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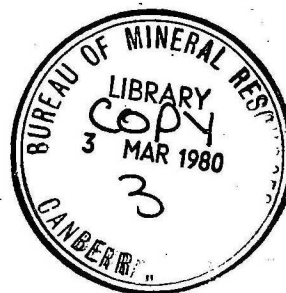


**DEPARTMENT OF
~~NATIONAL RESOURCES~~
NATIONAL DEVELOPMENT**

**BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS**

Record 1979/41

067790



PAPUA NEW GUINEA EARTHQUAKE INTENSITY DATA

1953-1959

by

I.B. Everingham

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SUMMARY

Earthquake intensity information for the period 1953-1959 was collated for inclusion in the Port Moresby Geophysical Observatory's computer storage and retrieval file.

About 375 intensity reports have been listed and the causative earthquakes identified wherever possible.

Damaging intensities were reported for five earthquakes: 3 March 1954, Tari MMV11; 10 October 1955, Kokopo and Warangoi, MMV11-V111; 19 March 1956, Kandrian MMV11; 16 May 1959, Karoola MMV1-V11; 19 November 1959, Lae MMV1-V11. On twenty occasions maximum intensities were MMV1 or greater.

Isoseismal maps were drawn for earthquakes which occurred on 3 March 1954 (MS 7.0), 23 August 1957 (MS 6.4) and 19 November 1959 (MS 7.0).

INTRODUCTION

For the periods 1916-1940 and 1960 to the present, reported earthquake intensities in Papua New Guinea (Fig. 5) are readily available from a computer storage and retrieval system maintained by the Port Moresby Observatory (Denham & Byrne, 1969).

Outside these periods, information on earthquakes prior to 1916 is available (see Everingham, 1977) but is very scarce, and 1941-1952 earthquake reports have not been discovered by the author. However, Rabaul Volcanological Observatory routinely collected earthquake information during the period 1953-1959 and the object of this Record is to present these data.

Data contained in the Rabaul Volcanological Observatory files and in Dent's (1974) report on western Papua have been extracted so that they may be assembled with the other data on the earthquake data computer file. Isoseismal maps are drawn for three earthquakes which were felt over a large area.

EARTHQUAKE INTENSITY REPORTS

1916-1940 reports

During the period 1916-1940 government-employed staff routinely completed Earthquake Notes and Earthquake Report forms. Intensities were estimated on the Rossi-Forel scale (given in Appendix 1), which was not suitable for estimating intensities in Papua New Guinea conditions. A high percentage of felt earthquakes were reported, but the reported intensities would be inconsistent because they were estimated by different observers. As a result of my readings of reports and other documents for the period, I feel that the observer tended to under-rate the intensity - no doubt because risk from earthquakes was not seriously considered when compared with risk from other sources associated with living in this remote, tropical region.

The original reports were first gathered by the Riverview Observatory staff and are now held by the Port Moresby Geophysical Observatory.

1960 to the present

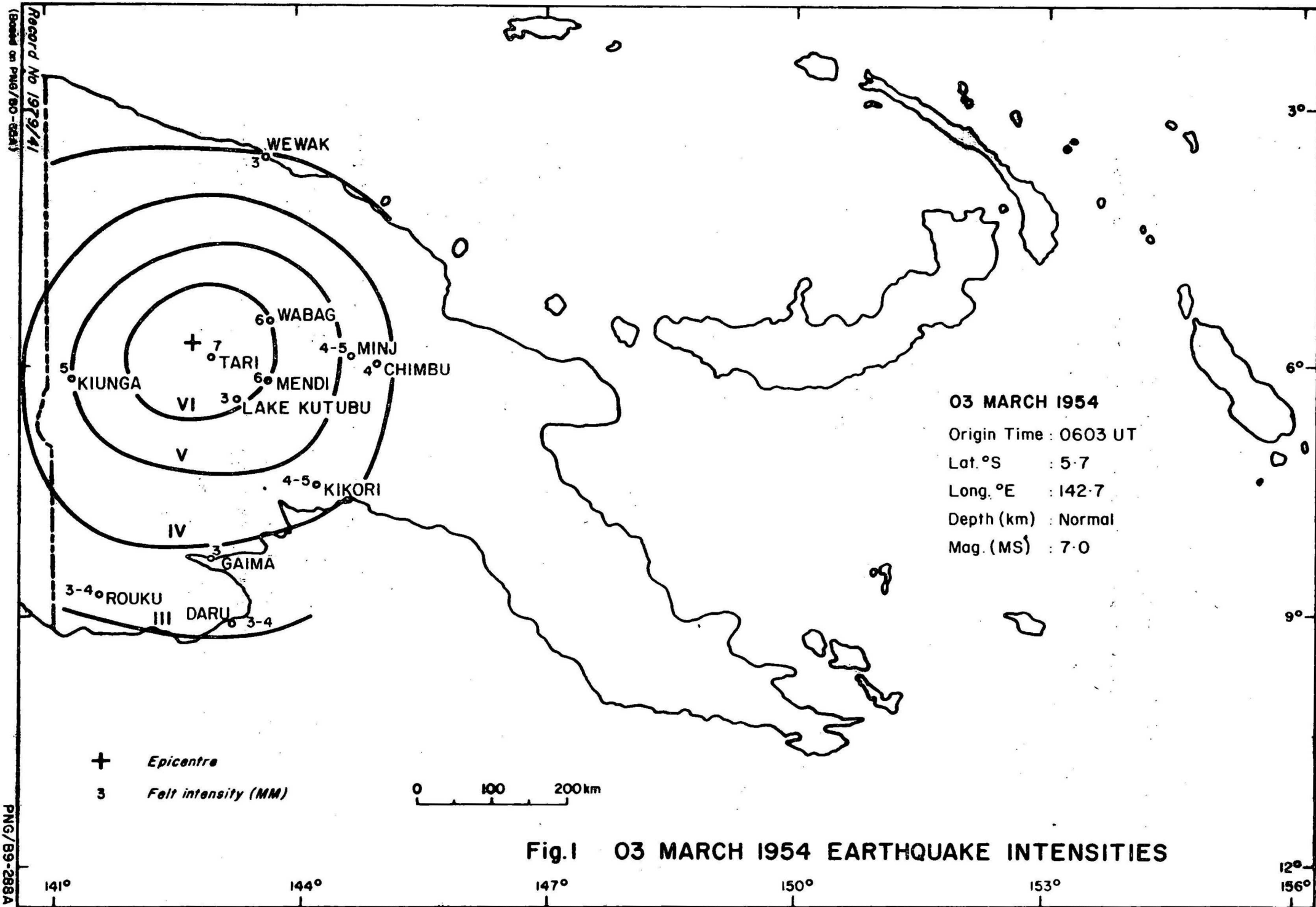
During 1967 Denham & Byrne (1969) introduced the computer storage and retrieval system for earthquakes and felt reports, and intensity data gathered routinely

In general very few reports are available for any particular tremor and isoseismal maps for the earthquake could not be drawn. However, it was possible to draw intensity maps for three earthquakes (Figures 1, 2, 3) which were felt over a wide area. Details of the earthquakes were:

	(a)	(b)	(c)
Date	03 Mar 1954	23 Aug 1957	19 Nov 1959
Time (UT)	06 02 56	02 00 19	11 08 47
Lat [°] S	5.7	5.50	5.91
Long [°] E	142.7	153.96	146.42
Depth (km)	Normal	106	115
Mag (MS)	7.0	6.5	7.0
Max. Intensity	VII	V	VI-VII

Apart from the three earthquakes listed above others caused high intensity shaking but over more limited areas. For example: 10 October 1955, Kokopo and Warangoi MM VII-VIII; 19 March 1956, Kandrian MM VII; 16 May 1959, Karoola MM VI-VII.

Severe earthquakes must have occurred in many places where observers did not report the phenomena because communication was difficult and intensity questionnaires could not be circulated after each important earthquake. This should be taken into account when the 1953-1959 data are used in assessing earthquake risk.



Record No. 1979/41
(Based on PNG/89-85A)

23 AUGUST 1957

Origin Time : 0200 UT

Lat. °S : 5.51

Long. °E : 153.96

Depth (km) : 106

Mag. (MS) : 6.4

+ Epicentre

3 Felt intensity (MM)

0 100 200 km

Fig.2 23 AUGUST 1957 EARTHQUAKE INTENSITIES

141°

144°

147°

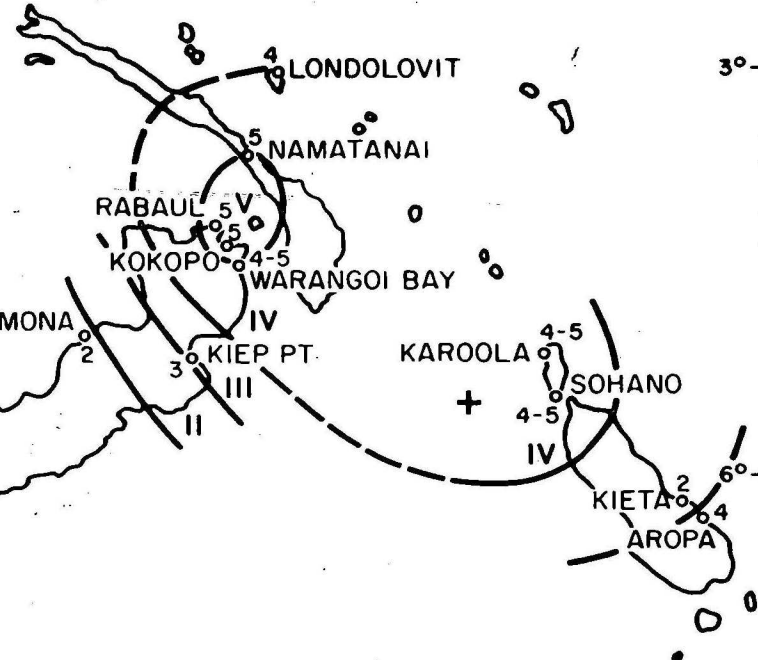
150°

153°

12°
156°

9°

3°



PNG/89-289A

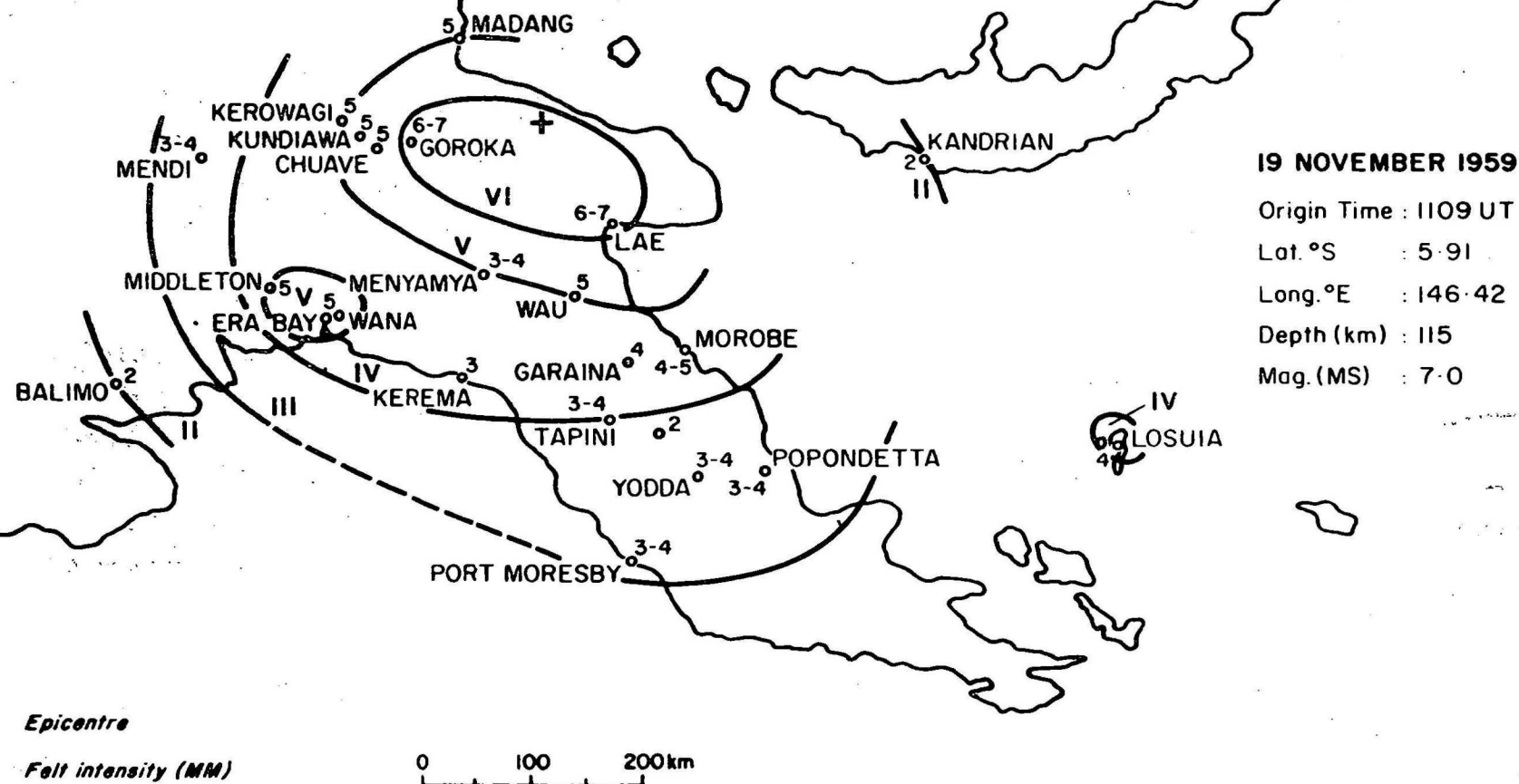


Fig.3 19 NOVEMBER 1959 EARTHQUAKE INTENSITIES

by the Geophysical Observatory are stored in this system. Questionnaires (Appendix 3) are issued by the Observatory for larger and widely felt earthquakes, and estimates of intensity on the Modified Mercalli scale (Appendix 2) are made by experienced Observatory staff.

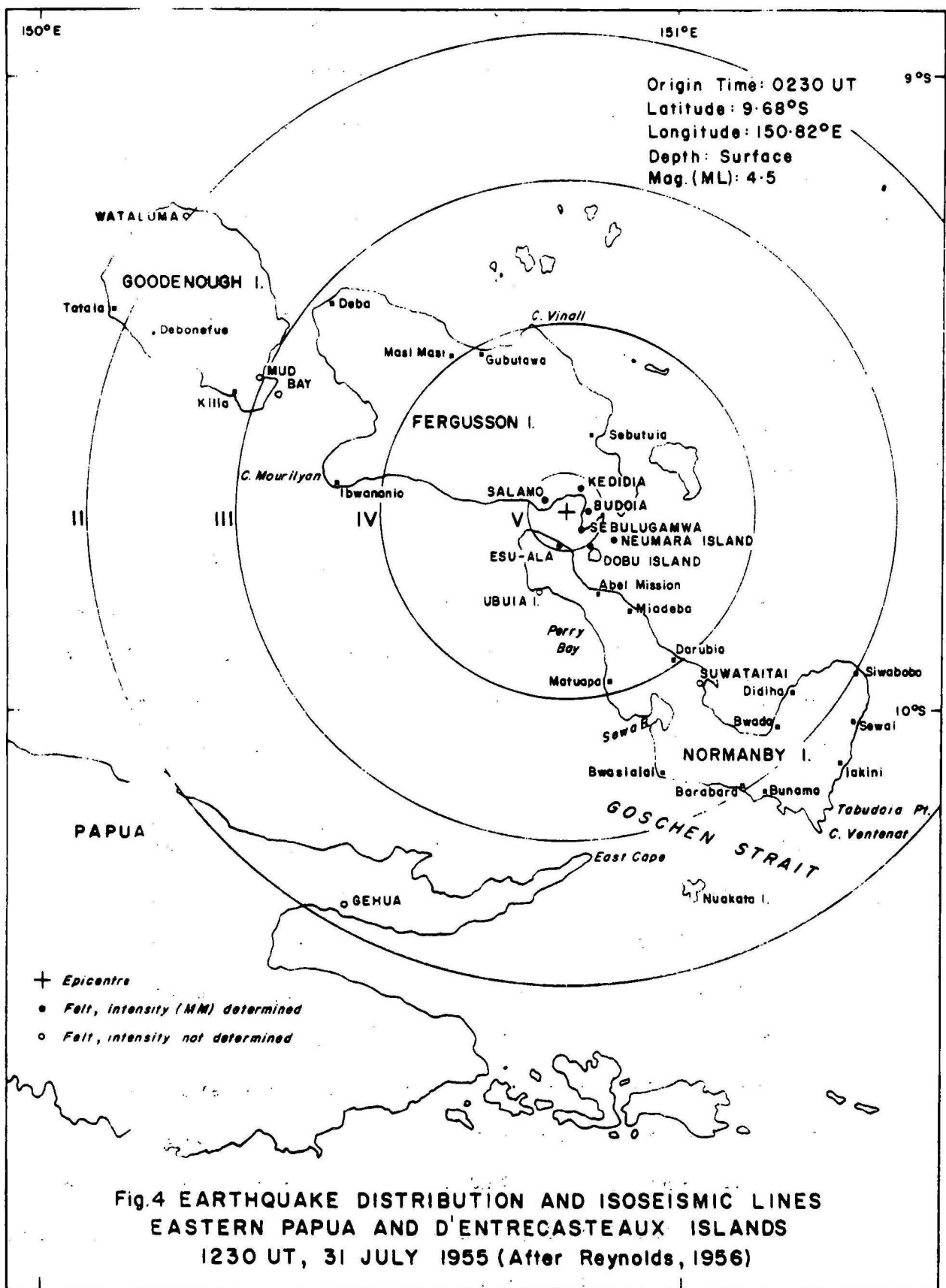
Since mid-1970 a Table designed to permit consistency in the intensity estimates has been used (Appendix 4).

1953-1959

The Rabaul Volcanological Observatory commenced an earth tremor reporting system in late 1953 (Taylor, 1966; Dent, 1974). Booklets with the Modified Mercalli Scale (Appendix 2) and columns in which data were to be entered were distributed to all known potential volcanic areas and to many others which were free of volcanos. Observers estimated the strength of earth tremors and forwarded their estimates to Rabaul. Such estimates are probably mutually inconsistent but very useful. The system still operates and intensity results are entered into the Port Moresby data file.

Earthquake intensity reports and, wherever possible, the associated earthquakes are listed in Table 1.

Geographical co-ordinates of the places named are given in Table 2 and the location of many larger villages and towns is shown in Figure 5.



C56/B9-3A

Reynolds's (1956) isoseismal map

Reynold's (1956) map of intensities of the 31 July 1955 earthquake felt in the D'Entrecasteaux Islands is included in this Record (Fig. 4) so that all the 1953-59 maps are available together.

ACKNOWLEDGEMENT

The Rabaul Observatory provided all the felt reports listed in Table 1.

REFERENCES

- DENHAM, D., & BYRNE, W.M.J., 1969 - A storage and retrieval system of seismic data for the New Guinea/Solomon Islands region. Proc. Earthq. Eng. Symp., Melbourne., Oct. 1969.
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- EVERINGHAM, I.B., 1977 - Preliminary Catalogue of tsunamis for the New Guinea/Solomon Islands region 1768-1972. Bur. Miner. Resour. Aust., Rep., 180.
- REYNOLDS, M.A., 1956 - The Goma Bay (D'Entrecasteaux Islands) earthquakes: July-September, 1955. Bur. Miner. Resour. Aust. Rec., 1956/7.
- RICHTER, C.F., 1958 - ELEMENTARY SEISMOLOGY. San Francisco, W.H. Freeman.
- TAYLOR, G.A.M., 1966 - The surveillance of Volcanoes in the Territory of Papua New Guinea. South Pacific Bulletin, Second Quarter, 1966.

TABLE 1. EARTHQUAKE INTENSITY REPORTS

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S, °E
<u>1953</u>				
Dec. 02	0425	Tari	4	3.5 141.5
		Wabag	2	MS 6.6
		Wewak	2	Depth normal
Dec. 12	0121	Tari	4	
<u>1954</u>				
Feb. 05	0919	Londolovit	4	4.6 153.5
		Sohano	2-3	MS 6.7
		Namatanai	3-4	Depth normal
Feb. 11	2209	Londolovit	6	
Mar. 03	0603	Tari	7	5.7 142.7
		Wabag	6	MS 7.0
		Mendi	6	Depth normal
		Kiunga	5	
		Kikori	4-5	
		Minj	4-5	
		Chimbu	4	
		Daru	3-4	
		Rouku	3-4	
		Kutubu Lake	3	
		Gaima	3	

TABLE 1. (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE	
				°S,	°E
		Wewak	3		
Mar. 03	1038	Kikori	4-5		
		Kutubu Lake	3		
		Mendi	3		
		Wabag	3		
		Gaima	2-3		
Mar. 03	1525	Tari	6		
		Mendi	4-5		
		Minj	3-4		
		Daru	3-4		
		Wabag	3		
		Kutubu Lake	3		
		Kikori	2-3		
Mar. 03	1603	Kutubu Lake	4		
Mar. 04	1148	Tari	4		
Mar. 08	1330	Mendi	4		
Mar. 17	1030	Mendi	5		
Mar. 21	0413	Chimbu	4		
		Mendi	3-4		
Apr. 09	1207	Kiunga	4		
May 19	2307	Pomio	4	5.2	151.8
				MS 6.3	
				Depth normal	

TABLE 1. (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S, °E	
<u>1954</u>					
May 30	0450	Esa-Ala	4		
Jun. 19	1200	Esa-Ala	4		
Sep. 17	0113	Namatanai	4	4.4	153.4
		Londolovit	4	MS 6.0	
		Ulamona	2	Depth normal	
Oct. 07	1918	Bwagoia	6	10.4	152.5
		Esa-Ala	5	Depth normal	
		Matuapa	4		
		Masi Masi	4		
		Barabara	3		
		Deba	3		
		Gehua	2		
Nov. 12	0730	Ioma	3-4		
Nov. 22	1140	Lae	4		
Dec. 06	1020	Mt Hagen	4		
Dec. 07	1020	Mt Hagen	4		
Dec. 09	2003	Mt Hagen	4		
Dec. 22	0419	Sohano	4		

1955

Jan. 02	1418	Wewak	4		
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TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1955</u>					
Jan. 19	0013	Londolovit	6		
Mar. 06	0540	Atitau	5		
Mar. 09	0620	Esa-Ala	5		
Mar. 10	0910	Esa-Ala	4		
Apr. 11	0050	Finschafen	4		
May. 23	0426	Lae	4		
Jun. 02	2000	Kilenge	4		
Jun. 15	1536	Warangoi	4	5.0	152.8
		Kerevat	4	Depth 130	
Jun. 29	0954	Finschafen	5	6.5	148.0
* Jul. 31	0230	Esa-Ala	4	9.7	150.8
		Salamo	5-6		
* Jul. 31	0315	Esa-Ala	4	9.7	150.8
Aug. 16	1150	Warangoi	5		

* Goma Bay swarm, Reynolds (1956).

TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1955</u>					
		Sohano	4	6.2	155.0
		Aropa	4	MS 7.0	
		Ulamona	2	Depth 190 km	
		Tol	2		
Sep. 08	0330	Aropa	4	6.9	155.7
				M 6.5	
				Depth Normal	
Oct. 09	1742	Warangoi	4		
Oct. 10	0858	Warangoi	7-8	5.1	152.8
		Kokopo	7-8	MS 7.3	
		Tol	6	Depth normal	
		Sohano	4		
		Popondetta	3		
		Ulamona	3		
		Walindi	2-3		
Oct. 10	1300	Warangoi	4		
Dec. 18	0310	Warangoi	4		
Dec. 26	0825	Popondetta	4		

TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1956</u>					
Jan. 06	1315	Yangoru	4		
Jan. 08	1846	Warangoi	4-5	4.5	153.0
Jan. 13	0222	Aropa	4		
Jan. 28	0743	Warangoi	4	4.6	151.4
				MS 6.5	
				Depth 100 km	
Mar. 19	1736	Kandrian	7	5.8	150.0
		Walindi	5	MS 6.4	
		Ioma	4	Depth normal	
		Popondetta	4		
		Awala	3-4		
		Talasea	3-4		
		Awelkon	3		
		Esa-Ala	2		
Mar. 19	2330	Warangoi	4		
Apr. 28	2350	Yangoru	4-5		
May 12	1115	Telefolmin	6		
Jun. 13	1712	Lae	4		
Jun. 29	2245	Esa-Ala	4-5		
Jul. 04	0304	Aropa	4	7.0	155.0
Jul. 18	0645	Warangoi	4-5		
Jul. 23	2157	Finschafen	5	6.0	148.0

TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1956</u>					
		Awelkon	4		
Jul. 28	1945	Namatenai	4		
		Warangoi	3		
Jul. 31	0315	Goma Bay	5-6	9.7	150.8
Oct. 06	0314	Londolovit	4		
Oct. 22	1235	Samari	4	9.42	150.04
Oct. 22	1630	Esa-Ala	4		
Oct. 23	0118	Esa-Ala	4		
Oct. 29	1858	Esa-Ala	4		
<u>1957</u>					
Apr. 05	1755	Wewak	4		
Apr. 19	0840	Buin	4		
Apr. 20	1230	Kilenge	4-5	5.83	147.55
		Umboi	4	MS 6.6	
		Awelkon	4	Shallow	
Apr. 28	1037	Karoola	5	6.0	155.0
		Salamo	3	Depth 60 km	
		Aropa	3		
		Pomio	2-3		
		Warangoi	2-3		

TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1957</u>					
May 11	1745	Buin	4		
Jun. 13	1225	Awelkon	4		
Jun. 20	0700	Esa-Ala	4		
Jun. 20	0755	Salamoa	5		
Jun. 20	1030	Esa-Ala	4		
Jul. 04	1412	Pomio	4	5.0	152.0
Jul. 04	1430	Pomio	4		
Jul. 05	0245	Pomio	4		
Jul. 07	1612	Buin	6		
		Aropa	4		
		Karoola	3		
Jul. 18	1111	Karkar Island	5	5.0	146.0
		Saidor	3		
		Alome	3		
		Goroka	2		
Jul. 19	2026	Lumi	5		
		Nuku	3	3.0	142.0
		Aitape	2		
Jul. 19	2140	Lumi	6		
		Aitape	3		
Jul. 20	0135	Lumi	4		
Jul. 21	0700	Namatanai	4	4.53	153.17
		Rabaul	3	Depth 46 km	

TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1957</u>					
		Warangoi	3		
		Karoola	3		
		Kiep	3		
Jul.21	2015	Lumi	4		
Aug.05	0813	Namatanai	4	5.0	154.0
Aug.16	0330	Namatanai	5		
		Karoola	3-4		
		Rabaul	3		
Aug.16	1158	Namatanai	5		
		Rabaul	4		
		Karoola	3		
		Kokopo	3		
		Aropa	3		
Aug.19	0013	Kiep	4		
		Rabaul	4		
		Warangoi	3-4		
		Tol	3		
		Pomio	3		
		Kokopo	3		
Aug.21	1625	Buin	4		
Aug.23	0200	Rabaul	5	5.50	153.96
		Namatanai	5	MS 6.4	
		Kokopo	5	Depth 106 km	

TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1957</u>					
		Warangoi	4-5		
		Karoola	4-5		
		Sohano	4-5		
		Aropa	4		
		Londolovit	4		
		Kiep	3		
		Fead Island	3		
		Kieta	2		
		Ulamona	2		
Sep. 08	1319	Kokopo	5	5.0	152.0
		Warangoi	3-4	Depth 60 km	
		Rabaul	3		
		Kiep	3		
		Pomio	2		
Sep. 14	1356	Lae	4	5.5	147.0
Sep. 14	1842	Kokopo	5	5.37	153.97
		Rabaul	4	Depth 118 km	
		Ulamona	2		
Nov. 03	1025	Lae	5	6.0	147.0
		Mumeng	2		
Nov. 03	1115	Lae	4	6.5	147.0
		Mumeng	2		

TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1957</u>					
Nov. 10	0345	Aropa	4	7.5	155.5
Nov. 10	0549	Camp Diddy	7	6.46	146.99
		Lae	5	MS 6.0	
		Wasu	2	Depth 22 km	
Nov. 11	0125	Lindenhafen	4		
<u>1958</u>					
Jan. 02	0021	Warangoi	4-5	5.0	152.0
		Rabaul	4		
		Kokopo	4		
		Pomio	2		
		Ulamona	2		
Jan. 09	1114	Lae	4	5.54	147.14
		Wau	4	MS 6.0	
		Wasu	4	Depth 175 km	
		Kainantu	4		
		Kundiawa	3		
		Kaiapit	3		
		Goroka	2-3		
		Mumeng	2		
		Awelkon	2		

TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1958</u>					
Jan. 29	1115	Buin	4		
Feb. 12	1635	Rabaul	4		
Apr. 04	0717	Warangoi	4	5.38	151.69
		Rabaul	2	MS 6.0	
Apr. 15	1007	Rabaul	4		
May 14	0358	Rabaul	4	4.5	153.0
		Warangoi	4		
		Namatanai	3		
		Londolovit	3		
May 24	1633	Lae	4-5	6.0	146.0
		Wau	4		
		Awelkon	3		
		Mumeng	2		
May 27	2333	Henganofi	4	5.84	146.65
		Menyanya	3	MS 5.5	
		Saidor	3	Shallow	
		Lufa	2-3		
		Awelkon	2		
		Kundiawa	2		
		Goroka	2		
		Chuave	2		
		Wau	2		
Jun. 06	1830	Kainantu	4		
Jun. 07	1545	Kaiapit	5		
Jun. 07	1826	Mumeng	4		

TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1958</u>					
Jun. 25	0937	Timbunke	6	3.65	144.00
		Aioma	3	MS 6.5	
Jun. 25	1245	Warangoi	4-5	5.30	151.61
		Pomio	4-5	Depth 35 km	
		Rabaul	4-5		
		Ulamona	3		
Aug. 03	0430	Kundiawa	5		
Aug. 15	0127	Walindi	4	6.0	150.5
		Kandrian	3-4		
Aug. 18	0340	Angoram	5		
Aug. 20	2248	Kainantu	4	5.0	149.0
		Kundiawa	2	Depth 250 km	
Aug. 25	1225	Warramong	5		
Sep. 02	1426	Kundiawa	5	5.72	144.81
		Chuave	4-5	Shallow	
		Awelkon	4-5		
		Aiome	4-5		
		Kerowagi	4		
		Kainantu	4		
		Goroka	4		
		Saidor	2		
Sep. 18	0650	Vanimo	4	2.5	141.0

TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1958</u>					
Sep. 20	1710	Boku	6	6.51	154.85
		Solano	4-5	MS 6.3	
		Karoola	4	Depth 65 km	
		Rabaul	4		
		Aropa	3		
Oct. 04	0550	Angoram	5	4.61	143.97
		Kerowagi	3	Depth 102 km	
		Tari	3		
		Lumi	2		
		Wewak	2		
		Aiome	2		
		Kundiawa	2		
Oct. 07	1235	Rabaul	4-5	5.40	152.04
		Pomio	4-5	MS 6.5	
		Warangoi	4-5	Depth 40 km	
		Karoola	3		
		Ulamona	2-3		

TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1958</u>					
Oct. 12	1230	Bogia	4	4.5	144.0
Oct. 21	0615	Lae	5	5.48	147.02
		Bugandi	3-4	MS 6.5	
		Mumeng	3	Depth 174 km	
		Awelkon	3		
		Finschafen	2		
		Saidor	2		
		Kundiawa	2		
		Mt. Hagen	2		
		Goroka	2		
Nov. 01	0339	Kavieng	4	3.52	150.20
				MS 6.3	
Nov. 12	0942	Boku	4		
Dec. 25	0806	Pomio	5	5.57	151.22
		Rabaul	4-5	MS 6.7	
		Rangarere	3	Depth 51 km	
		Ulamona	2		
Dec. 28	1722	Wasu	4	5.5	144.5

TABLE 1 (continued)

DATE	APPROX. TIME (UT).	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1959</u>					
Jan. 16	1438	Rangarere	4		
Feb. 09	2113	Rabaul	4	4.76	153.67
		Warangoi	3	MS 6.0	
		Rangarere	2	Depth 87 km	
Feb. 23	0159	Kandrian	5-6	5.77	149.37
		Walindi	4	MS 6.0	
		Pomio	2	Depth 45 km	
Mar. 05	1246	Bwaruada	5		
Mar. 12	0900	Warangoi	4		
Mar. 17	0444	Kandrian	4		
Apr. 05	2330	Saidor	5	5.47	146.42
		Gumini	4	MS 6.0	
		Lufa	4	Depth 38 km	
		Kandrian	3		
		Kaiaput	2		
		Aiome	2		
Apr. 15	0618	Rabaul	4		
		Londolovit	3		
Apr. 18	0618	Rabaul	4	4.64	153.38
		Warangoi	3-4	Depth 54 km	
		Londolovit	3		
		Taliligap	3		

TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1959</u>					
Apr. 20	0328	Lingalinga	4-5	6.01	148.81
		Kandrian	3-4	MS 6.0	
		Walinda	3	Depth 70 km	
Apr. 26	1645	Lae	4		
Apr. 27	1301	Taliligap	4		
May 01	1500	Taliligap	4		
		Rabaul	3		
May 16	0616	Karoola	6-7	4.92	153.33
		Taliligap	5-6	MS 6.8	
		Londolovit	5	Depth 70 km	
		Rabaul	4-5		
		Karlai	2		
May 24	2004	Pomio	4-5	5.5	152.5
				MS 6.8	
May 25	1207	Pomio	4-5		
May 28	2227	Ambunti	5	4.00	142.13
		Lumi	4	ML 5.0	
		Telefomin	2	Depth 137 km	
Jul. 09	2035	Samarai	5-6		
Jul. 22	2302	Rabaul	4	5.07	152.56
		Kokopo	4	MS 6.6	
		Karlai	4		
		Gavit	3-4		

TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1959</u>					
Aug. 08	2356	Karoola	6	6.0	155.0
		Rabaul	3	ML 6.0	
				Depth 100 km	
Aug. 13	0310	Kainantu	4		
Aug. 13	2122	Pondo	5		
		Rabaul	3		
Aug. 14	1115	Pondo	4		
		Gavit	3-4		
Aug. 15	1155	Pondo	4		
		Rabaul	3-4		
Aug. 16	1108	Pondo	4	5.0	152.0
		Rabaul	3	ML 4.9	
Sep. 19	1110	Henganofi	5		
Oct. 12	1217	Wewak	4		
Nov. 02	2004	Pomio	6	5.59	150.95
		Karlai	4	MS 6.4	
		Rabaul	3	Depth 67 km	
		Walindi	3		
Nov. 19	1109	Goroko	6	5.91	155.42
		Lae	6-7	MS 7.0	
		Madang	5	Depth 115 km	
		Chuave	5		

TABLE 1 (continued)

DATE	APPROX. TIME (UT)	PLACE	INTENSITY (MM)	EARTHQUAKE °S °E	
<u>1959</u>					
Nov. 19 (contd)		Kerowagi	5		
		Kundiawa	5		
		Era	5		
		Wana	5		
		Middletown	5		
		Wau	4-6		
		Morobe	4-5		
		Garaina	4		
		Losuia	4		
		Mendi	3-4		
		Tapini	3-4		
		Yodda	3-4		
		Popondetta	3-4		
		Port Moresby	3-4		
		Menyamja	3-4		
		Kerema	3		
		Woitape	2		
		Balimo	2		
		Kandrian	2		
Nov. 19	1320	Lufa	5		

TABLE 2. GEOGRAPHICAL CO-ORDINATES

PLACE	LAT (S)		LONG (E)	
	DEG.	MIN.	DEG.	MIN.
AIOME	05	08	144	44
AITAPE	03	08	142	21
ANGORAM	04	04	144	04
AMBUNTI	04	13	142	50
AROPA	06	20	155	45
ATITAU	04	46	145	20
AWALA	08	50	143	04
AWELKON	05	48	147	48
BALIMO	08	01	142	57
BARABARA	10	05	150	57
BWAGOIA	10	42	152	50
BOGIA	04	16	145	00
BOKU	06	35	155	20
BUGANDI	06	42	146	59
BUIN	06	46	155	41
BWARUADA	09	56	151	11
CAMP DIDDY	06	44	147	00
CHIMBU	06	01	144	58
CHUAVE	06	07	145	08
DARU	09	05	143	12
DEBA	09	54	149	43
ERA	07	21	144	43
ESA-ALA	09	44	150	49
FEAD ISLAND	03	20	154	40
FINSCHAFEN	06	36	147	51

TABLE 2. (continued)

PLACE	LAT (S)		LONG (E)	
	DEG.	MIN.	DEG.	MIN.
CHIMBU	06	01	144	58
CHUAVE	06	07	145	08
DARU	09	05	143	12
DEBA	09	54	149	43
ERA	07	21	144	43
ESA-ALA	09	44	150	49
FEAD ISLAND	03	20	154	40
FINSCHAFEN	06	36	147	51
GAIMA	09	41	147	25
GARAINA	07	53	147	08
GAVIT	04	12	151	38
GEHUA	10	18	150	23
GOMA BAY	06	08	145	09
GOROKA	06	04	145	25
HENGANOFI	06	14	145	38
IOMA	08	22	147	49
KAIAPIT	06	15	143	53
KARKAR ISLAND	04	57	145	58
KANDRIAN	06	12	149	32
KARLAI	05	05	151	57
KARoola	05	08	154	35
KAINANTU	06	17	145	51
KEREVAT	04	19	152	02
KEROWAGI	05	54	144	52
KIKORI	08	30	147	25

TABLE 2. (continued)

PLACE	LAT (S)		LONG (E)	
	DEG.	MIN.	DEG.	MIN.
KILENGE	05	35	148	30
KIUNGA	06	07	141	18
KOKOPO	04	27	152	16
KUNDIAWA	06	01	144	58
KUTUBU LAKE	06	24	143	19
LAE	06	44	147	00
LINGALINGA	04	13	152	12
LONDOLOVIT	03	05	152	38
LOSUIA	08	32	151	04
LUFA	06	20	145	18
LUMI	03	29	142	02
MASIMASI	05	36	146	13
MATUAPA	09	57	150	52
MENDI	06	08	143	40
MIDDLETON	07	16	144	12
MINJ	05	54	144	41
MT HAGEN	05	52	144	14
MUMENG	06	60	146	36
NAMATANAI	03	40	152	27
NUKU	03	40	142	27
POMIO	08	43	146	31
PONDO	04	34	151	38
POPONDETTA	08	47	148	14
PORT MORESBY	09	29	147	09
RANGARERE	04	13	151	35

TABLE 2. (continued)

PLACE	LAT (S)		LONG (E)	
	DEG.	MIN.	DEG.	MIN.
ROUKU	08	42	141	36
SAIDOR	05	37	146	28
SALAMO	09	40	150	48
SAMARAI	10	36	150	40
SOHANO	05	27	154	40
TALASEA	05	18	150	03
TALILIGAP	04	19	152	10
TARI	05	52	142	55
TELEFOMIN	05	08	141	38
TIMBUNKE	04	11	143	31
TOL	04	50	152	01
ULAMONA	05	00	151	15
UMBOI	05	38	147	55
VANIMO	02	41	141	18
WABA	04	32	145	16
WABAG	05	26	143	42
WALINDI	05	27	150	06
WANA	07	26	144	44
WARANGOI	04	30	152	10
WASU	05	58	147	12
WAU	03	34	143	38
WEWAK	08	33	147	15
WOITAPE	08	33	147	15
YANGORU	03	39	143	17
YODDA	08	49	147	41

APPENDIX 1

ROSSI - FOREL INTENSITY SCALE (1916-1940)

1. Shocks recorded by good seismographs.
2. Shocks noticed by a few people at rest.
3. Shocks noticed by many persons, strong enough for duration and direction to be estimated.
4. Shaking of windows and doors.
5. Quaking noticed by entire population; beds, & c., moved.
6. Trees swayed, clocks stopped, some people terrified.
7. General terror, but no damage to structures.
8. Chimneys thrown down, walls cracked.
9. Partial destruction of buildings.
10. Great catastrophe; ruined buildings; clefts in earth.

APPENDIX 2

MODIFIED MERCALLI INTENSITY SCALE.

Definition

Intensity

1. Not felt except by a very few under especially favourable circumstances.
2. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
3. Felt quite noticeably indoors, especially on upper floors of buildings but many people do not recognise it as an earthquake. Standing motor cars may rock slightly. Vibrations like passing of lorry. Duration estimated.
4. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors, disturbed; walls make cracking sound; sensation like heavy lorry striking building. Standing motor cars rocked noticeably.
5. Felt by nearly everyone; many awakened. Some dishes, windows, etc. broken; a few instances of cracked plaster; unstable objects overturned. Disturbance of trees, poles and other tall objects sometimes noticed. Pendulum clocks may stop.

6. Felt by all; many frightened and run outdoors: Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.

7. Everyone runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; some chimneys broken. Noticed by persons driving motor cars.

8. Damage slight in especially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Disturbs persons driving motor cars.

9. Damage considerable in specially designed structures; well designed frame structures thrown out of plumb; great in substantial buildings with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.

10. Some well-built wooden structures destroyed; masonry and frame structures and their foundations destroyed; ground badly cracked. Rails bent. Landslips considerable from river banks and steep slopes. Shifted sand and mud. Water splashed over banks of rivers, etc.

11. Few, if any, masonry structures remaining standing. Bridges destroyed. Broad fissures in ground. Underground pipe lines completely out of service. Earth slumps and landslips in soft ground. Rails bent greatly.

12. Damage total. Waves seen on ground surface. Lines of sight and level distorted. Objects thrown upward in the air.

QUESTIONNAIRE USED SINCE 1967

Name of Person reporting (block letters).....	<u>Shifted</u> small objects, furniture.....
.....	<u>Overturnd</u> small objects, furniture.....
Address.....	<u>Cracked</u> plaster, windows, walls ground.....
Date of shock.....Time.....AM.....Pm.....	<u>Fall</u> of, books, pictures, plaster, walls.....
<u>Place</u> where you were at time of shock.....	<u>Broke</u> dishes, windows, furniture.....
<u>Motion</u> rapid slow.....Shook how long.....	<u>Water tanks</u> : sloshed, split, top blew out.....
<u>Felt</u> by me, several people, many, all	
<u>Direction of motion felt outdoors</u> ; not certain,	<u>Building Damage</u> : none, slight, considerable, great, total
N., NE., E., etc.....	in buildings built of Native Materials wood, brick,
<u>Nature of ground underneath locality</u> ; rock, soil,	masonry, concrete.....
loose, compact, marshy, filled in.....	<u>Pets</u> : did the dog, cat, bird get frightened? Yes.No.Did not
level, sloping, steep.....	notice.....
<u>Awakened</u> me, no one, few, many, all (in my house)	<u>Animals</u> : what did the animals do?.....
.....	<u>Noise</u> : I did, did not hear anything.....
(in community).....	It sounded like a truck, like thunder, like rolling gal-
<u>Frightened</u> me, no one, few, many, all (in my home)	vanized iron tank.....
.....	The sound lasted for.....seconds
(in community).....	<u>Ground Movements</u> : Did people fall over, just stand, just
<u>Rattling</u> of windows, doors, dishes.....	walk, have no trouble?.....
<u>Creaking</u> of walls.....	Were there landslides, water waves, ground waves, nothing?
<u>Hanging objects</u> , doors, etc., did, did not, swing,	
N., NE., etc.....	
<u>Trees, bushes</u> , shaken slightly, moderately, fell	<u>After shocks</u> : During the next 24 hours I felt nil, one,
down.....	several, many smaller shocks.....

REMARKS.

.....

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APPENDIX 4

TABLE FOR EVALUATION OF INTENSITY

EFFECT	M.M. INTENSITY					
	III	IV	V	VI	VII	VIII
GROUND MOVE- MENTS	Faint Felt by half population.	Moderate Felt by most.	Strong Felt by all.	Very strong Slightly affects walk- ing.	Difficult to stand	People thrown down.
SEEN/ HEARD (other sounds apart from rumbling)	Faint rattle of windows house creaks. Hanging objects swing slightly.	Windows, crockery, etc., rattle building creaks. Trees shake slightly. Slight sloshing of tank water.	Unstable objects move. Pictures swing. Tree movements obvious. Water sloshes in tanks.	Objects fall, furniture moves. Trees strongly shaken. Water sloshes out from tanks.	Ground waves. Water waves.	Odd trees fall.
AWAKENED	Few	Many	All except few heavy sleepers.	All	All	All

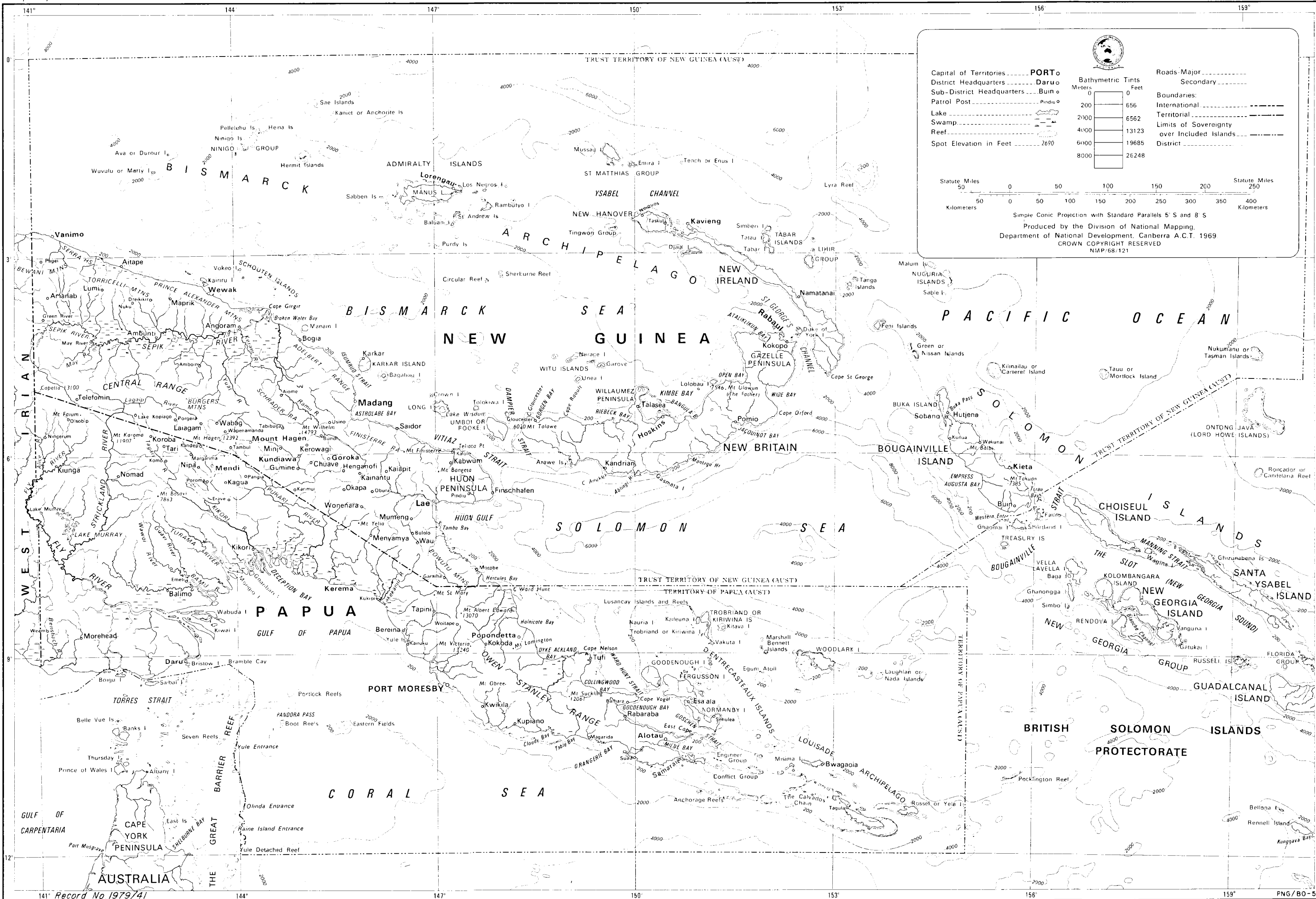
APPENDIX 4 (continued)

EFFECT	M.M. INTENSITY					
	III	IV	V	VI	VII	VIII
ALARMED	Nil	Very few alarmed.	Few alarmed.	Many alarmed. run out of doors.	All alarmed.	Some terrified.
DAMAGE	Nil	Nil	Weaker water tanks leak.	Few water tanks burst. Obvious cracks in weak masonry. A few weak village huts collapse.	Many burst tanks. Unreinforced brick walls collapse. Minor damage to house stumps.	Timber framed huts and houses off stumps. Roughly half, village huts off stumps of thrown down.
SLUMPING and LAND- SLIDES		Rare landslides.	Occasional landslides.	Occasional landslides.	A few land- slides. Settlement and cracking of unconsoli- dated ground.	Extensive landslides. Bad slumping of built up areas. Reef settlement.

PAPUA AND NEW GUINEA

Fig. 5

1:5,000,000



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