

TRANSACTIONS  
OF THE  
ROYAL SOCIETY OF NEW ZEALAND  
EARTH SCIENCES

VOL. 8

No. 2

14 JULY 1970

Seismic Regions of the South Island of New Zealand

By G. A. EIBY

Geophysics Division, Department of Scientific and Industrial Research.

[Received by the Editor, 18 August 1969]

*Abstract*

THE region of less frequent earthquakes that lies between the active Fiordland Region and the Main Seismic Region of New Zealand is separated from the Main Region at a north-west trending boundary that marks a sharp change in the amount and character of the activity. The boundary has no obvious geological expression, but continues the crest of the Lord Howe Rise. The southern boundary of this Central Seismic Region appears to continue the southern flank of the Rise. Maps of epicentres from 1940-64 and of earlier large earthquakes are given. Histograms are used to show the changes in frequency of earthquake occurrence with geographical position.

INTRODUCTION

It has become conventional to divide New Zealand seismicity into two parts, the Main Seismic Region, lying roughly between latitudes  $36\frac{1}{2}^{\circ}\text{S}$  and  $43\frac{1}{2}^{\circ}\text{S}$ , and the Fiordland Seismic Region, lying south of it and to the west of longitude  $169\frac{1}{2}^{\circ}\text{E}$ . Both these regions have earthquakes of both shallow and intermediate depth, and the Main Seismic Region has also some true deep-focus activity. Hamilton and Evison (1967) have classified these regions as active continental margins, the tectonic associations of the Main Region being with the Pacific Basin and those of the Fiordland Region with the Tasman Sea (Eiby, 1965).

Between these two regions is an area of lower seismicity, without foci at greater than normal depth (with a single possible exception). It does not seem to have been explicitly considered whether the earthquakes of this region constitute a distinct system with characteristics of its own, or whether they are merely scattered occurrences at the ill-defined boundaries of the major regions. The fact that this part of the country is traversed by the major Alpine Fault, geologically active in Recent time, makes the problem one of geophysical interest.

EXISTENCE OF A CENTRAL REGION

There are several reasons for considering that a distinct Central Seismic Region exists, possibly separable into an Alpine and a Canterbury Sub-region. Since 1940, there have been about 12 earthquakes with magnitudes of six and above in the Fiordland Region, and a similar number in the Main Region. All the Fiordland shocks have been to the west of  $169\frac{1}{2}^{\circ}\text{E}$  and south of  $44^{\circ}\text{S}$ , about 240km from any shocks of comparable size in the Main Region. If the shocks near Lake Coleridge

*Published by the Royal Society of New Zealand, c/o Victoria University of Wellington, P.O. Box 196, Wellington.*

*Trans. R. Soc. N.Z., Earth Sciences, Vol. 8, No. 2, pp. 29-39, 10 figs.*