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SEISMIC SHORT-PERIOD BACKGROUND NOISE AMPLITUDES AT PORT MORESBY FROM 1962 TO 1966

by

D. DENHAM and P. RUPA

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SUMMARY

An analysis of the background noise levels at Port Moresby from 1962 to 1966 indicates a strong seasonal variation within a year and little or no long term increase in the overall level.

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1. INTRODUCTION

When the World-wide Standardised Seismographs were installed at Port Moresby in 1962 the nearest habitation was over two miles away and access to the site was by a little-used unsealed road. However, with the rapid expansion of Port Moresby and the establishment of the University of Papua and New Guinea in 1966 this situation has changed. The University now abuts the Observatory site and there are plans to enlarge the existing access road to a six-lane highway to a new port site at Fairfax Harbour.

Concern is felt that such an increase in man-made background noise will reduce the effectiveness of the observatory as a high-gain seismic station. The study described in this Record was undertaken to establish the noise levels recorded at the observatory from 1962 to 1966 so that any deterioration in the background noise situation can easily be detected.

2. TECHNIQUES

The short-period vertical seismograph is the most important of the six-component World-wide system and the mean peak-to-peak noise amplitude was measured on this trace for every day when records were available from July 1962 to December 1966. These values were averaged to give a mean peak-to-peak value for each month.

All the measurements were made by one observer (P. Rupa) so that any over or under estimation of the noise values would apply to all readings. On most days the noise level may vary considerably throughout the day but if the record is sampled at a number of places then a reasonable average can be obtained for each day. In any case only the monthly means are used in the final analysis.

The noise amplitude for each day was estimated to the nearest 0.5 mm and the average value for the month is given to 0.1 mm.

3. RESULTS

Plate 1a shows the noise plot for the whole period from July 1962 to December 1966 and Plate 1b shows the mean monthly values for the same period. There has been little or no increase in the average noise levels since 1962. During this period the magnification has been kept at a constant 50,000 at a period of one second.

Most of the variation occurs within the year rather than from year to year. The noisiest months are May, June, July, and August when the south-east trade winds are at their strongest and the quietest months are November and December when there is little or no wind.

The level of background noise is the most important single factor controlling the effectiveness of a seismic station and the number of earthquakes recorded at any one station is a function of the local noise level. Plate 2 shows how the number of earthquakes recorded strongly depends on the background noise level. This plot indicates that an empirical relationship of the form:

$$\log n + b \log A = c$$

holds in the range of background noise observed at Port Moresby. In

this equation, n is the number of earthquakes recorded during a thirty-day month, A the mean peak-to-peak amplitude of the noise, and b and c are constants

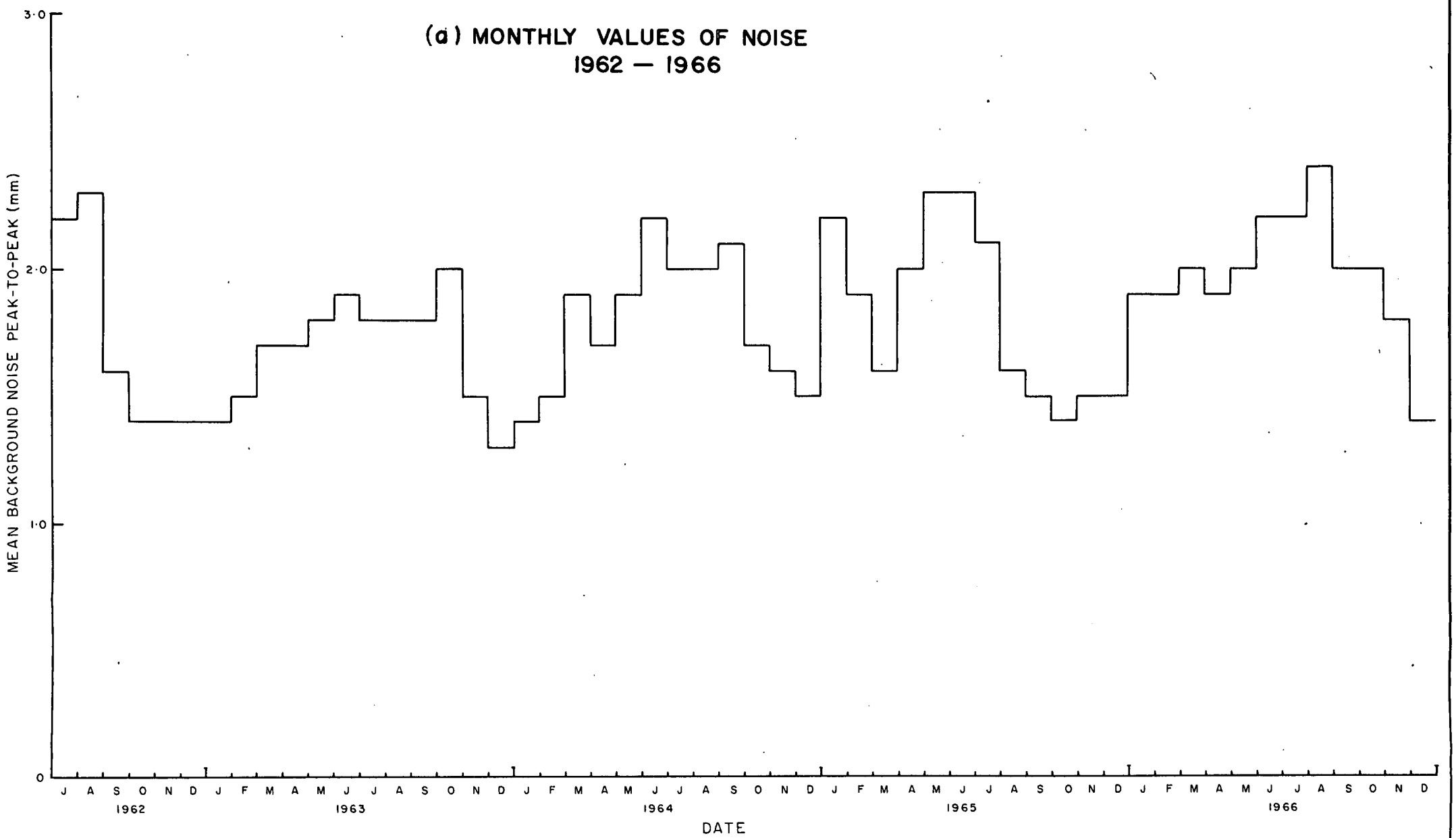
The plot shows very clearly the importance of situating seismic stations in areas of low background noise.

4. CONCLUSIONS

Up to the end of 1966 no significant long term increase in the background noise at Table Top Observatory had taken place. The results show a regular annual variation in background noise and a high correlation is observed between the number of earthquakes recorded and the noise level. As urban development increases around the observatory site a close watch should be kept on the situation.

Port Moresby, 1966

(a) MONTHLY VALUES OF NOISE 1962 — 1966



(b) MEAN SEASONAL VARIATION OF NOISE 1962 — 1966

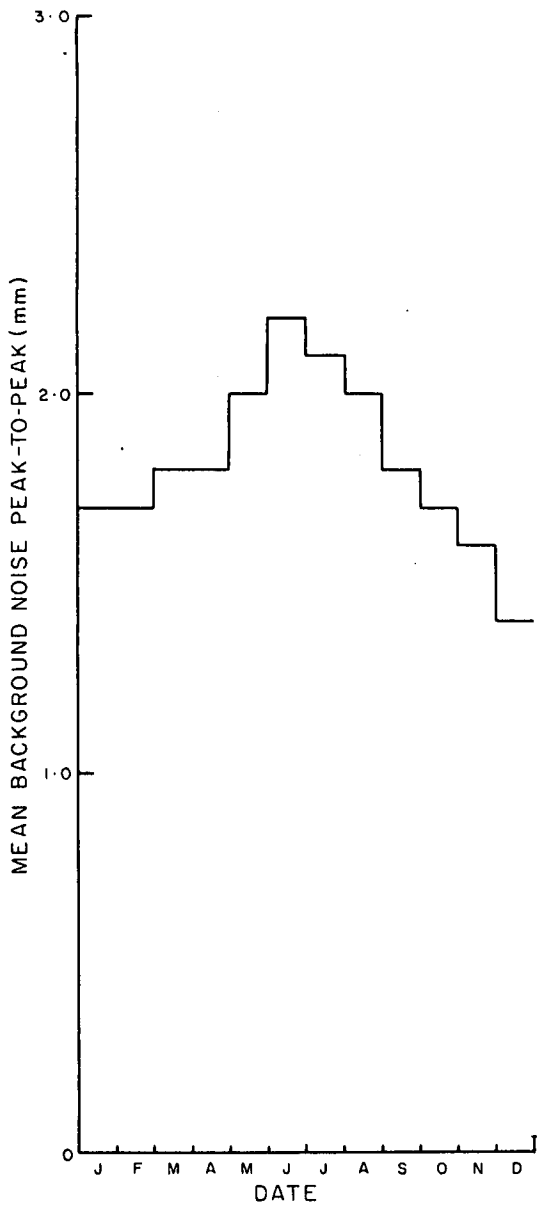


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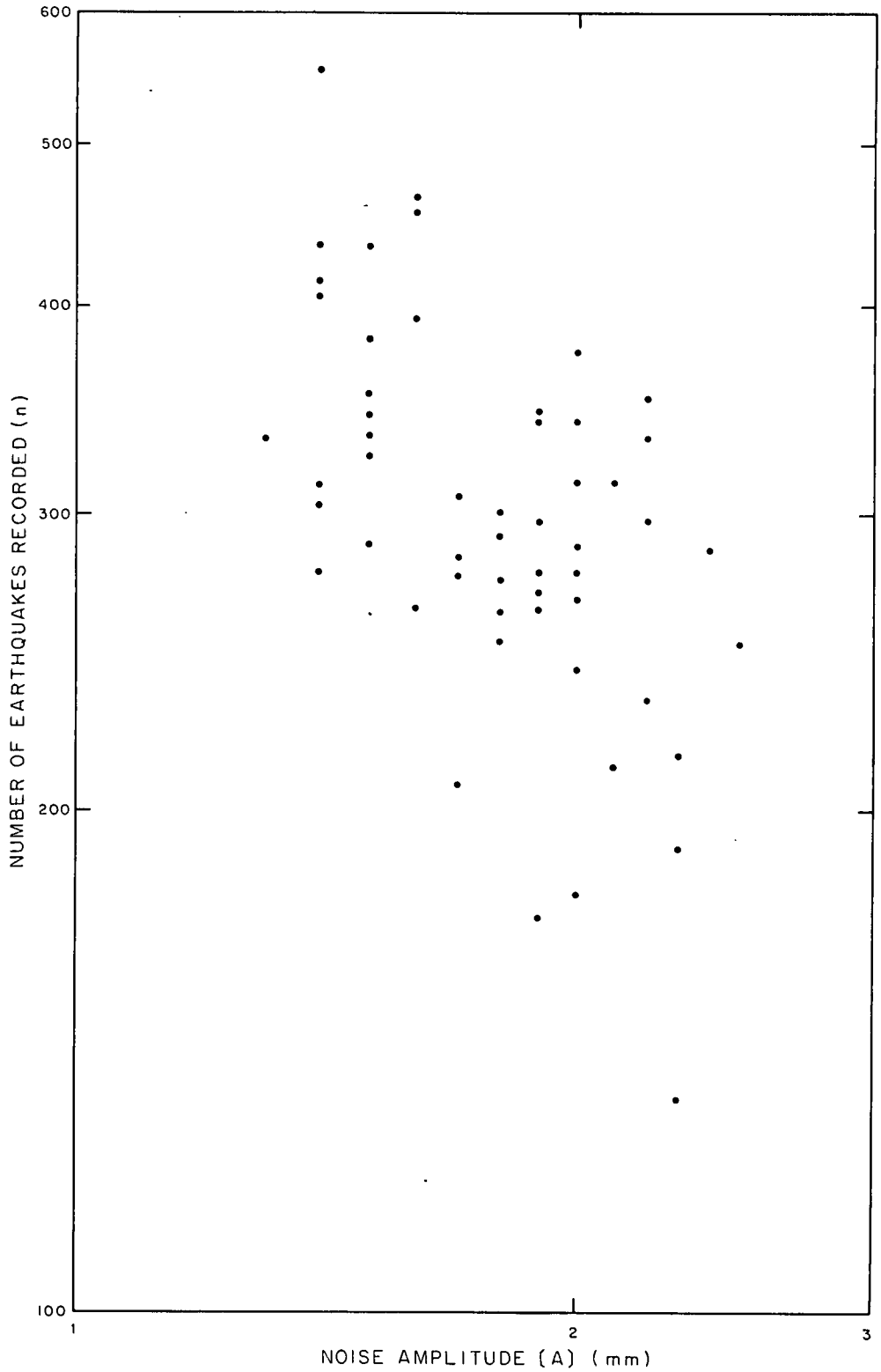
PLATE 1

PLATE 2



RELATIONSHIP BETWEEN NUMBER OF EARTHQUAKES RECORDED MONTHLY AND BACKGROUND NOISE

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Port Moresby, 1966