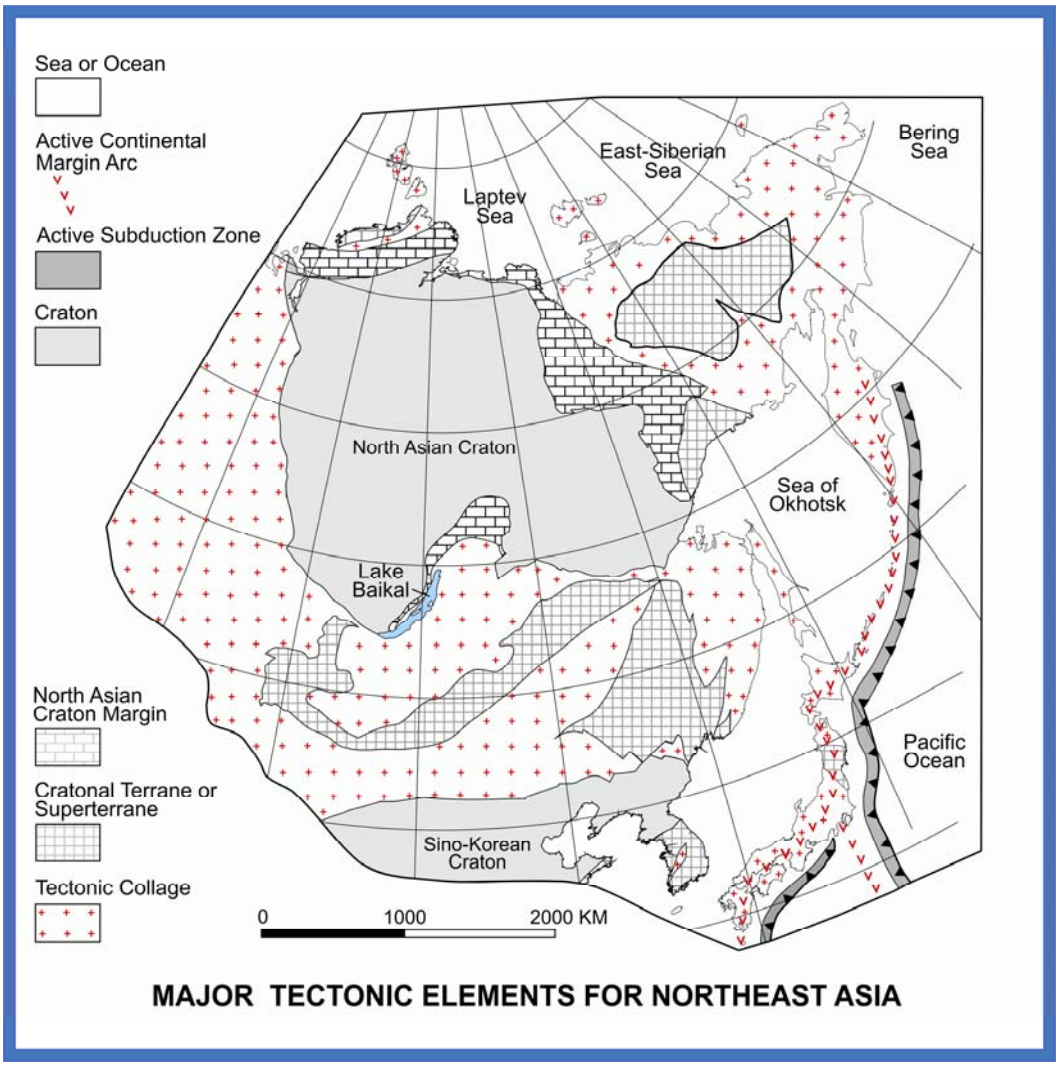
**Prepared in collaboration with Russian Academy of Sciences, Mongolian Academy of Sciences, Korean Institute of Geosciences and Mineral Resources, Geological Survey of Japan/AIST, and Jilin University**

# Appendix A - Description of Northeast Asia Project and Associated Products

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**U.S. Department of the Interior**
**U.S. Geological Survey**

**Prepared in collaboration with Russian Academy of Sciences, Mongolian Academy of Sciences, Korean Institute of Geosciences and Mineral Resources, Geological Survey of Japan/AIST, and Jilin University**

# Appendix A - Description of Northeast Asia Project and Associated Products

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Available online at: http://pubs.usgs.gov/of/2007/1183/Appendix A/.

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# Introduction to Regional Geology, Metallogenesis, and Tectonics of Northeast Asia

## Introduction

This appendix provides an overview of the associated project on the Metallogenesis and Tectonics of Northeast Asia and a list of the agencies and scientists that participated in the project, and to list the extensive publications that have been produced by the project.

## Project Area, Collaborating Agencies, Participants, and Purpose

The Northeast Asia 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). This area is approximately bounded by 30° to 82° N. latitude and 75° to 144° E. longitude. 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, China, the China Geological Survey, the Korea Institute of Geosciences and Mineral Resources, the Geological Survey of Japan/AIST, University of Texas Arlington, and the U.S. Geological Survey. The collaborating agencies and participants for the Northeast Asia project 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 by organizing symposia on the project at major and minor meetings. These supporters include 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.

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

The articles for this volume and for the supporting compilations 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. The work for the project was conducted over a seven-year period with large, end-of-year workshops in Northeast Asia. The articles in the volume should have major global impact. The information presented in the articles will be useful for several purposes, including regional tectonic analyses, mineral resource and metallogenic analysis, mineral resource assessment, petroleum resource analysis and assessment, neotectonic analysis, and analysis of seismic hazards and volcanic hazards.

The purpose of the project is to benefit participants and customers by: (1) providing a comprehensive international data base on the mineral resources of the region that will be the first, extensive knowledge available in English; (2) providing substantial new interpretations of the origin 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 for a wide variety of customers for making sound economic planning and investment decisions and for increasing their geologic knowledge of this region. These customers include: (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) news media.

## Products of the Northeast Asia Project

Products for the project include: (a) detailed mineral resource tables and location maps with data on about 1,674 significant lode deposits and 91 selected placer districts for the project area, based on original, cited references; (b) regional geodynamics maps and detailed explanations that provide the geologic setting for mineral deposits and metallogenic belts; (c) mineral deposit location and metallogenic belt maps; and (d) 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 paper format (USGS publications and scientific journals), and digital format (CD-ROM, and Internet/Web). Geodynamics maps, and mineral resource data and maps are compiled and published as GIS (Geographic Information Systems) spatial datasets. Following is a list of all project publications through the date of this publication.

### Preliminary Publications Book 1

Preliminary Publications Book 1 From Project on Mineral Resources, Metallogenesis, and Tectonics of Northeast Asia, Nokleberg, W.J., Naumova, V.V., Kuzmin, M.I., and Bounaeva, T.V., eds., 1999: U.S.G.S. Open-File Report 99-165 (CD-ROM). Available for free from Internet/Web at: http://pubs.usgs.gov/of/1999/of99-165/

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Geographic base map of Northeast Asia, by Miller, R.J., Koch, R.D., Nokleberg, W.J., Hwang, Duk-Hwan, Ogasawara, Masatsugu, Orolmaa, Demberel, Prokopiev, A.V., Sudo, Sadahisa, Vernikovsky, V.A., and Ye, Mao, 1999, *in* Nokleberg, W.J., Naumova, V.V., Kuzmin, M.I., and Bounaeva, T.V., eds., Preliminary publications book 1 from project on mineral resources, metallogenesis, and tectonics of Northeast Asia: U.S. Geological Survey Open-File Report 99-165 (CD-ROM), 1 sheet, scale 1:5,000,000, 3 p. Available for free from Internet/Web at: http://pubs.usgs.gov/of/1999/of99-165/

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Preliminary geodynamic map of Yakutia region, eastern Siberia, by Parfenov, L.M., Prokopiev, A.V., Deikunenko, A.V., Oxman, V.S., Smelov, A.P., Timofeev, V.F., Tret'yakov, F.F., Zadgenizov, A.P., and Vernikovsky, V.A., 1999, *in* Nokleberg, W.J., Naumova, V.V., Kuzmin, M.I., and Bounaeva, T.V., eds., Preliminary publications book 1 from project on mineral resources, metallogenesis, and tectonics of Northeast Asia: U.S. Geological Survey Open-File Report 99-165 (CD-ROM), 2 sheets, scale 1:5,000,000. Available for free from Internet/Web at: http://pubs.usgs.gov/of/1999/of99-165/

Preliminary table of Lode and Occurrences of Altay-Sayan Region and Adjacent Areas, Eastern Siberia, Russia, by Obolenskiy, A.A., Distanov, E.G., and Sotnikov, V.I., 1999, *in* Nokleberg, W.J., Naumova, V.V., Kuzmin, M.I., and Bounaeva, T.V., eds., Preliminary publications book 1 from project on mineral resources, metallogenesis, and tectonics of Northeast Asia: U.S. Geological Survey Open-File Report 99-165 (CD-ROM), 13 p. Available for free from Internet/Web at: http://pubs.usgs.gov/of/1999/of99-165/

Preliminary table of lode and placer deposits and occurrences of Mongolia, by Gunchin, D., Badarch, G., Chimed, N., Dorjgotov, D., and Gotovsuren, A., 1999, *in* Nokleberg, W.J., Naumova, V.V., Kuzmin, M.I., and Bounaeva, T.V., eds., Preliminary publications book 1 from project on mineral resources, metallogenesis, and tectonics of Northeast Asia: U.S. Geological Survey Open-File Report 99-165 (CD-ROM), 62 p. Available for free from Internet/Web at: http://pubs.usgs.gov/of/1999/of99-165/

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Preliminary terrane and overlap assemblage map of Altay-Sayan region, southern Siberia, by Berzin, N.A., 1999, *in* Nokleberg, W.J., Naumova, V.V., Kuzmin, M.I., and Bounaeva, T.V., eds., Preliminary publications book 1 from project on mineral resources, metallogenesis, and tectonics of Northeast Asia: U.S. Geological Survey Open-File Report 99-165 (CD-ROM), 1 sheet, scale 1:5,000,000. Available for free from Internet/Web at: http://pubs.usgs.gov/of/1999/of99-165/

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Terrane map of Northeast Asia: Principles of compilation and major subdivisions of the legend, by Parfenov, L.M., Khanchuk, A.I., and Nokleberg, W.J., 1999, *in* Nokleberg, W.J., Naumova, V.V., Kuzmin, M.I., and Bounaeva, T.V., eds., Preliminary publications book 1 from project on mineral resources, metallogenesis, and tectonics of Northeast Asia: U.S. Geological Survey Open-File Report 99-165 (CD-ROM), 11 p. Available for free from Internet/Web at: http://pubs.usgs.gov/of/1999/of99-165/

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Metallogenic belt and mineral deposit location maps for Northeast Asia, by Obolenskiy, A.A., Rodionov, S.M., Dejidmaa, Gunchin, Gerel, Ochir, Hwang, Duk Hwan, Miller, R.J., Nokleberg, W.J., Ogasawara, Masatsugu, Smelov, A.P., Yan, Hongquan, and Seminskiy, Z.V., with compilations on specific regions by Ariunbileg, Sodov, Biryul'kin, G.B., Byamba, Jamba, Davydov. Y.V., Distanov, E.G., Dorjgotov, Dangindorjiin, Gamyanin, G.N., Fridovskiy, V.Yu., Goryachev, N.A., Gotovsuren, Ayurzana, Khanchuk, A.I., Kochnev, A.P., Kostin, A.V., Kuzmin, M.I.,. Letunov, S.A., Li, Jiliang, Li, Xujun, Malceva, G.D., Melnikov, V.D., Nikitin, V.M., Parfenov, L.M., Popov, N.V., Prokopiev, A.V., Ratkin, V.V., Shpikerman, V.I., Sotnikov, V.I., Spiridonov, A.V., Stogniy, V.V., Sudo, Sadahisa, Sun, Fengyue, Sun, Jiapeng, Sun, Weizhi, Supletsov, V.M., Timofeev, V.F., Tyan, O.A., Vetluzhskikh, V.G., Wakta, Koji, Xi, Aihua, Yakovlev, Y.V.,. Zhizhin, V.I.,. Zinchuk, N.N., and Zorina, L.M., 2003, *in* Nokleberg, W.J., and 10 others, eds.,: Preliminary Publications Book 2 from Project on Mineral Resources, Metallogenesis, and Tectonics of Northeast Asia: U.S. Geological Survey Open-File Report 03-203 (CD-ROM), 1 sheet, scale 1: 7,500,000, 3 sheets, scale 1: 15,000,000, explanatory text, 93 p.

Significant metalliferous and selected non-metalliferous lode deposits, and selected placer districts of Northeast Asia, by Ariunbileg, Sodov, Biryul'kin, G.V., Byamba, Jamba, Davydov, Y.V., Dejidmaa, Gunchin, Distanov, E.G., Dorjgotov, Gamyanin, G.N., Gerel, Ochir, Fridovskiy, V.Yu., Gotovsuren, Ayurzana, Hwang, Duk Hwan, Kochnev, A.P., Kostin, A.V., Kuzmin, M.I., Letunov, S.A., Li, Jiliang, Li, Xujun, Malceva, G.D., Melnikov, V.D., Nikitin, V.M., Obolenskiy, A.A., Ogasawara, Masatsugu, Orolmaa, Demberel, Parfenov, L.M.,. Popov, N.V., Prokopiev, A.V., Ratkin, V.V., Rodionov, S.M., Seminskiy, Z.V., Shpikerman, V.I., Smelov, A.P., Sotnikov, V.I., Spiridonov, A.V., Stogniy, V.V., Sudo, Sadahisa, Sun, Fengyue, Sun, Jiapeng, Sun, Weizhi,. Supletsov, V.M., Timofeev, V.F., Tyan, O.A., Vetluzhskikh, V.G., Xi, Aihua, Yakovlev, Y.V., Yan, Hongquan, Zhizhin, V.I., Zinchuk, N.N., and Zorina, L.M., 2003, *in* Nokleberg, W.J., and 10 others, eds.,: Preliminary Publications Book 2 from Project on Mineral Resources, Metallogenesis, and Tectonics of Northeast Asia: U.S. Geological Survey Open-File Report 03-203 (CD-ROM), digital files and explanatory text, 47 p.

Mineral deposit models for Northeast Asia, by Obolenskiy, A.A., Rodionov, S.M., Ariunbileg, Sodov, Dejidmaa, Gunchin, Distanov, E.G., Dorjgotov, Dangindorjiin, Gerel, Ochir, Hwang, Duk Hwan, Sun, Fengyue, Gotovsuren, Ayurzana, Letunov, S.N., Li, Xujun, Nokleberg, W.J., Ogasawara, Masatsugu, Seminsky, Z.V., Smelov, A.P., Sotnikov, V.I., Spiridonov, A.A., Zorina, L.V., and Yan, Hongquan, 2003, *in* Nokleberg, W.J., and 10 others, eds.,: Preliminary Publications Book 2 from Project on Mineral Resources, Metallogenesis, and Tectonics of Northeast Asia: U.S. Geological Survey Open-File Report 03-203 (CD-ROM), 47 p.

## Digital Files for Northeast Asia Geodynamics, Mineral Deposit Location, 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, descriptions of map units, and descriptions of metallogenic belts (CD and Web versions), edited by Nokleberg, W.J., Badarch, Gombosuren, Berzin, N.A., Diggles, M.F., Hwang, Duk Hwan, Khanchuk, A.I., Miller, R.J. Naumova, V.V., Obolenskiy, A.A., Ogasawara, Masatsugu, Parfenov, L.M., Prokopiev. A.V., Rodionov, S.M., and Hongquan, Yan, 2004: U.S.G.S. Open-File Report 2004-1252 (CD-ROM). Available for free from Internet/Web at: http://pubs.usgs.gov/of/2004/1252/

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Descriptions of overlap assemblages and tectono-stratigraphic terranes, definitions, and methods for compilation for Northeast Asia geodynamics map, compiled by Parfenov, L.M., Khanchuk, A.I., Badarch, G., Berzin, N.A., Miller, R.J., Naumova, V.V., Nokleberg, W.J., Ogasawara, M., Prokopiev, A.V., and Yan, H., 2004, U.S.G.S. Open-File Report 2004-1252 (CD-ROM), explanatory text, 167 p. Available for free from Internet/Web at: http://pubs.usgs.gov/of/2004/1252/

Generalized Northeast Asia geodynamics map, compiled by Parfenov, L.M., Khanchuk, A.I., Badarch, G., Berzin, N.A., Hwang, D.H., Miller, R.J., Naumova, V.V., Nokleberg, W.J., Ogasawara, M., Prokopiev, A.V., and Yan, H., 2004, U.S.G.S. Open-File Report 2004-1252 (CD-ROM), scale 1:15,000,000. Available for free from Internet/Web at: http://pubs.usgs.gov/of/2004/1252/

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Stratigraphic columns for Northeast Asia geodynamics Map, compiled by Parfenov, L.M., Naumova, V.V., Khanchuk, A.I., Badarch, G., Ogasawara, M., Prokopiev, A.V., and Yan, H., 2004, U.S.G.S. Open-File Report 2004-1252 (CD-ROM), explanatory text and columns, 185 p. Available for free from Internet/Web at: http://pubs.usgs.gov/of/2004/1252/

## Additional Major Compilations

Preliminary Northeast Asia geodynamics map (Paper Maps on Demand, and Web versions), by Parfenov, L.M., Khanchuk, A.I., Badarch, Gombosuren, Miller, R.J., Naumova, V.V., Nokleberg, W.J., Ogasawara, Masatsugu, Prokopiev, A.V., and Yan, Hongquan, with contributions on specific regions by Belichenko, Valentina, Berzin, N.A., Bulgatov, A.N., Byamba, Jamba, Deikunenko, A.V., Dong, Yongsheng, Dril, S.I., Gordienko, I.V., Hwang, Duk Hwan, Kim, B.I., Korago, E.A., Kos'ko, M.K., Kuzmin, M.I., Orolmaa, Demberel, Oxman, V.S., Popeko, L.I., Rudnev, S.N., Sklyarov, E.V., Smelov, A.P., Sudo, Sadahisa, Suprunenko, O.I., Sun, Fengyue, Sun, Jiapeng, Sun, Weizhi, Timofeev, V.F., Tret'yakov, F.F., Tomurtogoo, Onongin, Vernikovsky, V.A.,. Vladimiro, A.G., Wakita, Koji, Ye, Mao, and Zedgenizov, A.N., 2003: U.S. Geological Survey Open-File Report 03-205, 2 sheets, scale 1:5,000,000. Paper version available from USGS Maps on Demand Web site: http://store.usgs.gov/mod/interest.html ($20.00 per sheet). Available for free from Internet/Web at: http://pubs.usgs.gov/of/2003/of03-205/

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Significant Metalliferous and Selected Non-Metalliferous Lode Deposits, and Selected Placer Districts of Northeast Asia (U.S. Geological Survey Open-File Report 03-220): http:// pubs.usgs.gov/open-file/of03-220/

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**Figure 1.** Regional summary geographic map for Northeast Asia showing major regions and countries.

**Table 1.** Organizations and participants in international project on metallogenesis and tectonics of Northeast Asia.

| Country | Organization | Participants |
|---|---|---|
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| | Mineral Resources Authority of Mongolia, and Ministry of Agriculture and Industry, Ulaanbaatar | Gunchin Dejidmaa<br>Ayurzana Gotovsuren |
| | Mongolian University of Science and Technology, Ulaanbaatar | Ochir Gerel |
| | Department of Geology and Mineralogy, Mongolian National University, Ulaanbaatar | Jamba Byamba<br>Dangindorjiin Dorjgotov |
| Russia | All Russia Research Institute for Geology and Mineral Resources of the World Ocean (VNIIOkeangeologia), Russian Ministry of Natural Resources, St. Petersburg | Boris I. Kim<br>Eugeney A. Korago<br>Mikhail K. Kos'ko<br>Oleg I. Suprunenko |
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| | Buryat Scientific Center, Russian Academy of Sciences, Ulan-Ude | Ivan V. Gordienko |
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| | | |
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