RIZNICHENKO, YU. V.

PA 43/49T68

USSR/Geophysics
Seismology
Seismometry

Mar/Apr 49

"Propagation of Seismic Waves in Discrete and Heterogeneous Media," Yu. V. Riznichenko, 14 pp

"Iz Ak Nauk SSSR, Ser Geog i Geofiz" No 2

Describes certain problems of propagation of elastic waves in subject media. Velocities of waves are of prime interest in seismometry. Examples illustrate adoption of formulas for Vo, obtained by simplified assumptions, to determine the order of possible values for seismic velocities

[redacted] 43/49T68

USSR/Geophysics (Contd) Mar/Apr 49

in certain actual media. Two diagrams show results of tests. Submitted 25 Jul 48.

[redacted] 43/49T68

[illegible], Yu. V.

36126. O [illegible] Kvazi-anizotropii. Izvestiya [illegible] Nauk SSSR, Seriya Geogr. i Geofiz., [illegible], No. 6, c. [illegible]. - Bibliogr: 37 nazv.

SO: Letopis' Zhurnal'nykh Statey, Vol. 10, Moskva, 1949

USSR/Geophysics - Seismology, Location of Refracting Boundaries May/Jun 51

"Determining the Elements That Govern the Occurence of the Refracting Boundary Under the Assumption That It Is Planar Only in the Region of Reception of the Seismic Waves," Yu. V. Riznichenko, Geophys Inst, Acad Sci USSR

"Iz Ak Nauk SSSR, Ser Geofiz" No 3, pp 9-15

Discusses possibility of quantitatively interpreting observations of refracted seismic waves when structure of medium in path from source of oscillations to region of reception differs by its great complexity. No assumptions are made on structure

186T39

USSR/Geophysics - Seismology, Location of Refracting Boundaries (Contd) May/Jun 51

of medium in the way. Only assumption is that in region of reception refracting boundary is planar, and border velocity and velocity in covering medium are const. Under these conditions, determines angle and direction of incidence of the boundary in this region. Generally discusses various variants of the problem, and gives complete soln of the problem in the case where number of observations equals 2. Submitted 9 Mar 51 by Acad O. Yu. Shmidt.

186T39

RIZNICHENKO, Yu. V.

USSR/Geophysics - Seismography Sep/Oct 51

"Modeling of Seismic Waves," Yu. V. Riznichenko, B. N. Ivakin, V. R. Bugrov, Geophys Inst, Acad Sci USSR

"Iz Ak Nauk SSSR, Ser Geofiz" No 5, pp 1-30

Discusses various methods for studying seismic wave phenomena under laboratory conditions. Describes exptl tests of the method based on application of elastic oscillations of ultrasonic frequency. This method allows one to obtain in the laboratory seismograms that are similar to those obtained of reflected or broken waves by multi-channel recording of earthquakes.

193T33

GAMBURTSEV, G.A.; RIZNICHENKO, Yu.V.; BERZON, I.S.; YEPINAT'YEVA, A.M.; PASECHNIK, I.P.; KOSMINSKAYA, I.P.; KARUS, Ye.V.; YEROFEYEVA, A.A., redaktor; KISELEVA, A.A., tekhnicheskiy redaktor

[Correlation method of refracted waves; manual for seismological engineers] Korreliatsionnyi metod prelomlennykh voln; rukovodstvo dlia inzhenerov-seismorazvedchikov. Moskva, Izd-vo Akad. nauk SSSR, 1952. 238 p. [Microfilm]. (MIRA 8:7)

1. Chlen-korrespondent AN SSSR (for Gamburtsev).
(Seismometry)

RIZNICHENKO, YU. V.

USSR/Geophysics - Seismology Jan/Feb 52

"Joint Processing of a Number of Observations of Seismic Head Waves," Yu. V. Riznichenko, Inst of Geophys, Acad Sci USSR

"Iz Ak Nauk SSSR, Ser Geofiz" No 1, pp 12-20

Research is conducted by Geophys Inst under direction of G. A. Gamburtsev. Problem concerns geometric seismology of refracted head waves, generated by one or several sources. Attempts detn of seismic velocities and of elements locating the refracting surface. Author thanks S. M. Fadyushkina, Yu. V. Butkova and O. I. Silayeva for help in construction of nomograms. Submitted 24 Oct 51.

205T38

RIZNICHENKO, YU. V.

USSR/Geophysics - Modeling of Seismic Waves May/Jun 52

"Modeling of Seismic Waves With the Aid of Ultrasonic Impulses," Yu. V. Riznichenko, B. N. Ivakin, V. R. Bugrov, Geophys Inst, Acad Sci USSR

"Iz Ak Nauk SSSR, Ser Geogiz" No 3, pp 58-69

Describes an impulse ultrasonic device for modeling of seismic waves in application to problems of seismic prospecting and earthquake studies. Presents examples of works with this device: modeling of Lamb's 2-dimensional problem concerning propagation of waves in a solid elastic half space; modeling of 3-dimensional problem concerning propagation of head refracted waves connected with thin layers; detn

224T71

of elastic properties of solid and friable minerals in small-size samples of arbitrary shape (particularly measurement of velocities of propagation of longitudinal waves). Submitted 17 Dec 51.

224T71

RIZNICHENKO, Yu. V., Prof.

Seismometry

Simulating seismic phenomena, Vest. AN SSSR, 22, No. 5, 1952.

Monthly List of Russian Accessions, Library of Congress, October 1952. UNCLASSIFIED.

RIZNICHENKO, Y. V. PA 241T31

USSR/Geophysics - Seismoscope Jan/Feb 53

"Impulse Ultrasonic Seismoscope," Yu. V. Riznichenko, B. N. Ivakin, and V. R. Bugrov, Geophys Inst, Acad Sci USSR

"Iz Ak Nauk SSSR, Ser Geofiz" No 1, pp 26-32

Describe construction and application of subject instrument for modeling seismic waves which are observed in seismic prospecting and in earthquake studies. State that the instrument is also used in detecting defects in building materials and in manufactured metal parts.

241T31

FD 335

USSR/Geophysics - Seismic intensity fields

Card 1/1

Author : Riznichenko, Yu. V.

Title : Determining the fields of intensity of seismic waves

Periodical : Izv. AN SSSR, Ser. geofiz. 1, 11-25, Jan/Feb 1954

Abstract : In the region close to the front of the wave the energy of the oscillations is propagated along rays. Its flow is similar to the vortexless flow of an incompressible fluid. In connection with this similarity the author formulates the problem of determining the intensity of the seismic waves within a medium if one is given the hodographs and intensities of the oscillations (or amplitudes of the displacements) on the surface. The author proposes a method for solving this problem.

Institution : Geophysics Institute, Academy of Sciences, USSR

Submitted : July 11, 1953

KIZNICHENKO, YU. V.

USSR/Geophysics - Seismology FD-1779

Card 1/1 Pub 45-1/18

Author : Riznichenko, Yu. V., and Silayeva, O. I.

Title : Determining the dependence of the velocities of propagation of elastic waves in samples of mineral rocks upon one-sided pressure

Periodical : Izv. AN SSSR, Ser. geofiz. 193-197, May-Jun 1955

Abstract : The authors work out a procedure for determining the dependence of the velocit of elastic waves upon mechanical stress. The measurements are conducted by means of the ultrasonic impulse method upon samples of mineral rocks under con ditions of one-sided pressure. At the same time they determine the static and dynamic moduluses of elasticity. Certain results of these measurements are presented. The senior author cites his three earlier works, co-authors: B. N. Ivakin and V. R. Bugrov, in the same journal (1951, 1952, 1953), on the modeling of seismic waves by ultrasonic impulses. Total of seven references (one German: W. Buchheim, Zum Problem der Drucksondierung in Gesteinen auf akustischer Basis, Freiberger Forschungshefte, Bergakademie, H. 7, 1953).

Institution: Geophysical Institute, Academy of Sciences USSR

Submitted : November 27, 1954

RIZNICHENKO, YU.V.

USSR/Geophysics - Seismoacoustic methods FD-2895

Card 1/2 Pub. 45 - 6/11

Author : Riznichenko, Yu. V.

Title : Communications. Seismoacoustic methods for studying the stressed state of rocks

Periodical : Izv. AN SSSR, Ser. geofiz., Nov-Dec 1955, 538-540

Abstract : A report delivered at the 16 March 1955 session of the scientific council of the Geophysical Institute, on the action of mechanical stresses on the state and particularly on the elastic properties of rocks, of interest in connection with the struggle against mine shocks or bursts as in coal mines. This problem was studied under the general guidance of the author in the laboratories of modeling and underground acoustics in the seismic prospecting division of the Geophysical Institute, especially the problem of mine pressures (i.e. the stressed state of rocks close to the mining operations. With the object of testing Academician A. A. Skochinskiy (Institute of Mining, Acad. Sci. USSR) proposed methods and other proposals, the Geophysical Institute developed and tested two geophysical (more precisely, seismoacoustical) methods: 1) the shaft impulse seismic method based on the disturbance of artificial elastic impulses and

Card 2/2

FD-2895

Abstract : investigation of the conditions governing their passage through the medium; and 2) the shaft acoustic method based on the study of the natural elastic impulses (noises etc.) arising in a mass under the action of the mine pressures.

Institution : Geophysics Institute, Acad. Sci. USSR

Submitted : April 6, 1955

RIZNICHENKO, Yu.V.; SHANINA, O.G.

Study of the shadow zone by modeling the earth's crust and upper mantle. Biul.Sov. po seism. no.15:11-24 '63. (MIRA 17:4)

USSR/ Geophysics

Card 1/1 Pub. 22 - 23/62

Authors : Riznichenko, Yu. V., and Myachkin, V. I.

Title : The pulse seismic method for studying the mountain pressure

Periodical : Dok. AN SSSR 102/3, 507 - 509, May 21, 1955

Abstract : The pulse seismic method for observing the gravitational pressures exerted by mountains, which was developed by the authors and their assistants, is described. The method is based on the same principle upon which the ultrasound defect detector operates. Twelve references: 9 USSR, and 3 USA. (1934-1955). Graph.

Institution : The Acad. of Sc., USSR, Geophysical Institute

Presented by: Academician G. A. Gamburtsev, February 28, 1955

RIZNICHENKO, Yu.V.; GLUKHOV, V.A.

Impulse ultrasonic seismic logging. Izv. AN SSSR.Ser.geofiz. no.11:1258-1268 N '56. (MLRA 10:1)

1. Akademiyz nauk SSSR Institut fiziki Zemli.
(Prospecting--Geophysical methods) (Seismology)

RIZNICHENKO, Yu. V

124-11-13248

Translation from: Referativnyy Zhurnal, Mekhanika, 1957, Nr 11, p 139 (USSR)

AUTHORS: Riznichenko, Yu. V., Silayeva, O. I., Shamina, O. G., Myachkin, V. I., Glukhov, V. A., Vinogradov, S. D.

TITLE: Seismo-Acoustic Methods for the Study of Stress Conditions in Mountain Rocks on Samples and In Loco. (Seysmoakusticheskiye metody izucheniya napryazhennogo sostoyaniya gornykh porod na obraztsakh i v massive.)

PERIODICAL: Tr. Geofiz. in-ta A N SSSR, 1956, Nr 34 (161), pp 74-163

ABSTRACT: The study surveys various methods for the investigation of stress conditions in mountain rocks. Principal attention is directed to the impulse method and the acoustic method. It is indicated that with an increase in pressure the modulus of elasticity grows faster than the density. Therefore, the speed of sound, which is proportional to the square root of the ratio of the modulus of elasticity and the density, increases with increasing pressure; more specifically, the speed of sound is proportional approximately to the one-sixth power of the pressure. It is noted, further, that the formation of cracks, at the

Card 1/2

124-11-13248

Seismo-Acoustic Methods for the Study of Stress Conditions in Mountain Rocks on Samples and In Loco. (Continued)

inception of failure of mountain rocks, is accompanied by a crackling noise. The study of the vibrations arising in the rock during failure is the basis of the acoustic method.

A description of a laboratory set-up for the study of the velocity of sound in stressed rock samples is offered, also a description of model tests and observations in mines by means of the seismic impulse method.

A survey is made of destructive compression tests on rocks, the apparatus and methodology for the study of the elastic impulses accompanying their failure, and corresponding observations in mines. Bibliography: 77 references.

(G. I. Pokrovskiy)

Card 2/2

RIZNICHENKO, Yu.V.

Divergence and absorption of seismic waves. Trudy Geofiz.inst. no.35:9-41 '56. (MIRA 10:1)

(Seismic waves)

RIZNICHENKO, Yu. V.

BALAKINA, L. M.

3(10) PHASE I BOOK EXPLOITATION SOV/1663

Akademiya nauk SSSR. Komitet po geodezii i geofizike.

Tezisy dokladov na XI General'noy assambleye Mezhdunarodnogo geodezicheskogo i geofizicheskogo soyuza. Mezhdunarodnaya assotsiatsiya seysmologii i fiziki nedr zemli (Abstracts of Reports Submitted to the XI General Assembly of the International Union of Geodesy and Geophysics. The International Association of Seismology and Physics of the Earth's Interior) Moscow, 1957. 102 p. /Parallel texts in Russian and English/ 1,500 copies printed.

No additional contributors mentioned

PURPOSE: This booklet is intended for geophysicists, especially those specializing in seismology.

COVERAGE: This collection of articles deals with the structure and composition of the Earth and phenomena related thereto. The majority of the articles concern studies of earthquakes and seismic waves. Other articles cover the structure of the Earth's crust and mountain roots; the elastic properties of rocks at high pressures; the piezoelectric effect of rocks and the method of modelling in tectonophysics. The collection also contains articles on the Earth's thermal history, the microseismic method of tracing storms and others.

Card 1/5

Card 3/5

47

AUTHOR: Riznichenko, Yu. V.

TITLE: A study of the structure of the Earth's crust during the period of the Third International Geophysical Year. ' · izucheniyu stroyeniya zemnoy kory v period tret'ego mezhdunarodnogo geofizicheskogo goda).

PERIODICAL: Izvestiya Akademii Nauk, Seriya Geofizicheskaya, 1957, No.2, pp. 129-140. (U.S.S.R.)

ABSTRACT: A paper presented at the Session of the Scientific Council, Geophysics Institute, Ac. Sc., January 25, 1956, reviews the methods of determining the structure in the depths of the Earth's crust, particularly by using explosions. Information is given on the investigations scheduled for the Third International Geophysical Year in the United States as well as in the Soviet Union. The first paragraph reviews modern seismic methods of studying the depths of the Earth's crust, giving examples of application on land and on the sea in the Soviet Union as well as in other countries.

Card 1/4

TITLE: A study of the structure of the Earth's crust during the period of the Third International Geophysical Year. (K izucheniyu stroyeniya zemnoy kory v period tret'ego mezhdunarodnogo geofizicheskogo goda).

One of the most interesting regions as regards interconnection of the mainland with the ocean are the Far Eastern Asiatic shores and their transition to the North-Western part of the Pacific Ocean. The Kurilo-Kamchatka zone of the Soviet Union belongs to this region. It is particularly here that the entire complex of characteristic geophysical and geological conditions and phenomena occur which accompany the transition from the shores to the ocean. In addition to other features, seismically it is the most active zone of the entire globe. The geological-geophysical investigations scheduled for this zone will also encompass investigations in the Okhotsk Sea and the North-Western part of the Pacific Ocean and also some other sections of the Pacific Ocean.

Card 2/4

TITLE: A study of the structure of the Earth's crust during the period of the Third International Geophysical Year. (K izucheniyu stroyeniya zemnoy kory v period tret'ego mezhdunarodnogo geofizicheskogo goda).

Para.1 deals with the methods of studying the structures deep in the Earth's crust; para.2 deals with investigations of the Earth's crust in the Soviet Union, mentioning prewar as well as post-war work; para.3 deals briefly with investigations of the Earth's crust carried out in Germany, the United States, Britain etc.; para.4 briefly outlines the investigations of the Earth's crust scheduled for the International Geophysical Year in the United States as well as in the Soviet Union.

There are 39 references, 33 of which are Slavic.

ASSOCIATION: Academy of Sciences of the USSR, Institute of Terrestrial Physics (Akademiya Nauk SSSR, Institut fiziki zemli).

47

TITLE: A study of the structure of the Earth's crust during the period of the Third International Geophysical Year. (K izucheniyu stroyeniya zemnoy kory v period tret'ego mezhdunarodnogo geofizicheskogo goda).

PRESENTED BY:

SUBMITTED: 8/24/56

AVAILABLE: Library of Congress

Card 4/4

RIZHNICHENKO, Yu.V.

Life and achievements of G.A. Gamburtsev. Biul. Sov. po seism. no.3:5-10 '57. (MIRA 11:5)
(Gamburtsev, Grigorii Aleksandrovich, 1903-1955)

RIZNICHENKO, V. (Moscow)

"Study of the Structure of the Earth's Crust in the USSR through the Deep Sounding Method." and "Problems of Ultrasonics in Seismological Investigation."

paper presented(by V. Riznichenko) at 1st Seismological Conference of the Geophysics Inst. Czechoslovakian Acad. Sci., Liblice, 22 March 1957.

Bergakademi (Berlin) No. 4, 1957.

RIZNICHENKO, Yu. V.

49-4-23/23

AUTHOR: Savarenskiy, Ye. F.

TITLE: First seismological conference of the Czechoslovak Ac.Sc. (O pervoy seysmologicheskoy konferentsii Chekhoslovatskoy Akademii Nauk).

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, 1957, No.4, pp.558-559 (USSR)

ABSTRACT: This conference was held between March 18 and 22, 1957 in Liblice, the aim of which was to acquaint seismologists of various countries with results of studies of seismicity, determination of the intensity of earthquakes, study of the structure of the Earth's crust, investigation of the propagation of seismic waves and design of apparatus. In addition to Czech seismologists, there were three seismologists from Hungary, three from Eastern Germany, two from Poland, one from Roumania and five from the Soviet Union. The conference was also attended by the General Secretary of the International Association of Seismology and Physics of Mineral Resources, Prof. Rothe of France. A total of thirty papers were read. Soviet delegates read the following papers:

1. Yu. V. Riznichenko "Study of the structure of the Earth's crust in the U.S.S. by the method of deep seismic sounding";

Card 1/2

49-4-23/23

First seismological conference of the Czechoslovak Ac.Sc.

2. P. S. Veytsman "On the results of work of deep seismic sounding of the Earth's crust in one of the mountainous regions of Central Asia;
3. N. V. Shebalin "Evaluation of the depth of the astenosphere in the region of the Vranch (Carpathian) mountains from the point of view of the relation between the intensity and the "ballicity" of earthquakes";
4. S. L. Solov'yev "On corrections to the values of earthquake intensities";
5. D. P. Kirnos and D. A. Kharin "Seismography for studying the seismic effect of explosions, vibrations of engineering structures and nearby earthquakes";
6. Ye. S. Borisevich "Magneto-electric oscillographs for scientific geophysical investigations";
7. Yu. V. Riznichenko "Application of ultrasound for seismological problems".

At the end of the report a brief table is given of the Czechoslovak stations participating in work in conjunction with the International Geophysical Year in which the type of instruments and the subject of investigations are also mentioned.

Card 2/2

AVAILABLE: Library of Congress.

49-7-2/14

AUTHORS: Riznichenko, Yu. V. and Shamina, O. G.

TITLE: Elastic waves in a solid stratified medium, using results of studies on two dimensional models. (Ob uprugikh volnakh v tverdoy sloistoy srede po issledovaniyam na dvukhmernykh modelyakh).

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, 1957, No.7, pp.855-873 (USSR).

ABSTRACT: The problem of a layer in an elastic medium is considered. The layer is finite or thin compared with the wavelength of the prevalent wave. The layer differs from the surrounding medium in that the velocity of propagation of elastic waves in it is higher than in the surrounding medium. It is called a "high velocity layer" (HVL). The layer may act as a waveguide for the so-called longitudinal slip waves. The problem of the HVL was considered by the present author in a previous paper (Ref.12). Results obtained with a three dimensional model of a thin solid layer in a liquid were used in that paper (Riznichenko et al, Refs.13-15). The present paper is a continuation of the work reported earlier. A two dimensional model of a stratified solid medium was used to study the propagation of elastic waves in a high velocity layer of the kind described above. The waves were

Card 1/3

49-7-2/14

Elastic waves in a solid stratified medium, using results of studies on two dimensional models. (Cont.)

excited by an ultrasonic method. The high velocity layer was made of duralumin (5400 m/sec) and the lower velocity medium was of plexiglass (2300 m/sec). The following special cases were studied: 1) free thin layer; 2) thin high velocity layer on a semispace; 3) thin high velocity layer placed under a layer with a lower velocity; 4) thin high velocity layer in an infinite medium with a lower velocity; 5) thick high velocity layer in an infinite medium of lower velocity. Results are given on the velocities of propagation, radiation and absorption coefficients, dispersion and phase and group velocities. The velocity of propagation of longitudinal waves in a HVL surrounded by an elastic medium does not differ significantly from the velocity in a free layer. The difference in velocities is about 2% which is slightly higher than the experimental error. The radiation coefficient for a longitudinal slip wave in a HVL placed on a semispace with a lower velocity is equal to the radiation coefficient for the HVL placed under a layer with a lower velocity, but is half that for a HVL in an infinite medium. A comparison of the P_{121} waves in thin and thick layers of duralumin

Card 2/3

Elastic waves in a solid stratified medium, using results of studies on two dimensional models. (Cont.)

showed that the velocity of propagation of a longitudinal slip wave is higher and the frequency lower, in the case of the thick layer. The difference is of the order of 8% for both the velocity and the frequency. The coefficients of absorption and radiation are much lower in the case of a thick HVL.
There are 15 figures and 27 references, 18 of which are Slavic.

SUBMITTED: January 4, 1957.

ASSOCIATION: Institute of Physics of the Earth, Ac.Sc., U.S.S.R. (Akademiya Nauk SSSR Institut Fiziki Zemli).

AVAILABLE: Library of Congress

RIZNICHENKO, YU. V.

49-11-4/12

AUTHOR: Riznichenko, Yu. V.

TITLE: Development of Ultrasonic Methods in Seismology. (Razvitiye ul'trazvukovykh metodov v seysmologii)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, 1957, No.11, pp.1341-1346 (USSR)

ABSTRACT: Brief review of Soviet seismological investigations in the high frequency range of the spectrum, i.e. 10 kc/s and higher. The term ultra-sound is used in this paper in its wider sense for designating not only the longitudinal ultrasonic elastic waves but also other elastic waves, i.e. transverse waves, surface waves and others, differing from the waves considered in "classical" seismology only from the point of view of their higher frequency. Since ultrasonics are intensively absorbed in rocks, the field of their application in seismology is limited almost exclusively to experimental seismology in cases in which the distance from the source is still so small that the ultrasonic waves can still be distinguished at the metering point. The author considers the application of ultrasonics to the following concrete problems: simulating on models of seismic wave processes directly related to the study of the structure of the Earth by seismic methods; study of the elastic properties of rocks on specimens and

Card 1/2

Development of Ultrasonic Methods in Seismology. 49-11-4/12

under natural conditions; study of the state of solid bodies under conditions of increasing mechanical stresses, up to breaking stresses, which is related to the study of processes in the foci of earthquakes and also to a number of other applied problems as, for instance, investigation of rock pressures. This article is based on the text of a paper read by the author at the First Seismological Conference of the Czechoslovakian Ac.Sc. held in Liblice in March, 1957.
There are 30 references, 23 of which are Slavic.

ASSOCIATION: Ac.Sc. USSR Institute of Physics of the Earth.
(Akademiya Nauk SSSR Institut Fiziki Zemli)

AVAILABLE: Library of Congress.

Card 2/2

RIZNICHENKO, Yu.V.

IVAKIN, B.N.; RIZNICHENKO, Yu.V., prof., otvetstvennyy red.; ALEKSEYEV, D.M., red.izd-va; PAVLOVSKIY, A.A., tekhn.red.

[Microstructure and macrostructure of elastic waves in one-dimensional continuous nonhomogeneous media] Mikrostruktura i makrostruktura uprugikh voln v odnomernykh nepreryvnykh neodnorodnykh sredakh. Moskva, Izd-vo Akad. nauk SSSR, 1958. 91 p. (Akademiia nauk SSSR. Geofizicheskii institut. Trudy, no.39) (MIRA 11:3)
(Elastic waves)

49-58-4-1/18

AUTHOR: Riznichenko, Yu. V.

TITLE: Methods of Mass Determination of the Co-ordinates of Near Earthquake Foci and the Velocities of Seismic Waves in the Region near these Foci (Metody massovogo opredeleniya koordinat ochagov blizkikh zemletryaseniy i skorostey seysmicheskikh voln v oblasti raspolozheniya ochagov)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, 1958, Nr 4, pp 425-437 (USSR)

ABSTRACT: The determination of the co-ordinates of the foci of near earthquakes and the velocities V of propagation of seismic waves is one of the classic problems of instrumental seismology. Various methods of solution of this problem have been proposed and the best of them must be subject to the following conditions: (a) they must allow a treatment of data of a given type, including surplus data, to be carried out without a preliminary and arbitrary division into groups; (b) the accuracy of the observed data must be fully employed; (c) it must be possible to estimate easily the compatibility of all the observed data and to be able to discover and reject all those which contain large errors; (d) one must be able to estimate the constancy and accuracy of the result; (e) the method must be simple and easy to use. The existing

Card 1/3

49-58-4-1/18

Methods of Mass Determination of the Co-ordinates of Near Earthquake Foci and the Velocities of Seismic Waves in the Region near these Foci.

methods do not satisfy all the above conditions simultaneously. A method is now pro_osed which does satisfy the above conditions and which does not involve the use of calculating machines. The method is based on the comparison of observed data with previously calculated theoretically possible curves produced in the form of charts which are very convenient in practice. The charts include all the possible solutions of the required geophysical problems. The method consists of three parts: 1. The co-ordinates of the foci are determined using isochrons obtained from surface hodographs; 2. The foci and the seismic velocities in the medium are determined simultaneously using a chart of linear theoretical hodographs; 3. A vertical hodograph is used to obtain the distribution of foci and velocities with depth. I. L. Nersesov is thanked for his collaboration. There are 6 figures, no tables and 29 references, 1 of which is English, 1 German, and the rest Soviet.

Card 2/3

49-58-4-1/18

ethods of Mass Determination of the Co-ordinates of Near Earth-quake Foci and the Velocities of Seismic Waves in the Region near these Foci.

ASSOCIATION: Akademiya nauk SSSR, Institut fiziki zemli (Academy of Sciences of the USSR, Institute for Studying the Physics of the Earth)

SUBMITTED: July 2, 1957.

1. Seismic waves--Velocity 2. Seismic waves--Propagation
3. Data--Analysis 4. Earthquakes--Theory

Card 3/3

SOV/49-58-9-1/14

AUTHOR: Riznichenko, Yu.V.

TITLE: On Investigation of Seismic Systems (Ob izuchenii seysmicheskogo rezhima)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, 1958, Nr 9, pp 1057-1074 (USSR)

ABSTRACT: An expedition was organised in 1953 to Garmskiy rayon, Tadzh SSR, in order to investigate their seismic systems. The method of investigation and the results obtained are summarised in this work.
To standardise the procedure, each earthquake was represented mathematically as a point in the five-dimensional space (TR_5). These were: x, y, z - the co-ordinates, t - time and E - energy of seismic activity. Thus, it was possible to derive a function for each earthquake and a set of functions gave the characteristics of a given seismic system. These were described by: an equation of seismic activity (A); the value of energy variation (γ) and the frequency of earthquakes (R).
In order to facilitate the analysis of data, the diagrams based on the above five dimensions were plotted.
Figure 1 shows the frequency of the earthquakes for the

Card1/6

region of Peter I Mountain (a - South, b - North). The co-ordinates are: x - distance, t - time. The circles represent intensity of seismic energy E. In order to obtain more exact picture of the energy involved, a cumulative graph of the two variables t and $E^{1/2}$ was produced (Figure 2).

To find out a total seismic energy for a particular region, the formula $\varepsilon = \sum\sqrt{\sum E_i}$ was used, where i = 1, 2, 3 .. m (m - number of earthquakes in unit time. The density (N^*) of earthquakes in unit volume (ΔP) was represented by the equation $N^* = \Delta N/\Delta P$ where ΔN - Nr of earthquakes. The volume ΔP was chosen experimentally by considering the local seismic conditions.

The distribution of frequency of the earthquakes and their energies was calculated from the formula:

$$\gamma = -(\Delta \log N^*)/(\Delta \log E) .$$

The frequency graphs were produced for various regions. Two of them, for Garm (a) and Stalinabad (b) are shown in

Figure 3. (The denotations are: N^* - frequency during one year per volume of 10^3 km, k - energy calculated from the formula $E = 10^K$ joules)
A mean seismic activity (A) was determined for each region by considering the mean energy $K_o = 7$ (Figure 7) in the formula:

$$N_K^* = 10^{\log A + \gamma(K_o - K)} ;$$

the mean seismic activity for the Garm region (Figure 3a) was determined as $A_7 = 5.0$ year^{-1} 10^{-3} km^{-3} and $A_7 = 0.9$ for the Stalinabad region. Charts were constructed where A was plotted (Figure 4 for Garm and Stalinabad). Only the weak earthquakes (energy 7-9) were considered owing to their high frequency. The strong ones (energy 10-13) were shown as black circles of various dimensions.

Card3/6 The frequency distribution of the weak earthquakes was found to be normal. This can be seen in Figure 5 where curves were drawn for different K (calculated from $E = 10^K$ joules) for the Garm region. Similar curves for the Stalinabad region were less accurate, thus giving an evidence of less frequent earthquakes in that area. Therefore, a period of observation had to be considered in relation to frequency that an error in calculation should be avoided. A relation of energy K in a period of years and the monthly frequency N_K was calculated.

Figure 6 shows this relation for the Garm region, as observed (1) and calculated (2) with 10% of accuracy. The theoretical curve was obtained from the formula:

$$R \cong \sigma N/\sqrt{N} = \delta_N \sqrt{N} = \text{const},$$

where σ_N - mean square of frequency (N) error. The value for R was found to be equal about one (e.g. Garm: R = 1.05 ± 0.08 during 1955/1956; Chusal: R = 1.3, see Figure 7). In order to include the parameter of error, a diagram was constructed (Figure 8) based on the equation

$$t = (R/\sigma)^2 (100/SA)\, 10^{\gamma(K-K_0)}$$

where $R = 1.05$, $\gamma = 0.43$, $K_0 = 7$, $A = A_7$, S - area in km^2. The required frequency can be estimated from this diagram, e.g. the dotted lines being the parameters for the Garm region, show that with 10% of error and the energy of 7, the period of two years is necessary to obtain the required frequency. Similarly, for the weak energy of $K = 2$ in the Chusal area, the time of 12 hours would be sufficient. On the other hand, for the earthquake with the energy $K = 17$ (In the Khaitskiy Rayon in 1949) a period of 500 - 1 000 years would be required. The diagram was calculated for the normal distribution. Therefore, it cannot be applied in the rare cases of the frequency distributed in the other form. In order to find out a relationship between γ, A and R for the energy of K equal up to 12, the observations were carried out in the area of Peter I Mountain for two years (Figure 9). The resultant curve of all the three values was found to be very similar to the R curve.

On Investigation of Seismic Systems SOV/49-58-9-1/14

It is not yet considered that the data described in this work can be applied for the exact determination of the seismic systems. However, it is hoped that the investigations carried out along these lines will produce better results in this difficult field.
There are 9 figures 16 references, 9 of which are Soviet, 5 English and 2 German.

ASSOCIATION: Akademiya nauk SSSR, Institut fiziki Zemli (Institute of Physics of the Earth, AS USSR)

SUBMITTED: December 30, 1957

Card 6/6

SOV/ 49-58-11-17/18

AUTHOR: Karus, Ye.

TITLE: Fourth Meeting of European Seismologists (IV assambleya seysmologov evropy)

PERIODICAL: Izvestiya Akademii Nauk SSSR Seriya Geofizicheskaya, 1958 Nr 11, pp 1418-1421 (USSR)

ABSTRACT: A meeting of the European Commission of the International Association of Seismologists and Earth Physicists took place in Utrecht, Holland on April 8-12, 1958. In the discussion on the determination of the earth's crust the following scientists took part: La Brousse, France (on investigation of the earth's crust in the Alpine [illegible]); Ye.I.Galperin and I.P. Kosminskaya, USSR (on the results of deep soundings in the [illegible]); Grind and [illegible], West Germany (on seismic waves produced by underwater detonations). The seismic problems of Europe were discussed by Tillotson, Great Britain (on an earthquake in England in 1957), [illegible], E. Germany (on the determination of depth of focus); [illegible], USSR (on the intensity of earthquakes in the USSR), Karnik, Czechoslovakia (on the seismic chart of Czechoslovakia), Peronacci, Italy (on seismic activities of Iran), Depanilis, Italy (on the seismic [illegible] Italy); Riznichenko, USSR (on the quantitative [illegible] plotting charts), Bobr-Modrawska, Poland (on earthquakes in Poland), Schalles, Israel (on the micro-seismic data of Israel). The question of apparatus was discussed by Bauls and Berkhamer, West Germany (on checking methods of seismographs) and Hiller, West Germany (on the identification of seismic apparatus). In the symposium on seismic waving, the following took part: Lemann, Denmark (on short period surface waves), Stoneley, Great Britain (on the Rayleigh waves on the sea bed), [illegible] and Vogel (on the dispersion of surface waves), [illegible], West Germany (on micro seismic waves in Hamburg), Jeffreys, Great Britain (on the diagraph of longitudinal waves). The theory of seismology was discussed by Veldkamp, Holland (on determination of dynamic parameters of earthquakes in Sumatra), Teisseire, Poland (on the relation of wave characteristics to the size of the centres), [illegible], USSR (on the relation of the area of disruption to the energy of seismic waves), Berckhemer, West Germany (on the relation of the area of disruption to the energy and period of registered waves), Galanopoulos, Greece (on [illegible] seists of shallow earthquakes based on geological [illegible]), Hiller, W. Germany (on after shocks; [illegible]), [illegible], USSR (on determination of dispersion and absorption of stationary elastic waves); Lemann, Denmark (on [illegible] near the earth centre); Vanek, Czechoslovakia (on P- and PP-waves registered in Prague in relation to epicentric distance); [illegible], France (on the period of symmetrical waves for different models of the earth); Scholte, Holland (on finding the solution of the equation describing the Rayleigh waves in an anisotropic compound medium); Ferri, Italy (on the exact determination of the Poisson coefficient based on wave [illegible]). As a result of the discussions several re[illegible] were taken, such as: to continue the investigation of the Alpine region, to improve seismic observations in [illegible] and to standardise the dynamical [illegible] of European seismic station.

Card 1/3

Card 3/3

RIZNICHENKO, Yu. V

GAMBURTSEV, Grigoriy Aleksandrovich [deceased]; BERZON, I.S., red.; RYABINKIN, L.A., red.; YEPINAT'YEVA, A.M., red.; PASECHNIK, I.P., red.; RIZNICHENKO, Yu.V., red.; DOBRYNINA, N.P., vedushchiy red.; MUKHINA, E.A., tekhn.red.

[Principles of seismic prospecting] Osnovy seismorazvedki. Izd.2. Moskva, Gos.nauchno-tekhn.izd-vo neft. i gorno-toplivnoi lit-ry, 1959. 377 p. (MIRA 12:4)

(Prospecting--Geophysical methods) (Seismic waves)

S/049/59/000/03/002/019

AUTHORS: Riznichenko, Yu. V. and Shamina, O. G.

TITLE: On Elastic Waves in Layers of Finite Thickness (As Determined from Two-Dimensional Models)

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya geofizicheskaya, 1959, Nr 3, pp 344-360 (USSR)

ABSTRACT: This is a continuation of the work published in this journal (Nr 7, 1957). Ultrasonic pulses of 140 kc/s frequency were applied to a model layer (an ultrasonic apparatus IKL-4 was used). The layer under investigation was made of brass, which was placed between Plexiglas and Duralumin. Velocity of elastic waves in the brass layer was intermediate between the velocities in Plexiglas and Duralumin. The properties of all three materials are given in Table 1, where V_{P_M}, $V_{P_{\Pi Л}}$ and $V_{P_{CT}}$ - velocities of longitudinal waves in a material according to its shape, V_R -

Card 1/3

S/049/59/000/03/002/019

On Elastic Waves in Layers of Finite Thickness (As Determined from Two-Dimensional Models)

velocity of surface waves, V_S - velocity of transverse waves, σ - Poisson's ratio, ρ - density, ρV_{P_M} - acoustic rigidity. The materials chosen for experiments were assumed to resemble a geological cross-section of the earth's crust. The wavelengths in layers of Plexiglas, brass and Duralumin are given in Table 2, where d - thickness of the layer. The longitudinal pulses in a thin brass plate (0.4 x 0.4 x 100 cm) are shown in Fig 1 and the corresponding amplitudes (plotted against length of the plate) are in Fig 2. "Seismograms" and hodographs in Figs 3-12 represent respectively: a thin brass plate on Duralumin (Figs 3 and 4); a thin brass plate between Plexiglas and Duralumin (Figs 5 and 6); a thick brass plate (0.4 x 6.0 x 100 cm) by itself (Figs 7 and 8); the

Card 2/3

S/049/59/000/03/002/019

On Elastic Waves in Layers of Finite Thickness (As Determined from Two-Dimensional Models)

same thick brass plate on Duralumin (Figs 9 and 10) and between Duralumin and Plexiglas (Figs 11 and 12). There are 14 figures, 2 tables and 14 references, 12 of which are Soviet and 2 English.

ASSOCIATION: Akademiya nauk SSSR, Institut fiziki Zemli (Ac. Sc. USSR, Institute of Physics of the Earth)

SUBMITTED: December 2, 1957

Card 3/3

SOV/20-126-4-19/62

3(10)

AUTHOR: Riznichenko, Yu. V., Corresponding Member AS USSR

TITLE: On Dispersed Reflected-refracted Seismic Waves (O rasseyannykh otrazhenno-prelomlennykh seysmicheskikh volnakh)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 4, pp 759 - 762 (USSR)

ABSTRACT: At the Institut fiziki Zemli AN SSSR (Institute for the Physics of the Earth, AS USSR) a method was worked out under A. M. Yepinat'yeva, which makes it possible to evaluate the transparency of layers. The effect produced by the wave of a short momentum originating from an arbitrary point of the disperging medium on the surface is calculated. Figure 1 shows a scheme of the dispersed wave for three layers, and calculation of the reflection- and refraction coefficients according to the scheme shown by figure 2 is carried out. The recurrent formula (1) for signals coming from an arbitrary point after reflection and diffraction and arriving at an arbitrary point is written down. The coefficients occurring therein are investigated, and for the latter the general formula (7) is written down. It is found that relative transparency may be

Card 1/2

evaluated by means of this method. The degree of transparency is judged according to the relative intensity of a single reflected wave. There are 2 figures and 1 Soviet reference.

ASSOCIATION: Institut fiziki Zemli im. O. Yu. Shmidta Akademii nauk SSSR (Institute for the Physics of the Earth imeni O. Yu. Shmidt of the Academy of Sciences, USSR)

SUBMITTED: March 31, 1959

GAMBURTSEV, Grigoriy Aleksandrovich, akademik [deceased]; RIZNICHENKO, Yu.V., red.; MOLODENSKIY, M.S., red.; BERZON, I.S., doktor fiz.-mat.nauk, red.; KEYLIS-BOROK, V.I., doktor fiz.-mat.nauk, red.; LYAPUNOV, A.A., doktor fiz.-mat.nauk, red.; YEPINAT'YEVA, A.M., kand.tekh.nauk, red.; KOSMINSKAYA, I.P., kand.fiz.-mat.nauk, red.; STARODUBROVSKAYA, S.P., mladshiy nauchnyy sotrudnik, red.; BERKGAUT, V.G., red.izd-va; MARKOVICH, S.G., tekhn.red.

[Selected studies] Izbrannye trudy. Moskva, Izd-vo Akad.nauk SSSR, 1960. 461 p. (MIRA 13:7)

1. Chleny-korrespondenty AN SSSR (for Riznichenko, Molodenskiy).
(Prospecting--Geophysical methods)

RIZHICHENKO, Yu.V. and MYACHKIN, V.I.

"Investigations into Rock Pressure, The Process of Disintegration and the Physico-Mechanical Properties of Rocks under Varying Pressure by Means of Seismo-acoustic Methods."

report to be presented at the International Rock Pressure Conference, Paris, France, 16-20 May 1960.

Inst of Physics of Earth im. O. Yu. Schmidt.

S/519/60/000/008/003/031
D051/D113

AUTHORS: Riznichenko, Yu.V.; Nersesov, I.L.

TITLE: Contribution to the development of the principles of a quantitative method of seismic zoning

SOURCE: Akademiya nauk SSSR. Sovet po seysmologii. Byulleten', no. 8, Moscow, 1960. Voprosy seysmicheskogo rayonirovaniya. 36-59

TEXT: The authors discuss the basic features of a quantitative method of close seismic zoning, which was developed by the Tadzhikskaya kompleksnaya seysmologicheskaya ekspeditsiya (Tadzhik Large-Scale Seismological Expedition) (TKSE) of the Institut fiziki Zemli AN SSSR (Institute of Physics of the Earth of the AS USSR) and the Institut seysmologii AN Tadzhikskoy SSR (Institute of Seismology of the AS Tadzhikskaya SSR). On the basis of data obtained by observations from 1955 to 1957 in the Garmskiy and Stalinabadskiy rayons, a map of seismic activity of these territories was plotted, which permits calculating the mean times of recurrence of earthquakes of different intensity in individual areas. The quantitative method of close seismic zoning, whose development is still in the initial stages, is intended to fill a gap

Card 1/4

S/519/60/000/008/003/031
D051/D113

Contribution to the development...

in present Soviet seismic research, in which the methods of general zoning (on a 1:5,000,000 scale) and microzoning (1:100,000) are mainly used. Quantitative close seismic zoning, which is carried out on a 1:500,000 scale, is an attempt to combine comprehensive seismic and geophysical research, so as to entirely satisfy the needs of earthquake engineering. Basic features of the new method are the quantitative characterization of earthquake intensity by frequency spectra and large-scale consideration of microearthquakes, in order to extrapolate strong ones. Discussing the method in detail, the authors first present some basic results obtained through the study of frequency spectra and the fading of vibrations with increasing distance from the earthquake center, i.e. dynamic characteristics of earthquakes; propagation of seismic waves depending on geological structure. They consider that the best quantitative method of representing seismicity is using earthquake recurrence N and seismic activity A as characterizing quantities. N is the usual ordinate of earthquake recurrence graphs (in regard to the surface of a region or the volume of a space it is called "normalized") and A designates the "level" of seismicity in these graphs. A graph, for instance, showing, depending on earthquake intensity, different earthquake recurrence curves for

Card 2/4

S/519/60/000/008/003/031
D051/D113

Contribution to the development...

various areas will, consequently, for a given earthquake intensity present different earthquake recurrence levels of these areas. The unit of A (A can be indexed A_1, A_2, etc., according to the seismic intensity $E = 10^{1,2,...}$ joules) corresponds to the annual recurrence of one earthquake on an area of 100 km. Rendering of the activity in A_7 units proved useful to the TKSE, which, with a dense network of stations, worked on limited territories of high seismicity. Another important characterizing quantity is

$\gamma = -\frac{\Delta \log N}{\Delta \log E}$ (E - earthquake intensity), which is constant for rectilinear recurrence curves, i.e. for curves depending on seismic intensities up to 10^{16} or 10^{17} joules. The knowledge of the law of earthquake recurrence $N = N(E)$ for a given district, permits calculating the mean density of the energy flow of all earthquake centers in this region. In this connection, the authors derived some formulae for W (energy flow) and ε (tectonic movement), which, however, due to the insufficient knowledge of N(E) regularities are only relatively important. Turning to the mapping of seismic acti-

Card 3/4

ity, the authors give a detailed account of how to determine the density of epicenters of a region in units of seismic activity and how to establish the seismic activity of the area according to the epicenters of earthquakes of various intensity. The concluding part of the article contains information on plotting and on an analysis of the initially mentioned map of seismic activity in two Tadzhik rayons. The following Soviet scientists are mentioned in connection with seismic research: A.G. Nazarov, S.V. Medvedev, V.I. Bune, Ye.F. Savarenskiy, G.A. Gamburtsev, and E.A. Dzhibladze. There are 8 figures and 36 references: 18 Soviet and 18 non-Soviet-bloc references. The four most recent references to English-language publications read as follows: B. Gutenberg, C.F. Richter, Magnitude and energy of earthquakes, Nature, 176, no. 4486, 1955; P.S. Amand, Two proposed measures of seismicity, Bull. Seism. Soc. Am., 46, no. 1, 1956; C. Tsuboi, Energy account of earthquakes in and near Japan. Journ. Phys. Earth., 5, no. 1, 1957; J.V. Riznichenko, On quantitative determination and mapping of seismic activity, Annali di Geofisica, Roma, v. XII, no. 2, 1959.

ASSOCIATION: Institut fiziki Zemli AN SSSR (Institute of Physics of the Earth of the AS USSR)

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0014449

RIZNICHENKO, YU. V.

S/169/61/000/010/009/053
D228/D304

AUTHORS: Bune, V. I., Gzovskiy, M. V., Zapol'skiy, K. K., Keylis-Borok, V. I., Krestnikov, V. N., Malinovskaya, L. N., Nersesov, I. L., Pavlova, G. I., Rautian, T. G., Reysnor, G. I., Riznichenko, Yu. V., and Khalturin, V. I.

TITLE: Methods of the detailed study of seismicity

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 10, 1961, 12-13, abstract 10A144 (Tr. In-ta fiz. Zemli AN SSSR, no. 9, 1960, 327 p.)

TEXT: The Tadzhik complex seismologic expedition was organized with the aim of studying the nature of earthquakes and the conditions of their genesis. The most seismically-active zones of the USSR (Garmo and Stalinabad) were chosen as the work areas. The specific conditions of working and processing the data demanded the development of special systems of observation and methods of interpretation. The large amount of recorded

Card 1/6

S/169/61/000/010/009/053
D228/D304

Methods of the detailed...

seismic phenomena permitted the use of statistical methods for studying their distribution in space and time; these methods, in their turn, provided the basis for introducing the quantitative indices of the seismicity characteristics of the seismically-active areas. The actual seismic observations were closely coordinated with geologic investigations, and this provided the possibility of exposing the tectonic basis of the seismic phenomena. A general review of the work area is given in Chapter 1, and concise data on major earthquakes are cited together with the general position of the expedition stations. A description of the standard main and auxiliary apparatus used at the stations, and also the layout and description of newly developed equipment--including an automatic seismic station with a magnetic memory--is cited in Chapter 2. The methods developed and utilized in the expedition for studying the crust's structure in the area under investigation from the records of nearby earthquakes are described in Chapter 3. Horizontal and vertical hodographs were constructed. The resulting material enabled the crust to be represented as a one-layer mass

Card 2/6

S/169/61/000/010/009/053
D228/D304

Methods of the detailed...

with a longitudinal-wave velocity of 6.0 - 6.1 km/sec. At the Mohorovicic boundary, the velocity suddenly changes to 8.0 km/sec. and then somewhat decreases, but at a depth of 300 km it subsequently increases to 9.2 km/sec. These data underlay the construction of isochrone charts used to localize the epicenters and to determine the focal depths. The isochrone charts were constructed with an account of the heterogeneity of the work area's geologic structure and the peculiarity of the seismic stations' location. This enabled the precision of hypocenter localization to be substantially increased, reducing it to 1 - 2 km at the center of the work area's topographic map. In Chapter 4, the definition of the concept of seismic energy at the focus is given, and the basic formulas are derived for its calculation. On the basis of experimentally obtained laws for the dying out of energy with distance, nomographs were constructed to determine practically the energy at the focus from the records of nearby earthquakes. Appraisal of the precision of calculation of the energy in relation to different factors shows that it may be determined accurately to the order of its magnitude. In this connection, the value K = lg E j.

Card 3/6

S/169/61/000/010/009/053
D228/D304

Methods of the detailed...

is introduced for characterizing the energy class of earthquakes. The value of K is compared with the earthquake magnitude M. The study of the iso-energy lines shows that the different degrees of the dying out of seismic energy along and across the strike of geologic structures exert a decisive influence on the form of the isoseisms. In Chapter 5, the frequencies of seismic vibrations are studied--in relation to the earthquake energy, the distance from the source, the geologic conditions at the point of observation and at the hypocenter, etc.--from recordings at both the customary stations and a special ЧИСС (ChISS) seismic-station intended for frequency analysis of seismic waves directly at their place of registration. A detailed description is given for the frequency-selective seismic-station ЧИСС-1954 (ChISS-1954) and for the results of the investigation of its recordings. Certain epicentral zones with an anomalous frequency are thereby revealed. The procedure for theoretically calculating the focal characteristics, and also for appraising these latter from empirical data, is given in Chapter 6. Several formulas are

Card 4/6

cited for determining the size of a focus in relation to its energy on the basis of different physical propositions. The dynamic parameters of the foci are determined; there appear to be definite predominant directions for both the strike and dip of the fracture planes. The characteristics of the seismic conditions of the Garmo and Stalinabad seismically-active regions--both as a whole and in individual areas--are quoted together with the variations in the parameters of the conditions in time. The quantitative expression of the seismicity during constant seismic conditions is determined by the seismic activity. The possibility is shown of constructing graphs of the recurrence of earthquakes from short observations of weak shocks, and methods are given for determining the period required to obtain the parameters of the seismic conditions with a pre-set precision in relation to the energy of the recorded earthquakes. The statistical constancy of the seismic conditions is determined by the so-called measure of dispersion of the frequency of earthquakes. A brief description of the area's stratigraphy and the history of its geologic development is given in Chapter 8. The structural schemes and descriptions of the most important

Methods of the detailed... S/169/61/000/010/009/053
D228/D304

deep faults are cited. The contemporary structure of the Garmo area is depicted as two main regions: the alpine geosynclinal zone in the south and the activated epi-Hercynian platform in the north. In section, it is drawn as several steps of Paleozoic basement adjoining each other along deep faults. A comparison of the seismicity with the tectonics of the study areas is made in Chapter 9. The construction of maps of isolines of seismic activity and gradients of the rate of tectonic movements is recommended for appraising the connection between the seismicity and the tectonics. Methods are cited for constructing such maps. The congruence between these magnitudes is established for the regions under investigation, and areas with the maximum gradient values correspond to those with the highest values of seismic activity. 272 references. [Abstracter's note: Complete translation.]

Card 6/6

26977

S/049/60/000/012/001/011
D214/D305

9, 9865 (1109, 1327)

AUTHORS: Riznichenko, Yu.V., and Shamina, O.G.

TITLE: On multiply reflected and transmitting waves

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya geofizicheskaya, no. 12, 1960, 1689 - 1706

TEXT: The present authors report a more detailed account of the theory developed by Yu.V. Riznichenko (Ref. 2: Dokl. AN SSSR, 126, no. 4, 1959). The theory was checked experimentally with the aid of models and the pulse ultrasonic method described by Yu.V. Riznichenko, B.N. Ivakin, and V.R. Bugrov (Ref. 3: Izv. AN SSSR, ser. geofiz., no. 2, 1959). The problem is formulated as follows: Consider a multilayer medium which consists of a uniform elastic half-space with thin-layer inclusions, whose elastic properties differ from those of the main medium. The layers form a plane parallel periodic sequence with a constant spacing h. The source of seismic oscillations S produces short pulses which are then applied to the free surface OA of the half-space. The seismic waves are observed

Card 1/7

at a point A on the surface, or within one of the layers (Fig. 1a). Waves emitted by the source are reflected and refracted in the medium, the reflection and transmission coefficients (energy coefficients) being r and p respectively. If for some reason a fraction q is absorbed by the medium, then $p + q + r = 1$. The coefficients p, q and r are in general functions of frequency. The problem consists in determining the number of all the waves reaching A simultaneously with the single reflection from the lowest-lying layer, and the intensity of all the scattered waves. The calculation is based on the following considerations: In order to facilitate the discussion the authors introduce a further (fictitious) medium which lies above the actual medium and is coterminous with it (Fig. 1b). In order to obtain the true ray pattern, the latter figure should be folded about the line OA. Two assumptions are then made. Firstly, it is assumed that OA is a thin layer similar to the other layers, and secondly, it is assumed that the source S emits waves both in the upward and the downward direction S. It is then shown that under these conditions, and subject to the further condition $p + r = 1$,

26977 S/049/60/000/012/001/011
D214/D305

On multiply reflected and ...

the phenomenon of total internal reflection from the free surface OA is automatically allowed for. If p + r is less than unity, i.e. there is some effective absorption q, then, subject to the above assumptions, there is also absorption at the free surface OA. This is consistent with real media, since seismic waves reaching the earth's surface from below may lose a fraction of their energy, owing to the non-perfect elasticity of the surface layers and scattering effects due to surface irregularities. As a first approximation it is assumed that q is much smaller than p. Extensive formulas are then derived giving the number of waves and their intensities at A. In order to determine the total intensities at any point M, it is sufficient to calculate the intensity of all such waves in the medium shown in Fig. 1b and then divide the result by 2. All the calculations are confined to plane waves. The theory has been checked by studying the transmission and reflection of waves in thin layers of water, glass and iron. The emitters and receivers were in the form of piezoelectric probes (Rochelle salt). The experimental arrangement is illustrated by Fig. 3. A detailed study was made of the form, amplitude and period of the waves as a function of the

Card 3/7

angle of incidence and the number of layers. For transmitted waves it was found that the form of the waves remains practically independent of the angle of incidence. The wave amplitude increases monotonically with the angle of incidence. The increase is faster for a larger number of layers. In the latter case the variation becomes linear and is more rapid for iron than for glass. The period of the transmitted wave is larger than that of the incident wave and increases with the number of layers. The increase is faster for iron than for glass. For reflected waves the results are summarized as follows. The form of the wave depends on the angle of incidence but only very slightly. The amplitude decreases slightly as the angle of incidence approaches the critical angle, and thereafter begins to increase, particularly for a large number of layers. The increase is larger for glass than for iron. The period of the reflected wave is smaller than that for the incident wave, and decreases slightly with the number of layers. In the region of the critical angle no special regularities were observed. The theoretical and experimental studies showed that when the structure of the medium is sufficiently complex the scattered waves become more inten-

26977 S/049/60/000/012/001/011
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On multiply reflected and ...

se than the main reflection, and a point is reached where the reflection is practically indistinguishable. This is analogous to scattering light in a turbid medium, where for high turbidities an object located in the medium disappears altogether. Model experiments in which the covering medium has a strong velocity and density differentiation provide information about the general behavior of the waves. A scattering medium with large differentiation and a small number of layers should, to some extent, behave as a medium with weaker differnetiation, but a large number of layers. There are 14 figures, 1 table and 8 Soviet-bloc references.

Card 5/7

32022
S/619/60/000/015/002/004
D039/D112

3,9300 (2406, 1019, 1109, 1327)

AUTHOR: Riznichenko, Yu.V.

TITLE: On the seismic magnitudes of underground atomic explosions

SOURCE: Akademiya nauk SSSR. Institut fiziki Zemli. Trudy, no 15 (182), Moscow, 1960. Seysmicheskiy effekt podzemnykh vzryvov, 53-87

TEXT: The present paper examines the results of determination of the seismic magnitudes of underground atomic explosions with an intensity of 1 ÷ 20 kt, i.e. the Rainier, Logan and Blanka explosions [Abstracter's note: The English rendition of the name Blanka could not be defined], and other underground nuclear explosions of the Hardtack series conducted on the test site in Nevada State, USA, in 1957-58. The purpose of the examination is to study various aspects of the problem of detecting underground atomic explosions among earthquakes. In this connection, the mean magnitude values of the a/m explosions are calculated, and the relation between the explosion intensity in kilotons of trinitrotoluene equivalent and its mean magnitude is determined. The author also established the number of small-focus earthquakes per year whose mangitudes exceed an explosion of a given intensity. It is

Card 1/5

32022
S/619/60/000/015/002/004
D039/D112

On the seismic magnitudes of ...

also shown that this number is not higher than the estimations accepted by the Conference of Experts on Banning Nuclear Tests which was heldat Geneva in 1958. The calculations of the Rainier, Logan and Blanka explosions are based on the local magnitude values (M_L) and teleseismic magnitude values (m) obtained by American experts and disclosed at a conference of experts which took place in Geneva on December 14, 1959. Two values of m, i.e. 5.2 and 5.1 were obtained for the Blanka explosion at Soviet stations situated at distances of 6,890, 8,320 and 10,080 km. For the Logan explosion a value of 4.9 was obtained at a distance of 6,890 km (the Tiksi Station). All stations used the recordings of the P-waves, in which the amplitudes and periods recorded by means of the CBK-M (SVK-M) seismograph were taken into account. All magnitudes m tabulated in the article entirely correspond to the Gutenberg unified scale and need not be recalculated. As regards the Baker and Logan explosions, the author considers that the difference between the mean extrascalar magnitudes in the three zones (the magnitude in zone [2] is about 0.5 less than in zone [3], and the magnitude in zone [1] is about 0.3 less than in zone [3]), is due to the fact that in zone (2) the conditions are highly unfavourable for the passage of high-frequency oscillations such as produced

Card 2/5

4

32022
S/619/60/000/015/002/004
D039/D112

On the seismic magnitudes of ...

by an artificial explosion. Discussing American data on the straggling of the Blanka, Logan and Rainier magnitudes, the author considers the standard deviation of ±0.4 to be excessive. The mean magnitudes for the Blanka and Logan explosions were obtained by the author on the basis of two calculation versions and equal (for the 1st and 3rd zones taken together) $m_{1,3} = 5.2 \pm 0.1$ and $m_{1,3} = 4.95 \pm 0.1$ respectively; for the Rainier explosion the mean magnitude value is $m_{1,3} = 4.7 \pm 0.1$. Criticizing the method for the determination of the relation between the explosion intensity and magnitude which was described by C.F. Romney (Ref. 9: "Journ. Geophys. Res.", 64, No. 10, 1959) the author gives his own final formula which solves this problem and can be applied within an intensity range from the Rainier to the Blanka explosions:

$$m = 4.6 \pm 0.1 + (0.50 \pm 0.06) \log Y, \quad (7)$$

where Y is the explosion intensity in kt. A corresponding formula is given for the local magnitudes M_L:

$$M_L = 3.9 \pm 0.7 \log Y, \quad (7)$$

Card 3/5

32022
S/619/60/000/015/002/004
D039/D112

On the seismic magnitudes of ...

The slope parameter for magnitudes determined on the basis of experimental data was n = 0.5 and not n = 1.0 as shown in Ref. 10 (Ref. 10: Practical Record on the Problem of Seismic Data Submitted by the US Delegation on Jan 5, 1959. Conference on the Banning of Nuclear Tests. Data of the Geneva Conference of Experts, 1959) [Abstracter's note: This is a Russian-language reference] and in the paper of C.F. Romney (Ref. 9). Moreover, even for the local magnitudes M_L, it equals only 0.7, which is close to those values which were evidently accepted in calculations at the Geneva Conference of Experts held in 1958. Thus, the results obtained by the author for larger underground atomic explosions fully agree with experimental data available for chemical explosions. Data on the determination of the annual amount of small-focus earthquakes whose magnitudes exceed an underground atomic explosion of a given intensity Y are tabulated. On the basis of this data the author concludes that, contrary to Ref. 10, the 1958 Geneva estimations of the number of earthquakes, whose magnitudes correspond to explosions in the 1-20 kt range, should be reduced by an average of 2 - 3 times. From this point of view, the task of a future international organization for controlling underground atomic explosions and detecting them among earthquakes is

Card 4/5

On the seismic magnitudes of ...

32022
S/619/ 60/000/015/002/004
D039/D112

simplified. The author thanks Soviet experts for their friendly cooperation during the Geneva conference in 1958, as well as his American colleagues - Doctor Charles Romney, Professor Hans Bete, Frank Press and John Tuki [Abstracter's note: the English rendition of the names Bete and Tuki could not be defined] - for their participation in discussions. V.F. Pisarenko is mentioned. There are 10 figures, 6 tables, 21 references: 10 Soviet-bloc and 11 non-Soviet-bloc. The four most recent references to English-language publications read as follows: Atomic Energy Commission Release on Hardtack Bomb Tests, No 2-39, March, 1959.; C.F. Romney, Amplitudes of Seismic Body Waves from Underground Nuclear Explosions, "Journ. Geophys. Res.", 64, No. 10, 1959.; D.S. Carder, W.K. Cloud, Surface Motion from Large Underground Explosion, "Journ. Geophys. Res.", 64, No 10, 1959.; A.L. Latter, E.A. Martinelli, E. Teller, A Seismic Scaling Law for Underground Explosions, Physics of Fluids, 1959.

Card 5/5

SHAMINA, O.G., seysmolog; VINOGRADOV, S.D., seysmolog; SILAYEVA, O.I., seysmolog; BARLAS, V.Ya., seysmolog; SHAMAYEVA, L.A., seysmolog; RIZNICHENKO, Yu.V., red.; PANTAYEVA, V.A., red.; RYBKINA, V.P., tekhn. red.

[Weak earthquakes] Slabye zemletriaseniia. Moskva, Izd-vo inostr. lit-ry, 1961. 533 p. (MIRA 15:1)

1. Institut fiziki Zemli AN SSSR (for Shamina, Vinogradov, Silayeva, Barlas, Shamayeva).
(Eaethquakes)

24808
S/049/61/000/004/001/008
D257/D306

9,9865

AUTHORS: Riznichenko, Yu.V., Shamina, O.G., and Khanutina, R.V.

TITLE: Elastic waves with a generalized velocity in two-dimensional bimorphous models

PERIODICAL: Akademiya nauk SSSR. Izvestiya, Seriya geofizicheskaya, no. 4, 1961, 497 - 519

TEXT: The present paper is an extension of the work of J. Oliver (Ref. 7: Earthq. Not., 27, No. 4, 1956) who suggested the use of layered two-dimensional models for seismic waves in media with parameters varying continuously in space. The models are sheets of variable or constant thickness which are stuck together in the same way as plywood; seismic waves are represented by ultrasonic pulses. The present authors give a theory of long-wavelength longitudinal, transverse and surface waves in bimorphous (two-layered) and polymorphous (many-layered) models. An experimental work on these waves is also reported; its aim was to find the possibilities and li-

Card 1/5

24808
S/049/61/000/004/001/008
D257/D306

Elastic waves with a ...

mitations of two-layered and many-layered models. The work was limited to a study of vibrations, whose displacement vector lies in the plane of the two-dimensional model. These vibrations are analogous to longitudinal, transverse SV and Rayleigh surface waves in three-dimensional media. Elastic properties of quasi-anisotropic media, consisting of successive isotropic layers with different properties, were discussed in the three-dimensional case by Yu.V. Riznichenko (Ref. 13: Izv. AN SSSR, Ser. gogr. i geofiz. 8, no. 6, 1949). Riznichenko's method is now used in the two-dimensional case. It is assumed that the two layers in the model are thin compared with the wavelength of elastic waves. General equations of the static theory of elasticity and boundary conditions at the faces of the components of the model, deformed by long longitudinal P and transverse S waves, are used to calculate the effective longitudinal and transverse elastic moduli and the velocities of propagation of P and S waves. The expressions are obtained first for the bimorphous (two-layered) case and are then generalized to a many-layered model. The velocities of propagation of long Rayleigh surface waves are calculated

Card 2/5

24808
S/049/61/000/004/001/008
D257/D306

Elastic waves with a ...

for single-layered and many-layered plates. A nomogram is given which relates the velocities of P, S and R waves with the Poisson's ratio σ for a massive sample and a plate. The nomogram can be used to find the effective value of σ for a massive sample modelled by a plate. The theoretical expressions were tested by experiments using an ultrasonic pulse source ИКЛ-4 (IKL-4). Piezoelectric Rochelle salt transducers of X-45° cut were used; their dimensions were 10 x 10 x 10, 20 x 20 x 20 and 60 x 40 x 10 mm. The techniques of longitudinal profiles and diagonal transmission were employed to separate longitudinal and transverse waves. Good contact between the working surfaces of the transducers and models was ensured by using castor oil. Models were made of thin sheets of brass, Duralumin, iron, Plexiglas (Perspex) and Getinaks (paper-filled phenolformaldehyde resin). The two-layered models were stuck together by a thin layer of paraffin wax, rubber plasticizer or glue БФ-2 (BF-2). The maximum dimensions of the models were 500 x 600 x 8 mm. The experiments showed that the theory given in the present paper is essentially correct in the case of long waves. It was found that

Card 3/5

24808
S/049/61/000/004/001/008
D257/D306

Elastic waves with a ...

if the thickness (h) of two-layered plates is much less than the elastic wavelength (in practice $h/\lambda \leqslant 0.1$), then P, S and R waves are generated in the plates. The attenuation of longitudinal and transverse waves in two-layered plates obeys the same law as in single-layered plates. This law is

$$A = A_0 \frac{\exp(-\alpha x)}{x^{1/2}},$$

where A_0 is a constant, α is the absorption coefficient per unit path length, and the term $x^{1/2}$ allows for spreading of the wave energy along a circular front. The absolute values of the absorption coefficient α for P waves, and especially for S waves, are larger in the two-layered model than in the individual plates (layers), of which the model is made. A "gradient" medium, in which velocity varies with depth, was modelled by two wedge-shaped plates stuck together. It was found that in such a medium even a small variation of velocity with depth, which cannot be detected by means of hodographs, affects very strongly the amplitudes of the longitudinal waves. There are 16 figures, 2 tables and 24 references: 17

Card 4/5

24808
S/049/61/000/004/001/008
D247/D306

Elastic waves with a ...

Soviet-bloc and 7 non-Soviet-bloc. The 4 most recent references to English-language publications read as follows: E. Howes, Tejada-Flores and R. Lee, J. Acoust. Soc. Amer., 25, no. 5, 1953; J. Oliver, F. Press and M. Ewing, Geophys., 19, no. 2, 1954; J. Oliver, Earthq. Not., 27, no. 4, 1956; F. Press, Geophys., 22, no. 2, 1957.

ASSOCIATION: Akademiya nauk SSSR, institut fiziki zemli (Institute of Physics of the Earth, Academy of Sciences, USSR)

SUBMITTED: October 29, 1960

Card 5/5

RIZNICHENKO, YU. V.

S/213/61/000/017/001/002
D239/2302

AUTHORS: Medvedev, S.V., Bune, V.I., Vvedenskaya, N.A., Gayskiy, V.N. Kirillova, I.V., Nersesov, I.L., Riznichenko, Yu.V., Savarenskiy, E.F. and Sorskiy, A.A.

TITLE: Instructions for regional seismological summaries

SOURCE: Akademiya nauk SSSR. Institut fiziki Zemli. Trudy no. 17 (184) Moscow 1961. Voprosy inzhenernoy seysmologii no. 5, 128-145

TEXT: These instructions were confirmed by the director of the Institute of Geophysics AN SSSR, M.A. Sadovskiy, on February 27, 1961. Their objective is clearly to secure a uniform system of recording all seismological data pertinent to building construction, obtained in future in the USSR. The instructions are divided into six parts, containing 64 numbered articles, the following being an indication of the scope of each part: 1) General

Card 1/3

S/619/61/000/017/001/002

Instructions for regional ...

Section. This defines the purpose and scope of the work. The seismological map of the USSR established in 1957 is being kept up to date by continuing observations. Its scale is 1 : 5.000,000. The map is to be used to make seismological forecasts both for the epicentral zone and for the whole earth's surface. 2) Instrumental data on earthquakes. This is defined as data obtained now from both fixed and expeditionary stations as opposed to the study of past earthquakes. Methods of classification by magnitude, precision of epicentral location and frequency of recurrence are defined. 3) Engineering seismology. Under this heading is defined the format of an atlas of strong earthquake with isoseismals. This should be on a scale of 1: 1,000,000. It is also hoped to include data on the energy density distribution of the frequency spectra. 4) Seismogeological data. Since some regularity is discernible in the distribution of shocks, a "seismotektonic" map should be a possibility. This would be particularly helpful in regions where seismological data up to this time are

Card 2/3

S/619/61/000/017/001/002
D239/D302

Instructions for regional ...

sphere. Gravitational data could also be useful here. 5) Procedures for making seismological summary maps and their documentation. These are to be of two types, corresponding to 1 and 3, above, i.e. seismological maps and maps of isoseismals showing energy and attenuation characteristics of the region. The way in which these should be prepared is described in considerable detail, together with some guidance about what is envisaged for the seismotektonic maps. 6) Arrangement, duration of and participants in the fulfilment of the project. The names and addresses of the participating institutions for each region are given; the end of the first term will be at the end of 1962. The map is expected from the AN SSSR (AS USSR) in 1963. There are 60 Soviet-bloc references

Card 3/3

31920
S/619/61/000/017/002/002
D239/D302

3,9300

AUTHORS: Nersesov, I.L., Rautian, T.G., Khalturin, V.I. and Riznichenko, Yu.V.

TITLE: Instructions for dynamic measurements on seismograms

SOURCE: Akademiya nauk SSSR. Institut fiziki Zemli. Trudy no. 17 (184). Moscow, 1961. Voprosy inzhenernoy seysmologii no. 5, 146-167

TEXT: The term " dynamic" signifies measurements of amplitude and period of oscillations, directions of first motion and duration of the trace, as opposed to kinematic measurements of times of arrival of phases. The objective is to obtain information of the strength and type of movement at the focus. Data from a long chain of stations are necessary and these data must be strictly comparable, on a uniform basis. It is assumed that

Card 1/4

31920
S/619/61/000/017/002/002
D239/D302

Instructions for dynamic ...

all such stations are fitted with type СГК (SGK) or СВК (SVK) seismographs or others of similarly wide bandwidth. The instructions are based on experience of near earthquakes (up to 700 km) in Central Asia, but recommendations are also given for dealing with earthquakes out to 100° epicentral distance, where diffraction begins to affect matters. The instructions are divided into eight sections as follows: 1) Dynamic quantities determinable from seismograms. These are A_i, T_i, the amplitude and period of first arrivals of each phase; A_{max}, T_{max} the maximum amplitude and corresponding periods of each phase; A_m, T_m, the the mean ditto; τ the duration of each wave-group. A distinction is made between relative duration which is measured between points of amplitude one third the maximum, and the absolute duration which is measured between points of fixed amplitude. The latter clearly depends on the energy. 2) measurement of

4

Card 2/4

31920
S/619/61/000/017/002/002
D239/D302

amplitude and period of first arrivals (details). 3) Separation of basic wave-groups on the trace (illustrated by examples). 4) Measurement of maximum amplitudes and the corresponding periods (details). 5) Measurement of mean amplitudes and mean periods (details). 6) Determination of total duration of seismic oscillation (definitions). 7) Calculation of seismic energy density. The formula evolved is

$$\mathcal{E} = 0.085 \frac{v}{v_s} \left[\frac{A_1^2}{T_1^2} \cdot \tau_1 + \frac{A_1^2}{T_2^2} \cdot \tau_2 + \ldots\ldots \frac{A_n^2}{T_n^2} \cdot \tau_n \right] \text{erg/cm}^2,$$

where the symbols are: v = velocity of given wave-group, V_s = velocity of S-waves, A = ground amplitude

Card 3/4

31920
S/619/61/000/017/002/002
D239/D302

Instructions for dynamic ...

in mm, T = period in seconds of first arrivals of phases 1,2,... ... n and τ = duration of phases 1,2, ... n. This section is also illustrated by examples and a nomogram for rapid calculation is given. 8) Calculation of the seismic energy at the focus. This simply involves evaluation of $4\pi R^2 \mathcal{E}(R)$. Another nomogram is given for this. A third nomogram can be used for estimating magnitude. All these data should be reported on a special form designed for the purpose and a completed example is given. There are 13 figures.

Card 4/4

26380
S/030/61/000/008/001/005
B105/B206

3,9300

AUTHOR: Riznichenko, Yu V , Corresponding Member AS USSR

TITLE: Reference sections of the earth

PERIODICAL: Akademiya nauk SSSR. Vestnik, no. 8, 1961, 37-44

TEXT: The author describes a project concerning the reference sections of the earth, which serves for a further development of the stereoscopic picture of the earth. The earth is "irradiated" by means of natural and mainly artificial seismic waves, and conclusions on its inner setup are drawn. From the determination of general rules concerning the setup of the earth, geophysicists at present proceed to the investigation of its local peculiarities. Prospecting geophysics has already at its command rational systems of observations in order to obtain precise information on the depth structure. In prospecting seismology the observations of reference sections are the bases of such investigations. For the globe as a whole, the arcs of great circles on the surface of the earth are identical with linear prospecting profiles, and the great-circle cross sections through the center of the earth identical with plane, vertical cross

Card 1/6

26380
S/030/61/000/008/001/005
B105/B206

sections. These cross sections and the reference sections corresponding to them must be laid in such a way that they are of interest in geological and geophysical respect. A sufficient number of well equipped seismic stations as well as sufficiently strong earthquake centers are required. The lines of great circles for the primary reference sections of the earth, as illustrated in the attached figure, are proposed. The belt of circle no. 1 in Europe and Asia extends across the seismic areas of the Tethys alpine range: across the Pyrenees, Alps, Carpathian Mountains, Crimea, Caucasia, the Pamirs, the Himalayas and across the territory of Indochina; it further crosses the highly seismic area of the Indonesian Islands, passes lowly seismic Australia, highly seismic New Zealand, crosses the Pacific, and on the South American Continent it takes its course across the highly seismic area in Peru, then across Brazil and Guiana into the Atlantic with its moderately seismic belt, and returns to Europe. Within this belt there are many well equipped seismic stations. The belt of circle no. 2 proceeds across Arabia, the highly seismic areas of Iran and Afghanistan, across the Soviet Union and the areas of the Tethys belt, the mountain range of the Tian Shan, the Altai Mountains, Pribaykal'ye as far as Kamchatka and the Pacific Plateau. This circle

26380
S/030/61/000/008/001/005
B105/B206

Reference sections of the earth

further crosses the Pacific, the Hawaiian Islands, Tierra del Fuego, Africa, Abyssinia, and returns to the Asian territory. These investigations have only been started in the Soviet Union. At the Institut fiziki Zemli im. O. Yu. Shmidta Akademii nauk SSSR (Institute of Physics of the Earth imeni O. Yu. Shmidt of the Academy of Sciences USSR) a team is dealing with this problem. At the recent Conference on Problems of Seismic Magnitude and Energy held in Prague it was proposed by V. Karnik and I. Vanek (Geophysical Institute of the Academy of Sciences of Czechoslovakia), A. F. Zatopek (Prague University), M. A. Sadovskiy, N. V. Shebalin and the author (Institute of Physics of the Earth imeni O. Yu. Shmidt) to conduct these investigations jointly. The present project concerning the reference sections of the earth is the realization and supplementation of a proposal by V. V. Belousov, President of the Mezhdunarodnyy geodezicheskiy i geograficheskiy soyuz (International Geodetic and Geographic Union), the so-called "Upper Mantle Project". This proposal was approved by the 12th plenary meeting of this Union in 1960. There are 1 figure and 5 references: 3 Soviet-bloc and 2 non-Soviet-bloc. The two references to English-language publications read as follows: H. Jeffreys, K. E. Bullen. Seismological Tables. 1940;

Card 3/6

26380
S/030/61/000/008/001/005
B105/B206

Reference sections of the earth

H. Jeffreys. The Times of PcP and ScS. "Monthly Not. RAS. Geophys. Suppl.", v. 4, No. 7, 1939.

Fig.: Project concerning the reference cross sections of the earth.

Card 4/6

SILAYEVA, Ol'ga, Ivonovna; RIZNICHENKO, Yu.V., otv.red.; SHAMINA, O.G., red.izd-va; RYLINA, Yu.V., tekhn.red.

[Using ultrasound in studying the propagation of elastic wave velocities and elastic parameters in rock smaples at unilateral pressure] Issledovaniia s pomoshch'iu ul'trazvuka skorostei rasprostraneniia uprugikh voln i uprugikh parametrov v obraztsakh gornykh porod pri odnostoronnem davlenii. Moskva, Izd-vo Akad. nauk SSSR, 1962. 110 p. (Akademiia nauk SSSR. Institut fiziki Zemli. Trudy, no.27). (MIRA 16:2)
(Rocks—Elastic properties) (Seismic prospecting)

BARLAS, V.Ya.[translator]; KEYLIS-BOROK, V.I., red.; RIZNICHENKO, Yu.V., red.; PANTIYEVA, V., red.; DOTSENKO, V., tekhn. red.

[Underground nuclear explosions]Podzemnye iadernye vzryvy. Moskva, Izd-vo inostr. lit-ry, 1962. 247 p. (MIRA 15:8)
Translated from the English.
(Underground nuclear explosions)

Z/023/62/000/001/002/004
D006/D102

AUTHORS: Kárník, V., Kondorskaya, N. V., Riznichenko, Yu.V., Savarensky, E.F., Solovyev, S.L., Shebalin, N. V., Vaněk, J., and Zátopek, A.

TITLE: Standardization of the earthquake magnitude scale

PERIODICAL: Studia geophysica et geodaetica, no. 1, 1962, 41-47

TEXT: The paper presents a proposal for standard methods of magnitude determination of both shallow and deep earthquakes, and describes the practical application of the suggested magnitude scale as agreed upon by Soviet and Czechoslovak seismologists at meetings held in Prague on December 7-14, 1960 and in early 1961. The proposal is based on the following postulates: (1) General acceptance of a unified formula for the definition of the earthquake magnitude M

$$M = \log (A/T)_{max} + \sigma(\Delta) \qquad (1)$$

where A is the maximum ground amplitude of the wave considered (in microns), T is the corresponding period in seconds, and $\sigma(\Delta)$ is the calibrating function expressing the relation between A/T and the epicentral distance Δ, which is

Card 1/3

Z/023/62/000/001/002/004
D006/D102

Standardization of the ....

different for different wave types; (2) General application of standard calibrating functions $\sigma(\Delta)$ for body and surface waves as calculated according to the methods recommended by the proponents; (3) Determination of a representative M for each earthquake, to be represented by a simple arithmetic mean of magnitudes of a single wave type as established according to the proposed standard method at many stations. The determination should be done by a proposed international center. As of January 1, 1962, the magnitude M will be determined according to the proposed standard method at all Czechoslovak and Soviet seismological stations. J. Vaněk and J. Stelzner are the personalities mentioned. There are 2 tables and 20 references: 8 Soviet-bloc and 12 non-Soviet-bloc. The references to the four most recent English-language publications read as follows: J. Vaněk, J. Stelzner, The problem of magnitude calibrating functions for body waves, Annali di Geofisica, 13, 1960, 393; E. Bisztricsány, On the determination of earthquake magnitudes, Annales Univers. Sci., Budapest, Sect. Geolog., 2, 1959, 39; T. Nagamune, A. Seki, Determination of earthquake magnitude from surface waves for Matsushiro seismological observatory and the relation between magnitude and energy. Geophys. Mag., 28, (1958), 303; Z. Droste, S. Gibowicz, Determination of the magnitude of distant earthquakes at the Silesian geophysical station in Raciborz. Acta geophys. polon.,

Card 2/3

Z/023/62/000/001/002/004
D006/D102

Standardization of the ....

6, (1958), 222. (Technical editor: L. Ruprechtová)

ASSOCIATION: Geophysical Institute, Czechoslovak Academy of Sciences, Prague (V. Kárník, J. Vaněk); Institute of the Physics of the Earth, Academy of Sciences of the USSR, Moscow (N.V. Kondorskaya, Yu. V. Riznichenko, E. F. Savarensky, S. L. Solovyev, N. V. Shebalin); Institute of Geophysics, Charles University, Prague (A. Zátopek)

SUBMITTED: November 11, 1961

Card 3/3

RIZNICHENKO, YU V

4

S/049/62/000/002/001/005
D218/D301

AUTHORS: Vaněk, J., Zátopek, A., Kárník, V., Kondorskaya, N.V., Riznichenko, Yu.V., Savarenskiy, Ye.F., Solov'yev, S.L. and Shebalin, N.V.

TITLE: Standardization of the magnitude scale

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya geofizicheskaya, no. 2, 1962, 153-158

TEXT: It is pointed out that various magnitude scales are used at the present time and that their main disadvantage is that they provide different magnitudes for a given earthquake. This is because in many cases the methods used to calculate the magnitude are not clearly defined and are inadequately described. A special conference of Soviet and Czechoslovak seismologists was convened in Prague on December 7-14, 1960, to deal with this problem. The aim of the present paper is to give an account of the main results of the Prague meeting and to suggest a standard method for determining

Card 1/4

4

Standardization of the magnitude scale S/049/62/000/002/001/005
D218/D301

the earthquake magnitude. It is suggested that the scale should be based on the following standard formula:

$$M = \lg\left(\frac{A}{T}\right)_{max} + \sigma(\Delta)$$

where A is the maximum displacement amplitude, T is the corresponding period in seconds and $\sigma(\Delta)$ is a calibrating function which describes the variation of A/T with epicentric distance and is different for different types of waves. This formula has been discussed by B. Guterberg and C.F. Richter, and by the first three of the present authors in an earlier work. The calibration function is taken as an average of the Q function of Guterberg and Richter and the β function of J. Vaněk and J. Stelzner. A table is reproduced giving the smoothed average calibrating functions for PH, PV, PPH, and SH waves. In the case of surface waves, the calibrating function is taken to be of the form $\sigma(\Delta) = a \log \Delta + b$. It was found that the coefficients a and b for LH waves are on average equal to 1.66 and 3.3 respectively. This result holds for surface waves at epi-

Card 2/4

centric distances between 2 and 160°. Below 5°, Sg and L waves must be carefully distinguished. It is pointed out that the problem of defining a single value for M is not yet solved because different average values are obtained for M with different types of waves (M_{LH}, M_{PH}, M_{SH}, and so on). Nevertheless, it was decided not to combine these values as on the unified Gutenberg-Richter scale, but to use the method described above to accumulate a large amount of data and return to the problem of defining an average magnitude later. Beginning with 1962, all stations of Czechoslovakia and the USSR will use the method described in the present paper. There are 2 tables and 20 references: 11 Soviet-bloc and 9 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: B. Gutenberg and C.F. Richter. Ann. Geophys., 9, (1956); Report of the committee on magnitudes 12th General Assembly of the IUGG, Helsinki (1960); J. Vaněk and J. Stelzner, Ann. Geophys., 13 (1960); T. Nagamune and A Seki, Geophys. Mag., 28 (1958).

4

S/049/62/000/002/001/005
D218/D301

Standardization of the magnitude scale

ASSOCIATION: Geofizicheskiy institut Akademii nauk Ch SSR (Geophysics Institute of the Academy of Sciences, Czechoslovak SSR), Geofizicheskiy institut Karlova Universiteta, Praga (Geophysics Institute, Charles University, Prague) and Akademiya nauk SSR, Institut fiziki zemli (Academy of Sciences USSR, Institute of Physics of the Earth)

SUBMITTED: October 31, 1961

Card 4/4

RIZNICHENKO, Yu.V.; FEDYNSKIY, V.V.

Conference of the work group on the earth's crust, held in Paris on March 19-22, 1962. Izv. AN SSSR. Ser. geofiz. no.7:990-992 Jl '62. (MIRA 15:7)

(Earth--Surface)

RIZNICHENKO, Yu.V.

Possibilities of calculating maximum earthquake. Trudy Inst. fiz. Zem. no.25:5-15 '62. (MIRA 15:11)

(Seismometry)