

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

TECHNICAL LETTER NUMBER 18

COMPILATION OF SEISMIC-REFRACTION CRUSTAL DATA
IN THE SOVIET UNION*

by

Robert Rodriguez**, William P. Durbin, Jr.,***
J. H. Healy**, and David H. Warren**

DENVER, COLORADO

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Technical Letter
Crustal Studies-18
February 28, 1964

Dr. Charles C. Bates
Chief, VELA UNIFORM Branch
Advanced Research Projects Agency
Department of Defense
Pentagon
Washington 25, D. C.

Dear Dr. Bates:

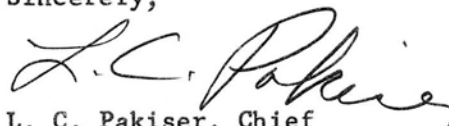
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by

Robert Rodriguez**, William P. Durbin, Jr.,***
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Sincerely,


L. C. Pakiser, Chief
Branch of Crustal Studies

- * Work performed under ARPA Order No. 485.
- ** U. S. Geological Survey, Denver, Colorado.
- *** United States Air Force Aeronautical Chart and Information Center,
St. Louis, Missouri.

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INTRODUCTION

The U. S. Geological Survey is preparing a series of terrain atlases of the Sino-Soviet bloc of nations for use in a possible nuclear-test detection program. Part of this project is concerned with the compilation and evaluation of crustal-structure data. To date, a compilation has been made of data from Russian publications that discuss seismic-refraction and gravity studies of crustal structure. Although this compilation deals mainly with explosion seismic-refraction measurements, some results from earthquake studies are also included. None of the data have been evaluated.

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** U. S. Geological Survey, Denver, Colorado.

*** United States Air Force Aeronautical Chart and Information Center,
St. Louis, Missouri.

DESCRIPTION OF THE COMPILATION

The compilation of crustal-structure data is presented on a series of 4 maps which can be used as overlays on Army Map Service Series 1106 base maps that cover land areas in the eastern hemisphere. Major land and water areas have been outlined to facilitate the identification of locations without resorting to the parent map.

Major emphasis of the compilation has been on crustal thickness. Profile-line locations are generally replaced by lines along which crustal thickness values have been compiled from seismic-refraction data, gravity data, or a combination of both. Depths to the M discontinuity are sometimes scaled from published sections and do not necessarily represent the original measurements presented in the text. Upper-mantle velocities are listed when these data are available from seismic studies.

Although the legend on each map is intended to be self-explanatory, it is also explained here. Location of data is represented by either an X or a line. Crustal-thickness values are listed either separately or as the numerator of a fraction. Velocities in the upper mantle appear as the denominator of the fraction or to the side of the line location. If a number follows, it is an index to a reference listed in reference E-1, Dementitskaya (1961).

A keyed list of references follows the section of this report entitled REFERENCES. All references are available in English translation.

REFERENCES

Three references are of particular value because of the large amount of data they contain: McConnell and McTaggart-Cowan (1963), Demenitskaya (1961), and the collection "Deep Seismic Sounding of the Earth's Crust in the U.S.S.R." (1962).

References are listed in English translation in arbitrarily separated lists. Lists A to D are defined by geographic region. List E contains comprehensive compilations, and List F contains papers from the collection "Deep Seismic Sounding of the Earth's Crust in the U.S.S.R." (1962). The abbreviation of the translating agency is listed in parentheses following the reference. They are:

ACIC U. S. Air Force Aeronautical Chart and Information Center.

AGI American Geological Institute.

AGU American Geophysical Union.

List A - Baltic Shield - Caucasus

- A-1 Grachev, Yu. N., Dekhnich, M. Ya., Litvinenko, I. V., Nebrasova, K. A., and Sosnovskaya, A. V., 1960, Plutonic geophysical investigations on the territory of the Baltic Shield: International Geological Congress, XXI Session. Reports of Soviet Geologists, p. 43-49. (ACIC).
- A-2 Neprochnov, Yu. P., Goncharov, V. P., and Neprochnova, A. F., 1959, Seismic data on the structure of the earth's crust in the central section of the Black Sea: Doklady Akad. Nauk SSSR, v. 129, nos. 1-6, Nov.-Dec. (AGI).
- A-3 Demenitskaya, R. M., 1961, Basic feature of the earth crust structure on geophysical data: Transactions of the Scientific Research Institute of Arctic Geology, v. 115, p. 143-146 excerpted. (ACIC).
- A-4 Balavadze, B. K., and Tvaltvadze, G. K., Sept. 1958, The structure of the earth's crust in Georgia according to geophysical data: Akad. Nauk SSSR, IZV., no. 9, p. 623-628. (AGU).
- A-5 Demenitskaya, R. M., 1961, Basic feature of the earth crust structure on geophysical data: Transactions of the Scientific Research Institute of Arctic Geology, v. 115, p. 126-131. (ACIC).

List B - Caspian Sea - Turkmenia

- B-1 Gal'perin, E. I., and Kosminskaya, I. P., July 1958, Characteristics of the method of deep seismic sounding on the sea: Akad. Nauk SSSR, Izv., ser. Geofiz., no. 7, p. 475-483. (AGU).
- B-2 Kosminskaya, I. P., and Tulina, Yu. V., 1956, An experimental application of the seismic depth-sounding method to the investigation of the structure of the earth's crust in parts of western Turkmenia: Bull. Acad. Sci. USSR, Geoph. ser., no. 7, p. 38-66. (AGU).
- B-3 Godin, Yu. N., and others, 1962, Peculiarities of the structure of the earth's crust in the west of central Asia: Reports Acad. Sci. USSR, v. 146, no. 4, p. 813-815. (ACIC).
- B-4 Dementitskaya, R. M., 1961, Basic feature of the earth crust structure on geophysical data: Transactions of the Scientific Research Institute of Arctic Geology, v. 115, p. 136-142 excerpted. (ACIC).

List C - Lake Balkhash

- C-1 Kosminskaya, I. P., Mikhota, G. G., and Tulina, Yu. V., Oct. 1958, Crustal structure of the Pamir-Alai zone from seismic depth-sounding data: Akad. Nauk SSSR, Izv., ser. Geofiz., no. 10, p. 673-683. (AGU).
- C-2 Godin, Yu. N., Volvovsky, V. S., and Volvovsky, I. S., 1960, Seismic investigation of the earth's crust in the region of the Fergana intermontane depression: Doklady, Akad. Nauk SSSR, v. 133, nos. 1-6. (AGI).
- C-3 Ulomov, V. I., Jan. 1960, Some special features in the structure of the earth's crust in central Asia according to records of high-power explosions: Akad. Nauk SSSR, Izv., ser. Geofiz., no. 1, p. 83-85. (AGU).
- C-4 Godin, Ya. N., Vol'vovski, B. S., Vol'vovski, I. S., and Fomenko, K. E., 1961, Determination of the structure of the earth's crust by means of regional seismic investigations on the Russian platform and in central Asia: Akad. Nauk SSSR, Izv., ser. Geofiz., no. 10, p. 955-960. (AGU).
- C-5 Dementitskaya, R. M., 1961, Basic feature of the earth crust structure on geophysical data: Transactions of the Scientific Research Institute of Arctic Geology, v. 115, p. 132-135 excerpted. (ACIC).

List D - Lake Baykal - Pacific Ocean

- D-1 Massarsky, S. I., 1962, Travel-time curves for altai seismic waves from industrial explosion data: Akad. Nauk SSSR, Izv., ser. Geofiz., no. 7, p. 569-572. (AGU).
- D-2 Shaposhnikov, K. K., 1962, Structure of the earth's crust in the northeastern region of the USSR, as obtained from the geophysical data: Jour. Geol. and Geoph., no. 9, p. 100-105. (ACIC).
- D-3 Aver'yanov, A. G., Veizman, P. S., Halperin, E. I., Zverev, S. M., Zaionchkovski, M. A., Kosminskaya, I. P., Krakshina, R. M., Mikhota, G. G., Tulina, Yu. V., 1961, Deep seismic sounding in the zone of transition from the Asian continent to the Pacific Ocean during the IGY: Akad. Nauk SSSR, Izv., ser. Geofiz., no. 2, p. 109-117. (AGU).
- D-4 Kosminskaya, I. P., Zverev, S. M., Veitsman, P. S., Tulina, Yu. V., and Krakshina, R. M., 1963, Basic features of the crustal structure of the Sea of Okhotsk and the Kuril-Kamchatka zone of the Pacific Ocean from deep seismic sounding data: Akad. Nauk SSSR, Izv., ser. Geofiz., no. 1, p. 11-27. (AGU).
- D-5 Golenetskiy, S. J., 1961, Determination of the thickness of the earth crust according to observations of the waves reflected from its base and the depth of deposition of aftershock focuses of the middle-Baykal earthquake of August 29, 1959: Academy of Sciences of USSR, Siberian Branch, Geology and Geophysics, Issue 2, p. 111-116. (ACIC).

List E - Additional Sources

- E-1 Demenitskaya, R. M., 1961, Basic feature of the earth crust structure on geophysical data: Transactions of the Scientific Research Institute of Arctic Geology, v. 115, 222 p. (ACIC).
- E-2 McConnell, R. K. Jr., and McTaggart-Cowan, G. H., 1963, Crustal seismic refraction profiles, a compilation: Univ. Toronto, Inst. Earth Sci., Sci. Rep. no. 8. (written in English).

List F - All references are taken from the book "Deep Seismic Sounding of the Earth's Crust in the U.S.S.R., a Collection of Reports," 1962, Academy of Sciences of the U.S.S.R., Ministry of Geology and Conservation of Mineral Resources, Leningrad, 449 p.

- F-8 Kazanli, D. N., and Popov, A. A., Characteristic of plutonic waves recorded in central Kazakhstan, p. 127-155.
- F-9 Davydova, N. I., and others, The wave characteristic during deep seismic sounding on the Magadan-Kolyma profile, p. 156-170.
- F-10 Egorkin, A., The structure of the terrestrial crust in the Southeast of the Russian Platform, p. 171-212.
- F-11 Pomerantseva, I. V., and Margot'yeva, M. V., On the question concerning the nature of waves recorded during the deep seismic sounding, p. 213-247.
- F-12 Litvinenko, I. V., Nekrasova, K. A., Special features of deep seismic sounding in Baltic Shield, p. 248-276.
- F-13 Trebukova, B. D., Results in connection with the application of the deep seismic sounding method on the dry land in Azerbaydzhan SSR, p. 277-290.
- F-15 Gal'perin, Ye., The fundamental characteristic of plutonic waves recorded during deep seismic sounding in the Central part of the Caspian Sea, p. 305-342.
- F-16 Donabedov, A. T., and others, Study of the structure of terrestrial crust in Eastern coast line of Caspian Sea with application of deep seismic sounding method, p. 343-381.
- F-17 Neprochnov, Yu. N., Results of abyssal seismic sounding in the Black Sea, p. 382, 396.