550.34:551.241

DETERMINATION OF THE THICKNESS OF THE GRANITIC LAYER IN S.W. FINLAND

by

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Abstract

Single and double *P* reflexions from the Conrad discontinuity were observed during the 1958 investigation at Pori. They indicate a thickness of 17.9 km for the granitic layer.

Introduction

The 1958 investigation carried out by the Seismological Division consisted of nine submarine explosions off the city of Pori, S.W. Finland, with charges varying from 20 to 600 kilograms of TNT. The P_g and S_g velocities were found to be 5.72 and 3.34 km/sec (VESANEN, METZGER, NURMIA, PORKKA, [5]), while the equipment used has been described by NURMIA [1] and SIIVOLA [4].

Instrumentation

As the reflected impulses consist of relatively high frequencies, a special vertical-component geophone that utilizes a piezo-electric transducer (Fig. 1) was used for the investigation. The output of the geophone was of the order of one millivolt per micron of ground displacement at ten cycles per second, and the signals were recorded with a standard electrocardiograph at a paper speed of 25 mm per second.

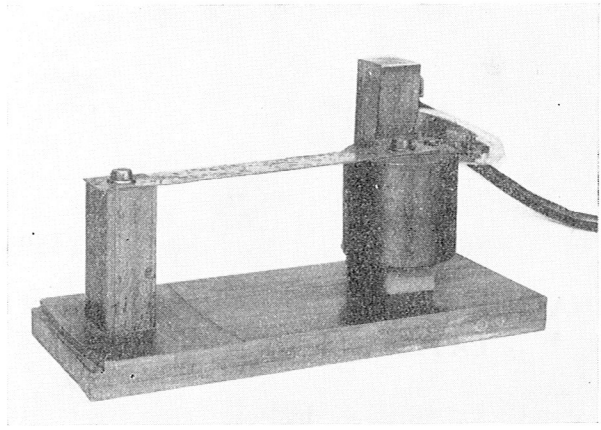

Fig. 1. Piezo-electric geophone.

Observations

Clear high-frequency arrivals that were interpreted as single and double reflexions from the Conrad discontinuity were recorded when the distance to the explosion site was 6.0 km, 33.8 km, 61.7 km, and 71.0 km. At other distances simultaneous direct arrivals made it impossible to determine the precense of a reflected signal. The reflexion arrival times, the corresponding distances, and the resulting depths of the Conrad discontinuity obtained by using the P_g velocity value (5.72 km/sec) determined in the same investigation, are given in Table 1.

Table I.

Shot No.	Dist. (km)	Refl. travel time (sec)	Interpre-tation	First-layer thickness (km)
1	6.0	6.4	single	18.05
3	33.8	8.55	single	17.67
3	33.8	13.88	double	17.95
7	61.7	12.45	single	17.80
9	71.0	14.15	single	19.50
Mean value excluding No. 9: 17.9 km				

Fig. 2 is a reproduction of the record from shot No. 3, the single and double reflexion arrivals are marked with arrows.

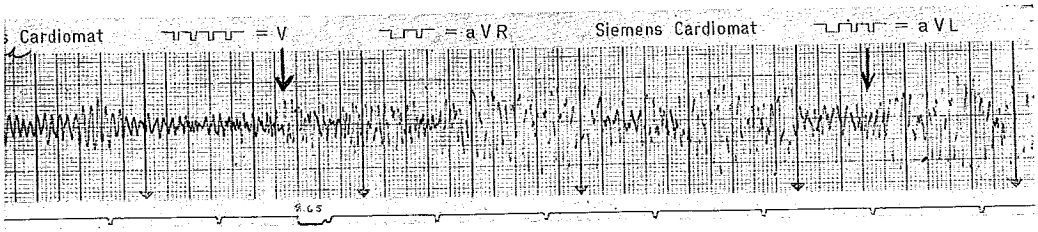

Fig. 2. The single and double reflections from the Conrad discontinuity marked with arrows.

Discussion

The results for different shocks are seen to show good mutual agreement, with the exception of shot No. 9. With this particular shot there was difficulty in determining the location of the shot point owing to the great distance from the shore, and this value is therefore excluded from the final result.

There have been no reports of similar investigations from elsewhere in Fennoscandia, but the result is in general agreement with those obtained in Central Europe (e.g. REICH, [2]; ROTHE, PETERSCHMITT, [3]).

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