Research Notes

A Note on the Seismicity of the Ross Sea Region

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Summary

Although the aseismicity of Antarctica has been confirmed by IGY observations, small local disturbances, up to magnitude 3, are almost a daily feature of seismograms at Scott Base. *S–P* intervals of these shocks range from 3 to 38 s but half of the shocks recorded have *S–P* differences of 4–6 s, values appropriate to the distance of Mt Erebus. An unusual low-velocity phase ($V \simeq 0{\cdot}6$ km/s) is present on many seismograms.

For many years it has been known, from teleseismic observation, that the whole of Antarctica is seismically stable. No epicentre has yet been reliably located along the postulated structural connection between the junction of the Easter Island Rise, the Indian Antarctic Swell and the New Zealand region at about 64° S, 160° E, and the northern end of the Palmer Peninsula; or at latitudes higher than 65° S elsewhere (Gutenberg & Richter 1949). As a result of the comparatively close network of seismological stations on the Antarctic continent developed during IGY, minor seismicity, previously undetected teleseismically, should be disclosed. Activity of sufficient magnitude ($\sim M = 4$) to be located by the present array of stations is also absent in the Ross Sea region. Examination of the Scott Base and Hallett Station records during IGY reveals no shocks which could be placed south of the Balleny Islands, with the exception of minor local activity near Scott Base.

This activity, being recorded at only a single station, does not lend itself to reliable quantitative analysis. However the following remarks may be made following a study of these local shocks.

1. Over 300 near earthquakes were recorded at Scott Base between 1957 June 1 and 1958 December 31. Provisional *S–P* intervals were assigned to 150 of these shocks and these intervals range from 3 to 38 seconds. Seventy-six earthquakes have *S–P* intervals of 4–6 s; the remainder are mainly grouped in the 9–13 s and 27–38 s ranges, the latter values being dubious because of the difficulty in identifying the first *S* arrival. In connection with the origin of shocks of *S–P* interval 4–6 s it is worth noting that the Scott Base seismographs are about 30 km south of the mildly active volcano Mt Erebus.

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2. The maximum magnitude of the local earthquakes recorded during the above period is estimated to be not greater than 3·0

3. On many of the seismograms an unusual phase of apparent velocity about 0·6 km/s is present. Most prominent on the vertical component, this arrival takes the form of one or two pulses of 4–8 cycles of regular waves of period about 1½–2 s. Figure 1 shows the vertical component of a typical earthquake in the

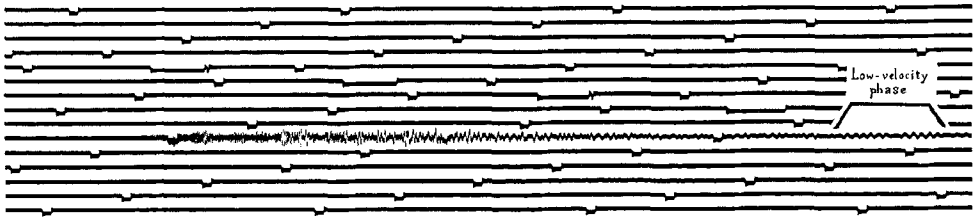

FIG. 1.—Local earthquake recorded on short-period vertical seismogram (Benioff), 1957 August 3, at Scott Base.

9–13 s range and the diminishing coda increases in amplitude and period and becomes quite regular as the low-velocity phase arrives. Kizawa (1960) has recently reported a phase with a group velocity of 0·6 km/s on records from the Mori weather station 54 km from the volcano Usu in Japan. Kizawa's "third phase" shows dispersion, stationary values of the group velocity lying between 1½ and 2 s. The path between Usu and the Mori weather station passes through Utiura Bay (depth < 100 m) for over 90 per cent of its length and the phase is not recorded at other stations in the vicinity where there is no water covered segment in the path.

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