Appendix A

Description of the Northeast Asia Project and Associated Products

By Warren J. Nokleberg 1, Leonid M. Parfenov 2, Alexander I. Khanchuk 3, Mikhail I. Kuzmin 4, Alexander A. Obolenskiy 5, Andrei V. Prokopiev 2, Sergey M. Rodionov 6, Alexander P. Smelov 2, Gombosuren Badarch 7, Hongquan Yan 8, Duk Hwan Hwang 9, and Masatsugu Ogasawara10

Introduction

This appendix provides an overview of the associated project on the Metallogenesis and Tectonics of Northeast Asia and lists the participating agencies and scientists and the extensive publications that have already been produced.

Project Area, Collaborating Agencies, Participants, and Purpose

The project area consists of eastern Russia (most of Siberia and most of the Russian Far East), Mongolia, northeastern China, South Korea, Japan, and adjacent offshore areas (fig. 1), bounded by latitude 30-82° N. and longitude 75-144° E. Participating agencies in the project are the Russian Academy of Sciences, VNIIOkeangeologia and Ministry of Natural Resources of the Russian Federation; Mongolian Academy of Sciences; Mongolian University of Science and Technology; Mongolian National University; Jilin University, Changchun, People’s Republic of China; the China Geological Survey; the U.S. Geological Survey; the Geological Survey of Japan/AIST; University of Texas Arlington; and the U.S. Geological Survey (USGS). Collaborating agencies are listed below in table 1. In addition to the numerous agencies and participants, several major Western organizations and universities have supported the project by inviting project-related talks and organizing symposia on the project at major and minor meetings, including the Colorado School of Mines; Stanford University; University of Alaska Fairbanks; University of Pittsburgh; the Alaska Miners Association; the Northwest Mining Association; and the Society of Economic Geologists.

This project extends and builds on data and interpretations from a previous project on Major Mineral Deposits, Metallogenesis, and Tectonics of the Russian Far East, Alaska, and the Canadian Cordillera that was conducted by the USGS, the Russian Academy of Sciences, the Alaska Division of Geological and Geophysical Surveys, and the Geological Survey of Canada.

The chapters in this volume and for the associated publications were compiled by a large group of international geologists, using new concepts and definitions for analyzing the metallogenesis and tectonics of a large and geologically complex region. Research was conducted over a 7-year period with large, end-of-year workshops in Northeast Asia. Each chapter should have major global significance. The information presented here will be useful for several purposes, including regional tectonic analysis, mineral resource and metallogenic analysis, mineral-resource assessment, petroleum-resource analysis and assessment, neotectonic analysis, and analysis of seismic and volcanic hazards.

The purpose of this project is to benefit participants and customers by (1) providing a comprehensive international database on the mineral resources of the region that will be the first, extensive knowledge available in English; (2) providing substantially new interpretations of the origin

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2 Russian Academy of Sciences, Yakutsk.
3 Russian Academy of Sciences, Vladivostok.
4 Russian Academy of Sciences, Irkutsk.
5 Russian Academy of Sciences, Novosibirsk.
6 Russian Academy of Sciences, Khabarovsk.
7 Mongolian Academy of Sciences, Ulaanbaatar.
8 Jilin University, Changchun, People’s Republic of China.
10 Geological Survey of Japan/AIST, Tsukuba.
and crustal evolution of mineralizing systems and their host rocks, thereby enabling enhanced, broad-scale metallogenic and tectonic reconstructions; and (3) promoting trade and scientific and technical exchanges between North America and Eastern Asia. With the numerous and detailed publications and presentations at important professional meetings (listed below), the project has provided vital data to a wide variety of customers for making sound economic planning and investment decisions and for increasing their geologic knowledge of the region, including (1) mining, petroleum, environmental, construction, investment, and information companies; (2) Federal and State government agencies in all countries; (3) professional organizations; (4) earth-science departments at universities; and (5) the news media.

**Products of the Northeast Asia Project**

Products for the project include (1) detailed mineral resource tables and location maps with data on 1,674 significant lode deposits and 91 selected placer districts in the project area, based on original, cited references; (2) regional geodynamics maps and detailed explanations that provide the geologic setting for mineral deposits and metallogenic belts; (3) mineral deposit location and metallogenic belt maps; and (4) metallogenic and tectonic interpretations, including a four-dimensional time-space model depicting the crustal origin and evolution of mineral deposits and host rocks. Publications are released in both hard copy (USGS publications and scientific journals), and digital format (CD-ROM, World Wide Web).

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**Figure 1.** Regional summary geographic map of Northeast Asia showing majors regions and countries.
### Table 1. Organizations and participants in international project on metallogenesis and tectonics of Northeast Asia.

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<thead>
<tr>
<th>Country</th>
<th>Organization</th>
<th>Participants</th>
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<tr>
<td>China</td>
<td>Geological Research Institute, Jilin University, Changchun</td>
<td>Yongsheng Dong, Xujun Li, Fengyue Sun, Jiapeng Sun, Weizhi Sun, Hongquan Yan, Mao Ye, Aihua Xi</td>
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<td>Japan</td>
<td>Geological Survey of Japan/AIST, Tsukuba</td>
<td>Masatsugu Ogasawara, Masakatsu Sasada, Sadahisa Sudo, Koji Wakita</td>
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<td>Mongolia</td>
<td>Institute of Geology and Mineral Resources, Mongolian Academy of Sciences, Ulaanbaatar</td>
<td>Sodov Ariunbileg, Gomboosuren Badarch, Demberel Orolmaa, Onongin Tomurtogo</td>
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<td>Mineral Resources Authority of Mongolia, and Ministry of Agriculture and Industry, Ulaanbaatar</td>
<td>Gunchin Dejidmaa, Ayurzana Gotosuren</td>
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<td>Ochir Gerel</td>
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<td>Department of Geology and Mineralogy, Mongolian National University, Ulaanbaatar</td>
<td>Jamba Byamba, Dangindorjiin Dorjgotov</td>
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<td>Russia</td>
<td>All Russia Research Institute for Geology and Mineral Resources of the World Ocean (VNIIOkeangeologia), Russian Ministry of Natural Resources, St. Petersburg</td>
<td>Boris I. Kim, Eugene A. Korago, Mikhail K. Kos'ko, Oleg I. Suprunenko</td>
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<td>Buryat Institute of Geology, Russian Academy of Sciences, Ulan-Ude</td>
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<td>Buryat Scientific Center, Russian Academy of Sciences, Ulan-Ude</td>
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Table 1. Organizations and participants in international project on metallogenesis and tectonics of Northeast Asia.—Continued

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<td>U.S.A.</td>
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<td>Christopher R. Scotese</td>
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<td>U.S. Geological Survey, Menlo Park, California</td>
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<td>Warren J. Nokleberg</td>
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Geodynamics maps and mineral-resource data and maps are compiled and published as Geographic Information Systems (GIS) spatial datasets. Following is a list of all project publications through the date of this publication.

**Preliminary Publications, Book 1**


Geographic base map of Northeast Asia, by Miller, R.J., Koch,
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Preliminary publications book 2 from project on mineral resources, metallogenesis, and tectonics of Northeast Asia, by Nokleberg, W.J., Miller, R.J., Naumova, V.V., Khanchuk, A.I., Parfenov, L.M., Kuzmin, M.I., Bounaeva, T.M., Obolenkiy, A.A., Rodionov, S.M., Seminskiy, Z.V., and
Metallogenesis and Tectonics of Northeast Asia


Digital Data Files for Northeast Asia Geodynamics, Mineral-Deposit Locations, and Metallogenic-Belt Maps, Stratigraphic Columns, Descriptions of Map Units, and Descriptions of Metallogenic Belts

Digital files for Northeast Asia geodynamics, mineral deposit location, and metallogenic belt maps, stratigraphic columns,
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[URL: http://pubs.usgs.gov/of/2004/1252/]


Additional Major Compilations


Geographic information systems (GIS) spatial data compilation of geodynamic, tectonic, metallogenic, mineral deposit, and geophysical maps and associated descriptive

**Basic Data and Interpretative Articles on Mineral Resources, Metallogenesis, and Tectonics**


Distribution map of mineral deposits and occurrences in Mongolia, by Dejidmaa, G., Bujinlicham, B., and five others, 2002: Mineral Resources Authority of Mongolia, scale 1:1,000,000 (in Mongolian and English).


Evolution of magmatism and mineralization in Mongolian Alta, by Gerel, O., Dandar, S., Minjin, Ch., and Enkhbaatar, Sh., 2000: Izvestiya Vuzov Sibiri, v. 4-5, p. 140-142.


Formation of a terrane collage in orogenic belts of the Circum-North Pacific, by Parfenov, L.M., Nokleberg, W.J., Monger,
Geochemistry and primary nature of highly metamorphic rocks in the northern part of the Ama tectonic melange zone (Aldan shield), by Beryozkin, V.I., Smelov, A.P., Kotov, A.B., Kovach, V.P. and Sal’nikova E.B., 2000: National Geology, p. 3-6 (in Russian).
Geologic map of Mongolia, by Tomurtogoo, O., Badarch, G., Orolmaa, D., Makhbadar, Ts., Khosbayar, P., 2000: Mineral Resources Authority of Mongolia, scale: 1:1,000,000 (in Mongolian).
Interview about new project on mineral resources, metallogeny, and tectonics of Siberia, Mongolia, Northeastern China, and Northern Japan: Nauka (Science) in Siberia, July, 1997, no. 25, p. 6.
Intraplate Mesozoic magmatism in Mongolia, by Gerel, O., 2000: Izvestiya Vuzov Sibiri, v. 4-5, p. 142-144.
Middle Paleozoic continental-marginal magmatism and Mesozoic metamorphic events in the junction zone


Petrological characteristics of granites from the Avdrant and Janchivlan pluton, by Gerel, O., Kanizawa, S., and Ishikawa, K., 1999: Problems of geodynamics and metallogeny of Mongolia. v. 13, p. 30-34.


Phanerozoic polymetamorphic complexes of the Chersky...


Tectonic map of Mongolia, by Tomurtogoo, O., 2002: National Resources Authority of Mongolia and Academy of Sciences of Mongolia, scale 1:1,000,000, 15 p. (in Mongolian and English).


Tectonic map of Mongolia, (Brief explanatory notes to the Tectonic Map of Mongolia), by Tomurtogoo, O., 2002: National Resources Authority of Mongolia and Academy of Sciences of Mongolia, 22 p. (in Mongolian and English).


Tectonics of Mongolia (Brief explanatory notes to the Tectonic Map of Mongolia), by Tomurtogoo, O., 2002: National Resources Authority of Mongolia and Academy of Sciences of Mongolia, 22 p. (in Mongolian and English).


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37, p. 736-751.


Special Issue of Geology and Geophysics on the Geodynamics, Metallogeny, and Petroleum Potential of the North Asian Craton and Framing Orogenic Belts


Major Book Reports


Abstract Volumes for 1998 and 2002 Conferences

Metallogeny, fuel resources, and geodynamics of the North Asian Craton and framing orogenic belts, by Kuzmin,


**General-Interest Articles**

Metallogenesis of Northeast Asia and Northwest North America, in International Geoscience, by John Reinemund: Geology, August, 1997, p. 27.

Mineral Resources, metallogenesis, and tectonics of eastern and southern Siberia, Mongolia, northeastern China, South Korea, and Japan, by Jean Weaver, Geology, February, 1999, p. 24.

**Acknowledgments**

We thank the many geologists who have worked with us for their valuable expertise on the mineral deposits, geology, metallogenesis, and tectonics of Northeast Asia. We thank Russian interpreters Tatiana Bounaeva, Elena Alexeenko, and Elena Koltunova for their skill and assistance during long and complex scientific dialogs, and for translation of complex geologic-unit and mineral-deposit descriptions, and references. We also thank Russian Academy of Science managers N.L. Dobretsov and Alexander S. Borisenko and USGS managers L.C. Gundersen, P.P. Hearn, K. Johnson, R. Koski, L.P. Leahy, J. Medlin, M. Power, and J.N. Weaver for their encouragement and support of the project.
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