Magyar Állami Eötvös Loránd Geofizikai Intézet
GEOFIZIKAI KÖZLEMÉNYEK
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PRAXIS UND PROBLEME DER ERDGEZEITENMESSUNGEN

R. TOMASCHEK

Es werden die verschiedenen Methoden zur Bestimmung der einzelnen Komponenten der Erdgezeiten und der Love'schen Konstanten kritisch besprochen und die bei der harmonischen Analyse auftretenden Schwierigkeiten diskutiert. Die experimentellen Ergebnisse der Erdgezeitenmessungen und ihre Anwendung in verschiedenen Problemen der Geodäsie, Astronomie und Geophysik werden dargelegt. Weiterhin wird auf die Wichtigkeit des Studiums der unperiodischen Veränderungen hingewiesen, da diese weitgehende Hinweise auf das geophysikalische Verhalten der oberen Erdschichten geben. Es werden experimentelle Ergebnisse solcher Beobachtungen und der Residualbewegungen gezeigt.

EXPLOSION - SEISMIC DETERMINATION OF P_g AND S_g VELOCITIES IN FINLAND

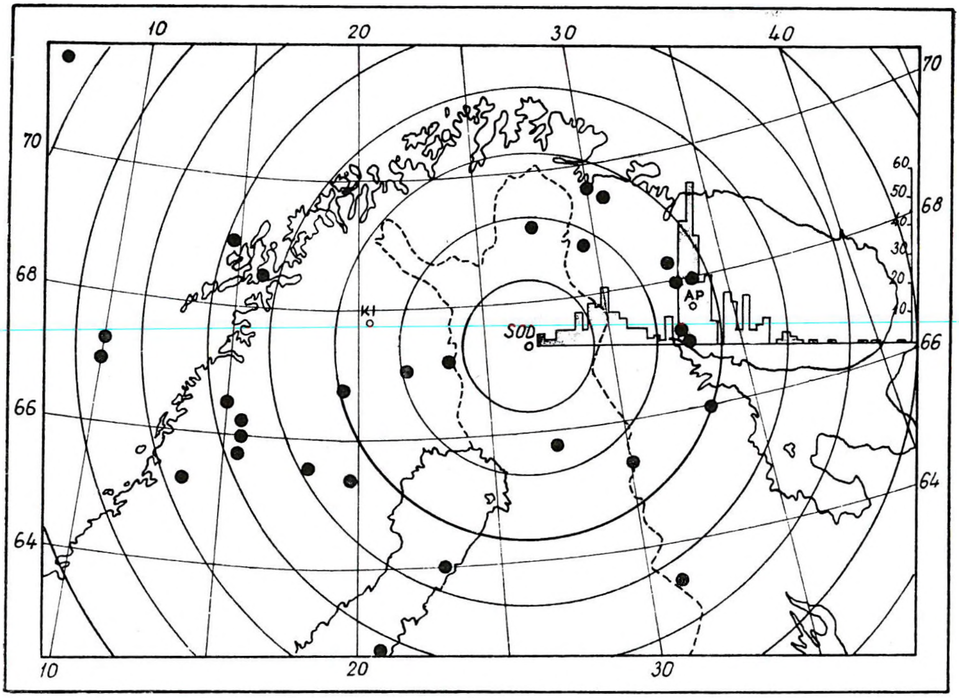
E. VESANEN, A. METZGER, M. NURMIA AND M. T. PORKKA

As the first phase of a programme in explosion seismology [6], a number of underwater charges varying from 20 to 600 kg of TNT were exploded off the city of Pori, on the west coast of Finland (61.5° N and 20°—21°E) while a temporary seismograph station was operating on the shore (Fig. 1).

To obtain accurate values for the travel times, the shots were detonated electrically from a ship and the detonating impulses were transmitted over a radio lin by the carrier modulation technique to the recording station and recorded directly on the seismograms [5]. In Table 1 are given the weights of explosive, depths of water and distances from the recording station.

Table 1.

Shot No	Weight of Explosive kg	Water Depth m	Distance km
1	20	21	6,0
2	20	33	15,2
3	300	68	33,8
4	300	101	43,5
5	300	117	53,3
6	600	126	61,7
7	600	118	71,0



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Nurmia short period vertical and horizontal seismometers [2] attached to high speed recorders were used for recording the blasts. A special highfrequency vertical seismometer designed by Nurmia [3] was also used.

Until now, only the velocities of Pg and Sg have been computed by the method of least squares. In the following tables (Table 2 and 3) are given the velocities of Pg and Sg, the recorded and calculated travel times of Pg and Sg and their differences. The major source of error in the results is the inaccuracy in determining the locations of the shots, which is estimated to be from 50 to 300 m depending on distance.

Table 2.

Shot No	Distance km	T sec	T_{calc} sec	$T - T_{calc}$ sec
1	6,0	1,11	1,03	+0,08
2	15,2	2,59	2,64	—0,05
3	33,8	5,75	5,89	—0,14
4	43,5	7,56	7,58	—0,02
5	53,3	9,42	9,29	+0,13
6	61,7	10,79	10,77	+0,02
7	71,0	12,38	12,39	—0,01

$V_{Pg} = 5{,}72$ km/sec

Table 3.

Shot No	Distance km	*T* sec	T_{cal} sec	$T - T_{calc}$ sec
1	6,0	1,79	1,84	—0,05
2	15,2	4,66	4,60	+0,06
3	33,8	10,20	10,16	+0,04
4	43,5	13,18	13,06	+0,12
5	53,3	15,93	15,99	—0,06
6	61,7	18,51	18,50	+0,01
7	71,0	21,12	21,28	—0,06

V_{Sg} = *3,34 km sec*

The velocities Pg = 5,72 km/sec and Sg = 3,34 km/sec give the Poisson constant in the granitic layer as 0,241. All these results confirm the corresponding results computed from data on the natural earthquakes of Fennoscandia [4].

It was surprising that all the blasts of 300 and 600 kg explosive were well recorded at the seismograph station of Sodankylä, at a distance of more than 700 km (Fig. 1). The Swedish stations also recorded the explosions [1]. In the following table (Table 4) are given the average distances of the different seismograph stations in Fennonscandia from the shots.

Table 4.

Station	Distance km
Uppsala	230
Skalstugan	470
Göteborg	630
Kiruna	690
Sodankylä	710

References:

1. *Bath, M.:* Preliminary Seismological Bulletin, July 21—28,. 1958. Seismological Laboratory Uppsala.

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4. *Porkka M. T.:* (To be published.)
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