EAST OF 165°E)	<u>TOTAL</u>
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
1986	14	16	3	33
1987	9	8	11	28
1988	14	2	5	21
1989	12	9	7	28
1990	18	8	3	29
1991	11	10	1	22
1992	11	6	13	30
1993	10	16	1	27
1994	16	10	4	30
1995	11	7	4	22
1996	13	11	4	28
1997	17	5	16	38
TOTAL	216	162	97	475
AVERAGE (1981-1996)	12.7	9.5	5.7	27.9

\* (Gray, 1978)

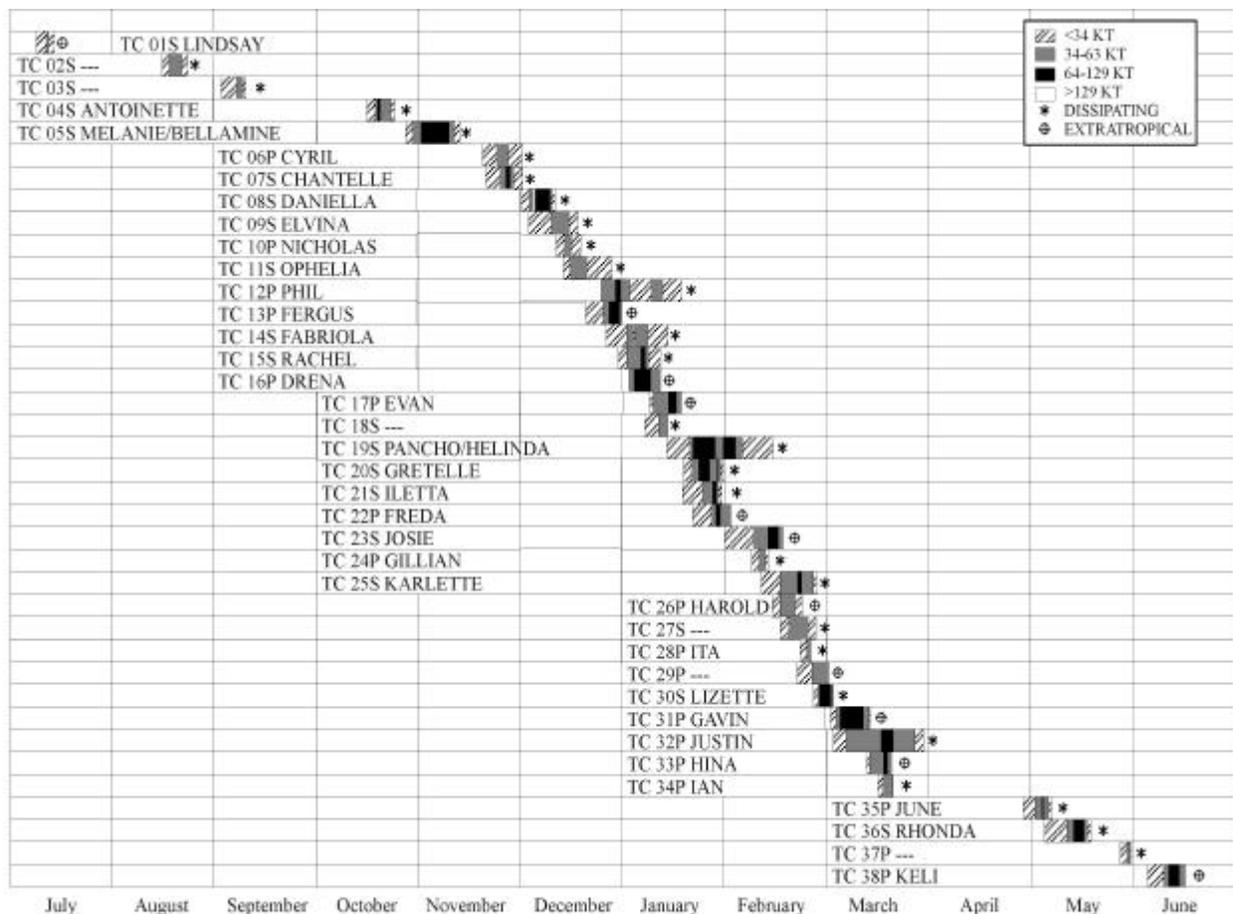
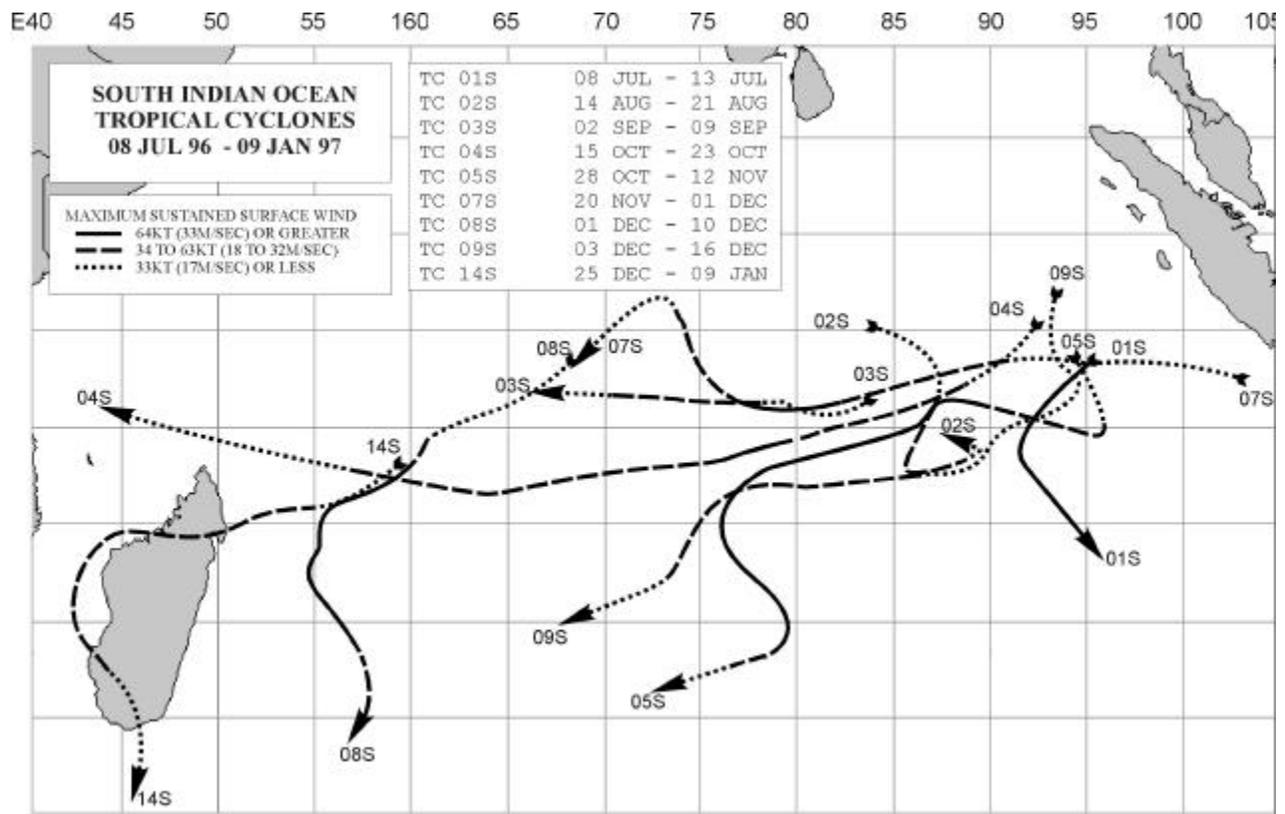
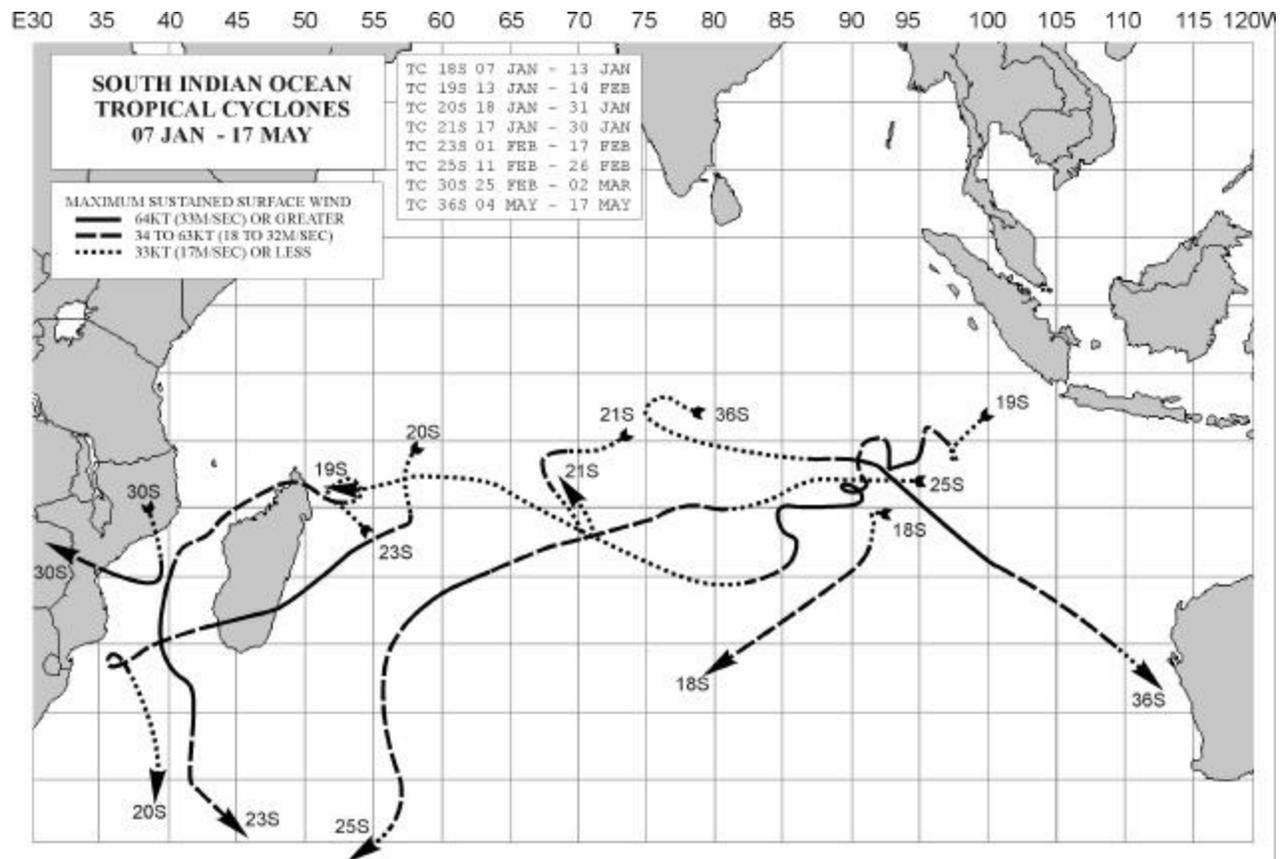


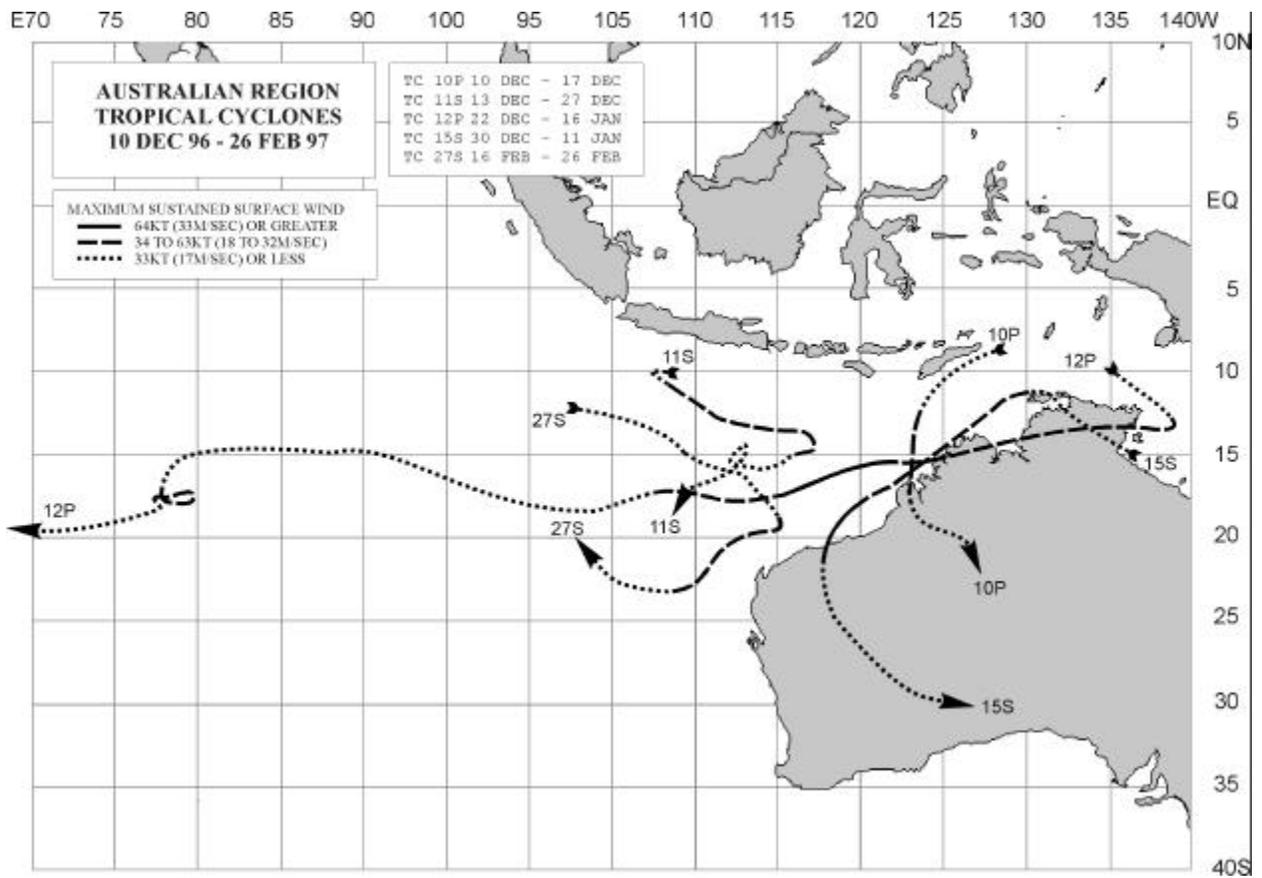
Figure 4-1 Chronology of South Pacific and Indian Ocean tropical cyclones for 1997 (01 July 1996 - 30 June 1997)



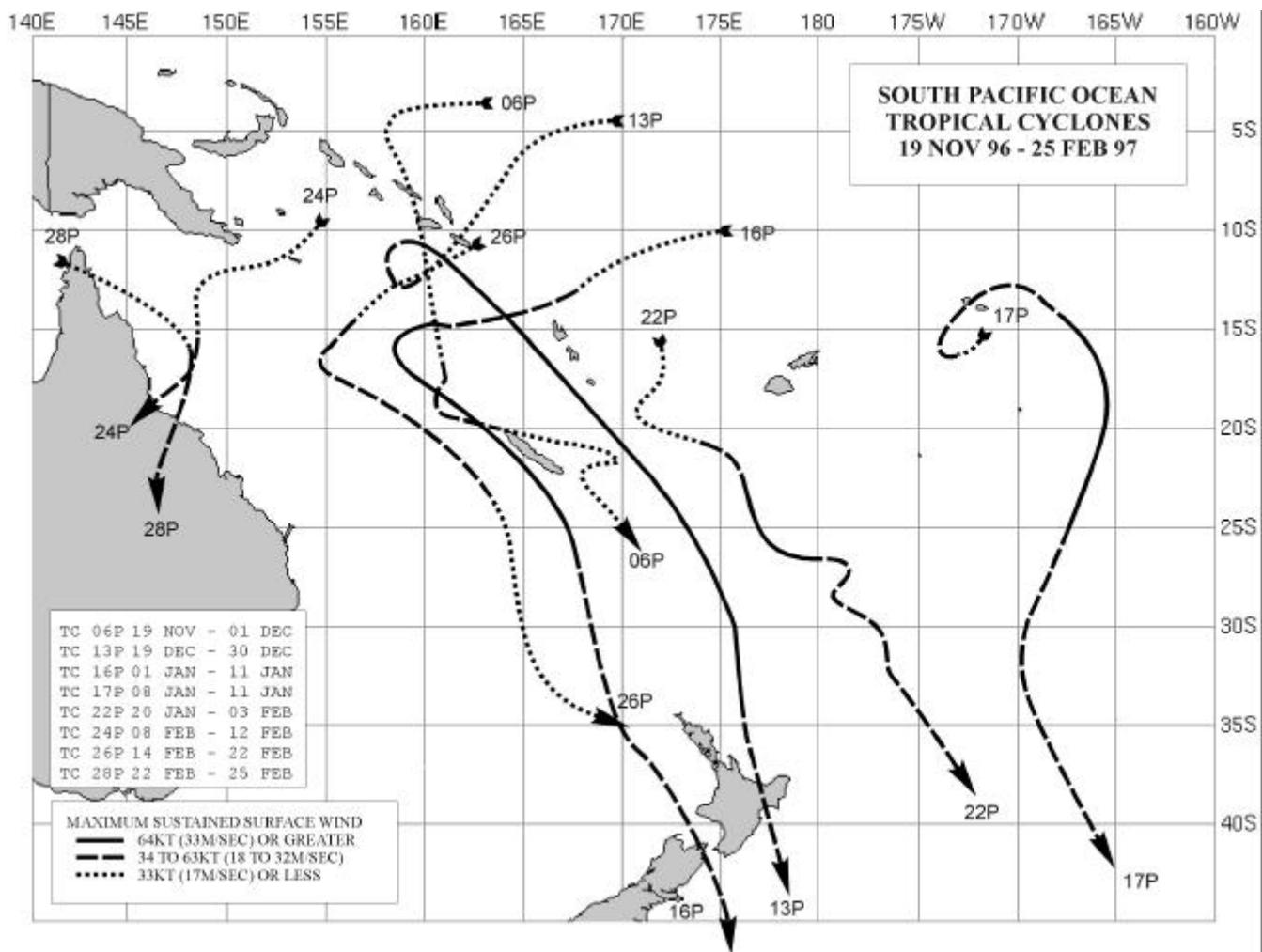
**Figure 4-2** Tropical Cyclone best tracks for the South Indian Ocean



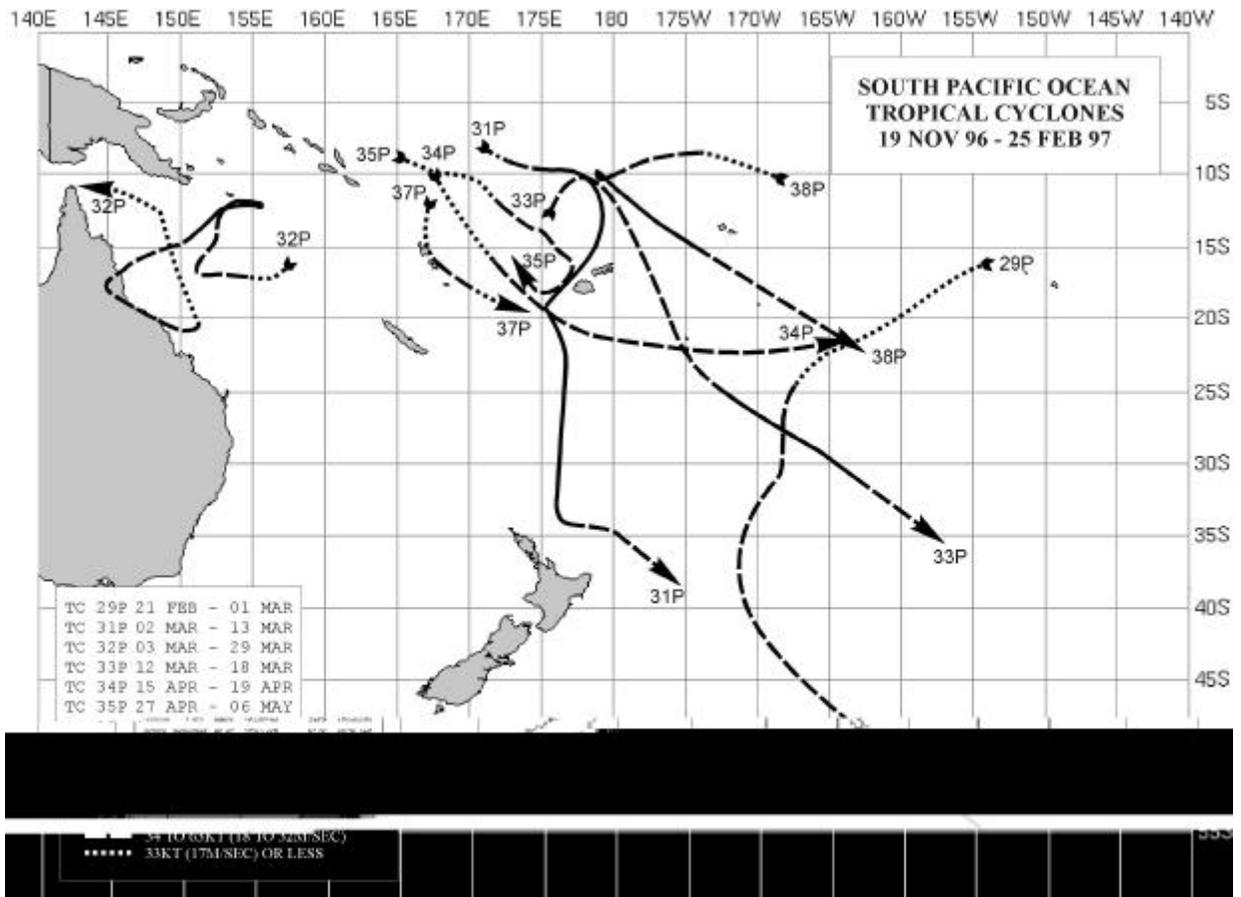
**Figure 4-3** Tropical Cyclone best tracks for the South Indian Ocean



**Figure 4-4** Tropical Cyclone best tracks for the Australian Region



**Figure 4-5** Tropical Cyclone best tracks for the South Pacific Ocean



**Figure 4-6** Tropical Cyclone best tracks for the South Pacific Ocean