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The following extracts are from "Seismicity of the Earth" by Gutenburg and Richter, Princeton University Press 1954.

"Tsunamis or seismic sea waves, popularly but incorrectly termed "tidal waves", are large water waves, often rising to great heights on exposed coasts and propagated across the oceans with the velocity of waves on the surface of deep water. Most of them follow large shallow earthquakes. In the open ocean the height of these waves is relatively small; together with the great wave length this results in such waves escaping direct observation. Since velocity decreases in shallow water, the waves rise rapidly on approaching a coast."

On May 22nd - 23rd the following major earthquakes occurred in the central coastal region of Chile.

Date	Local (N.G.) Time			Epicentre	Magnitude
	h	m	s		
22nd	20	30	39	38°S 73½°W	M 6½
	20	32	43	37½°S 73° W	M 7¼-7½
23rd	04	55	57	38°S 73½°W	M 7¾
	05	10	47	38°S 73½°W	M 7½-7¾
	05	11	20	38°S 73½°W	M 8¼-8½

Tsunamis originating from one or more of these earthquakes began arriving along the coastal region of the Territory in the early hours of May 24th and continued throughout the day.

Assuming that the magnitude 8 + earthquake in Chile was the cause of the first sea wave to reach the Territory then the wave travelled at an average velocity of about 385 m.p.h. with a distance of about 190 miles between crests. Observed periods between successive crests at Rabaul ranged from 25 minutes to 35 minutes. The average depth of ocean traversed is estimated to be approximately 6,790 feet.

The following are reports of observations received from several places throughout the Territory (see Fig. 1).

RABAUL

A series of small tsunamis began arriving in Rabaul at between 0300 hours and 0400 hours on the 24th and tidal fluctuations continued throughout the day. The maximum height was about 4 feet and the period of oscillation ranged from 25 to 35 minutes (see Fig. 2).

Losses in Burns Philp bulk stores from saturation by sea water were estimated at £1000. Slight damage was effected to several other low-lying places along the foreshores of Simpson Harbour.

VANIMO

At 10 a.m. Mrs. P.W. Murphy observed an 8 feet rise and fall in sea level lasting 20 minutes. This was followed by 4 feet rises.

AITAPE

Abnormal tidal activity on the Aitape coast in the early morning produced tidal surges of 3 feet above normal.

WEWAK

Wewak registered an abnormal tide rise of approximately 6 feet at 6 a.m.. The sea continued to surge all day and at 1 p.m. 2½ feet rises were observed at 20 minute intervals. Coastal roads were 3 feet under water during the night.

HATZFELDHAVEN

Tide fluctuations of several feet between 0800 and noon were reported. The range of variation was roughly assessed at 6 feet.

MADANG

Relatively constant variations of 15 inches over periods of 30 minutes were observed. During the night the tide rose 3 - 4 feet above spring tide level.

LAE

Nil disturbance observed.

LORENGAU

At approximately 3 a.m. the tide rose quickly to about 4 feet above mean sea level and then ebbed in a short undetermined time. At Lorengau wharf in Seeadler harbour at 1115 hours the water level was rising and falling over a seven inch range with 6 minutes between consecutive lows - 4 minutes in, 2 minutes out.

LOMBRUM

Reports from the Naval base at Lombrum indicate the first tsunami at 0300 hours approximately, followed by two further waves; also gradual rise of about 4 feet at 0645, 0745 and 1000 hours. Apparent sea wave influence recorded duration 0645-0730, 0745-0755. Maximum height of influence approximately 4 feet at half tide. Minor influence of approximately 1 foot at 1015. No damage reported at Lombrum, slight damage at the native village of Papitalai.

PAK ISLAND

At 6 a.m. the tide rose to 2 feet 6 inches above normal, then receded below low tide level. Two cycles were observed to take 1 hour. At 0945 hours the tide was rising and falling every 15 minutes.

JOHNSTON ISLAND

M.V. Tami reported terrific tide rips 8 miles south-east of Johnston Island.

KAVIENG

Kavieng reported a rapid rise and fall up to 3 feet in a few minutes at intervals.

LONDOLOVIT

Between 0900 and 1100 hours on the 24th the water level in Londolovit Bay was observed to rise from low water to high water level then recede, the cycle taking about 10 minutes. Although no large waves were observed the sea appeared to be disturbed by a strong undertow.

MULIAMA

Mr. Bell of Muliama Plantation on the east coast of New Ireland, reported abnormal conditions of sea level occurring throughout the day and continuing into the night. The first observation at 0530 hours indicated full tides every 8 minutes. The water level did not attain any greater height than normal high tide but it was noted from debris remaining that tsunamis had reached the observer's bungalow, which is 20 feet from normal high water mark, during the night. Mr. Bell considers that the tides receded more rapidly than they flooded.

ANIR ISLAND

M.V. Theresa anchored at Malekolon, Anir Island, reported rapid rise and fall of tide 5 - 6 feet at 0650 and 0844 hours.

SOHANO

Tide variations of 2 feet at 5 minute intervals were observed at Sohano from early morning, moderating in the afternoon.

KIETA

The District Office at Kieta reported "no actual tidal waves" but tides were 2 feet above and 6 feet below normal for that time of year. The duration from low to high was 10 minutes and 5 complete movements were observed between 0640 and 0915 hours.

LAGENDA

The meteorological officer reported a swiftly running sea and unusually high tides every 10-15 minutes.

WALINDI

Tides about every 10-15 minutes.

ULAMONA

Nil disturbance observed.

SERAGI

High tides when they should have been low and the sea disturbed.

RANGARERE

Tide very strong upstream in the river, whirlpools around the reefs and the sea disturbed. Flood tides occurred every 15-20 minutes.

VULCANOLOGICAL OBSERVATORY,
RABAUL

CALCULATIONS:

Lombrum figures are used in the following calculations since they may be considered the most reliable.

1. Although the precise path of the Tsunamis is not known and the time of their first arrival at Lombrum is approximate, the following figures are indicative of the probable average velocity.

Lombrum	Epicentre	$\triangle$	Km.	Miles
$02^{\circ}S$ $147\frac{1}{3}^{\circ}E.$	$38^{\circ}S$ $73\frac{1}{2}^{\circ}W.$	122°	13,560	8,475

Origin time = 0511 23/5/60

First arrival - Lombrum = 0300 24/5/60

Travel time = 22 hours approximately

Average velocity = $\frac{8475}{22}$ = 385 m.p.h.

2. Wave length (L) = vT where T = period of oscillation. Taking T = 30 minutes as the average period

$$L = \frac{385}{2} = 192 \text{ miles.}$$

3. The velocity of waves over deep water is given by $\sqrt{gh}$ where g is the acceleration of gravity and h is the depth.

$$\text{Thus } h = \frac{v^2}{g}$$

Therefore the average depth of ocean traversed is approximately 6,790 feet.

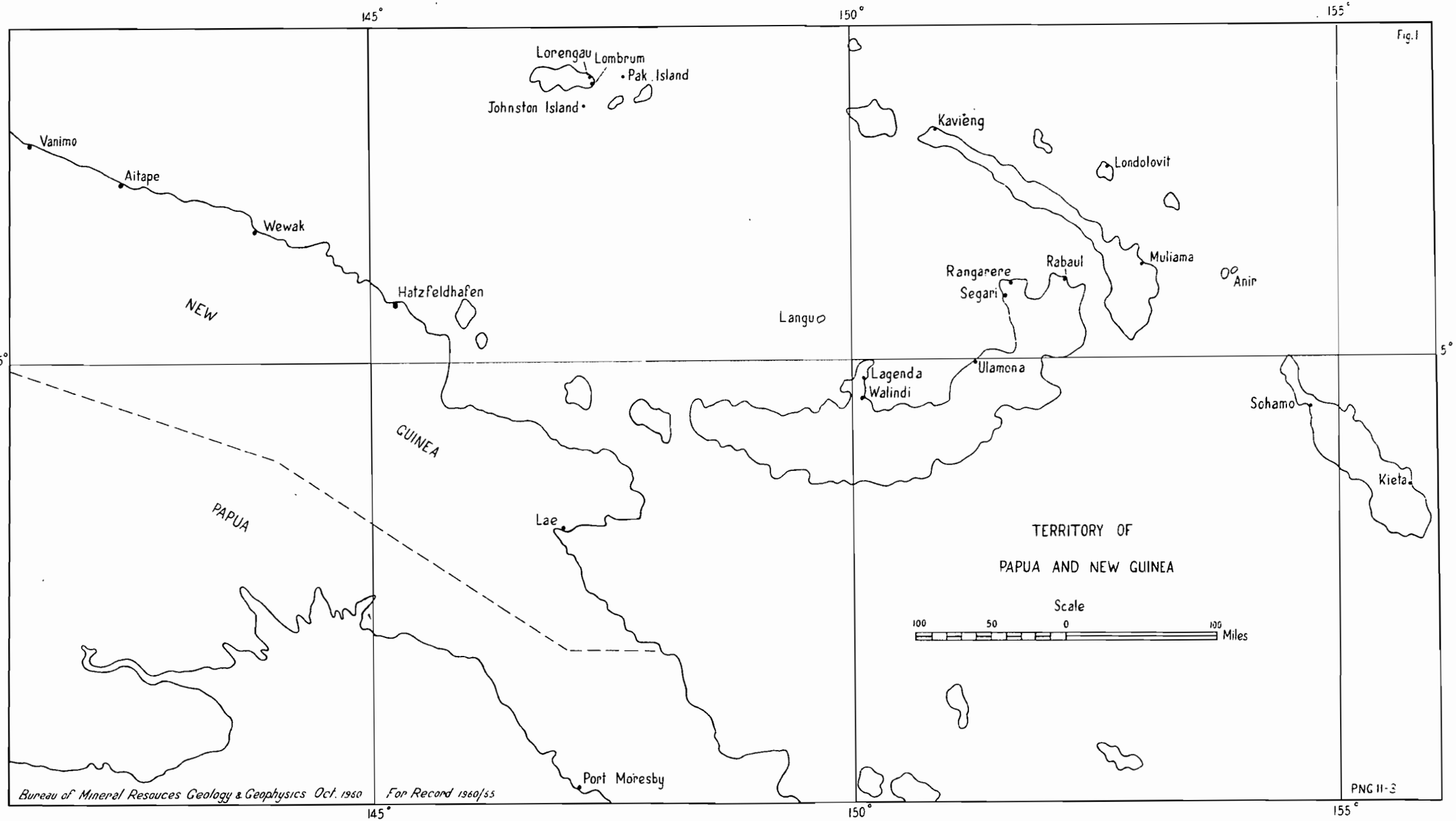
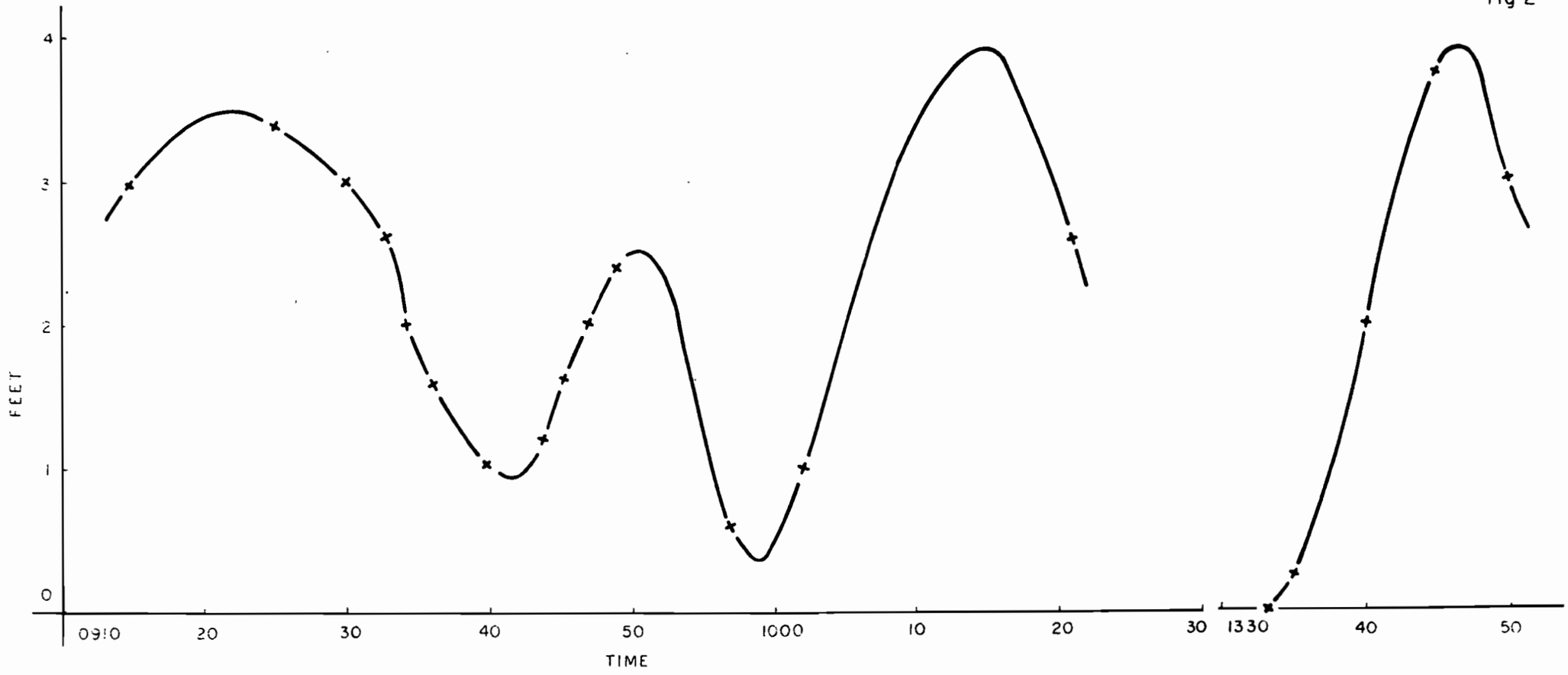

145°
150°
155°
Fig.1
Lorengau
Lombrum
Pak Island
Johnston Island
Kavieng
Londolovit
Vanimo
Aitape
Wewak
Hatzfeldhafen
Rangarere
Rabaul
Muliama
Segari
Anir
NEW
Languo
5°
Lagenda
Walindi
Ulamona
Schamo
GUINEA
Kieta
PAPUA
Lae
TERRITORY OF
PAPUA AND NEW GUINEA
Scale
100 50 0 100 Miles
Port Moresby
Bureau of Mineral Resouces Geology & Geophysics Oct. 1960
For Record 1960/55
PNG 11-3

Fig 2



Data from Harbour Office Rabaul - observed on a tide stick attached to the main wharf.

PNG 10/9

A M.

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