

EARTHQUAKE IN RANUA AND PUDASJÄRVI 1956

by

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On December 24th, 1956, the seismographs at the new seismograph station of the Geophysical Observatory at Sodankylä recorded an earthquake at an epicentral distance of 1.5° only and southwards from Sodankylä. The returned preliminary questionnaires sent out by the Director of the Observatory explained that the earthquake was felt in Ranua and Pudasjärvi.

A detailed study of the earthquake was made at the seismological station of the University of Helsinki. In all, 59 of the questionnaires sent out in connection with the study were returned.

The earthquake was felt over an area of about $7,500 \text{ km}^2$. The maximal length of the area, in almost the N—S direction, was about 130 km and the breadth only about half this (Fig. 1). The macroseismic epicentrum was at 65.7° N , 27.4° E and the time of origin H : 18—32. Many observers checked the time, after the tremor, according to the radio signal.

The intensity of the shock seems to have been III—IV, according to the modified Mercalli-Cancani scale, all over the area mentioned. RENQVIST [1] has pointed out that it seems to be a typical feature of the earthquakes occurring in Finland that their intensity is the same over a relatively wide area. Outside the above-mentioned epicentral area we have only one observation: The shock was felt in the fourth storey of an apartment building in Rovaniemi, 110 km from the epicentrum, and the observations correspond to the intensity II.

The returned questionnaires claimed that there were at least three aftershocks: Dec. 24, 19—00 (II); 20—55 (III); Dec. 25, 07—00 (III).

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According to RENVIST's investigation [2], 12—15 shocks occur in this area during a century.

The direction of the long axis of the epicentral area seems to coincide with the direction of a lithological boundary according to the geological map [3]. The direction of the long axis also corresponds to the lines of equal free air anomaly in this area [4]. Here the free air anomaly changes from negative to positive and the change is very steep.

As regards the microseismic records, the stations in Sweden, Uppsala, Kiruna and Skalstugan also recorded the earthquake. At the station in Helsinki only the Mainka seismographs were in operation and they, of course, did not record the shock.

The distance obtained from the Sodankylä records corresponds to the distance measured from the macroseismic epicentrum. There were several fore- and aftershocks. The data are:

Main shock	Foreshocks	Aftershocks
Dec. 24 iP_n 18—31—51.0 iP_b 51.6 iP_g 54.3 iS_n 32—11—4 (iS_b) 12.0 iS_g 13.0 Distance: 1°5 H: 18—31—22	1. Dec. 24 iS_g 06—36—36 2. iS_g 07—52—06 3. iS_g 10—10—14 4. iS_g 10—46—28 5. iS_g 15—43—16	1. Dec. 24 iS_g 20—26—30 2. eP_g 20—54—25 iS_g 45 3. Dec. 25 iS_g 00—50—08 4. iS_g 03—38—42 5. iS_g 06—56—31 6. iS_g 14—20—00

The microseismic study gives:

	Sodankylä	Kiruna	Skalstugan	Uppsala
Measured distance from macroseismic epicentrum	1.6° 178 km	3.4° 378 km	6.9° 767 km	7.4° 822 km
$S_n—P_n$	20.4	—	—	—
Distance	1.5°	—	—	—
$P_g—H$	—	1—02	—	—
Distance	—	3.2°	—	—
$S_g—H$	—	1—45	3—30	3—50
Distance	—	3.2°	6.4°	7.0°

The microseismic data made it possible roughly to estimate the thickness of the earth's crust in Northern Finland. The result obtained seems to indicate that Mohorovičić's discontinuity exists at a depth of

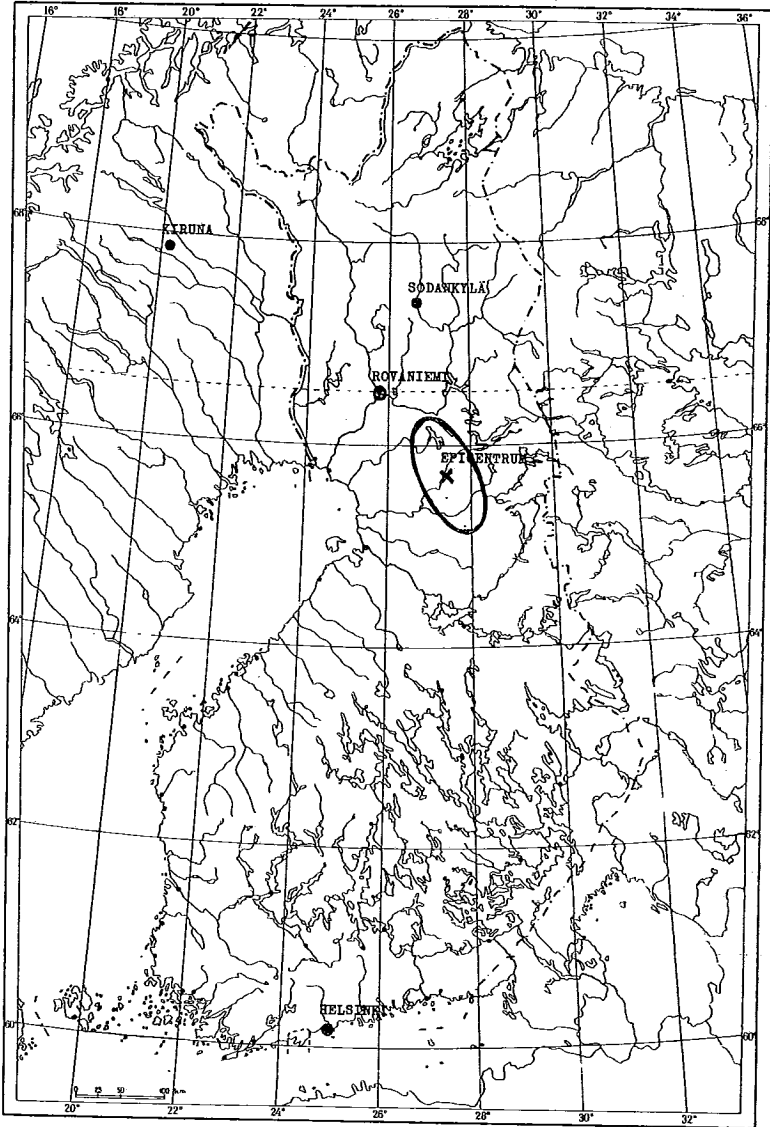


Fig. 1. Epicentrum 65.7° N, 27.4° E.

30—40 km there. Of course, this value is only very approximate. However, it suggests that the thickness of the earth's crust is less in Northern Finland than in Northern Sweden. The value for Northern Sweden has been obtained by isostatic computations [5].

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