

In the map accompanying the report of the Dominion Observatory for 1929 the epicentre of Arthur's Pass earthquake is plotted at  $42.7^{\circ}\text{S}$ ,  $171.7^{\circ}\text{E}$ , which is very close to Harper's Pass. This position is shown by a circle in Fig. 7. Both the *International Seismological Summary* and Gutenberg and Richter (1954) assign an epicentre farther north at  $42.5^{\circ}\text{S}$ ,  $172.0^{\circ}\text{E}$ , and much closer to the suggested boundary. The ISS result depends upon readings at 99 seismograph stations. Both epicentres are in uninhabited mountainous country, and the distribution of reported felt intensities is of little help in distinguishing between them.

Speight (1933) visited the district, and from a study of landslides decided that "the epicentral area is located to the east of the pass, and the belt of country where the disturbance was greatest extends in a WSW to ENE direction through the branches at the head of the Poulter River and on into the upper valley of the south branch of the Hurunui River". He gives a map on a scale of approximately 20km to the inch on which this area is marked. Its centre is about 8km south of the Dominion Observatory epicentre, and still farther south of the ISS position. This is surprising in view of Speight's criticisms of previous estimates as being too far south. It is not clear whether he reached the position of the ISS epicentre, which appears to be the most satisfactory one on the available evidence.

#### DEEP FOCUS ACTIVITY

The Central Seismic Region does not appear to contain any earthquakes with greater than normal focal depth, with the possible exception of a small shock on 1962 December 26. This was assigned an epicentre at  $42.9^{\circ}\text{S}$ ,  $171.4^{\circ}\text{E}$ , and a focal depth of 70km. This depth depends greatly upon a single reading at the Kaimata station (KAI). Although the movement begins during a deflection time-mark, there is no obvious reason to question it. In view of the uncertainty of all depth determinations in this range, and the possibility of abnormally great crustal thickness beneath the Southern Alps, this is not shown beyond doubt to be an intermediate earthquake. Its magnitude was only 3.9, and it is at least 80km south of any other shock that has been assigned a depth greater than normal, until the intermediate depth activity of the Fiordland Region is reached, some 250km farther south.

#### POSSIBLE SUBDIVISION OF THE CENTRAL REGION

In view of the generally low seismicity of the Central Region, it may be premature to attempt further subdivision, but the counts of epicentres in the X and Y sections of region B emphasise the difference between the Alpine section and the Canterbury Plains. The broad association between high seismicity and mountainous terrain in many parts of the world has been developed by Soviet geophysicists into the concept of tectonic "contrast". Earthquakes are considered to occur where the rate of deformation is greatest, regions of uplift being replaced by regions of subsidence within a short horizontal distance (Savarenskii and Kirnos, 1955, p. 40). The proposed subdivision would conform with this view. The plains are not inactive, but there have been few shocks approaching magnitude 4 in recent years, and earlier records of more widely felt earthquakes can be explained by epicentres in the active regions. A shock of magnitude 5, on 1968 January 24, with a provisional epicentre at  $43.6^{\circ}\text{S}$ ,  $172.5^{\circ}\text{E}$ , is apparently within the Central Region.

Within the Alpine sub-region, there has been a noticeable concentration of shocks in the vicinity of Lake Coleridge, including the largest, of magnitude 6, on 1946 June 26. The intermittent character of the activity is very noticeable, periods of several years without even a minor shock being succeeded by numerous earthquakes within a few months. Shocks at the western margin of the Main Seismic Region, in the sea to the north of Mount Egmont, behave in a similar way, and this may be a reason for assigning shallow activity to the west of the Sub-Crustal Rift (Eiby, 1964) to a separate region.