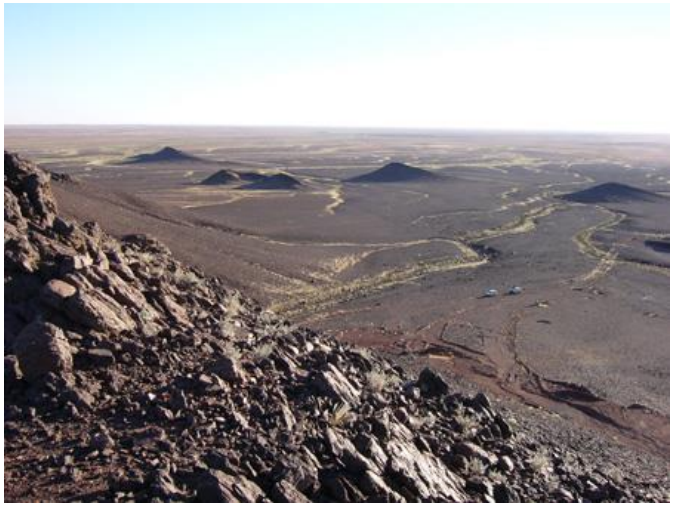
Japan-Mauritania Project
Study on Strategic Plan of Mineral Resources Development in the Islamic Republic of Mauritania

among the Institute for Geo-Resources and Environment, AIST, Mauritanian Office for Geological Researches (OMRG) and Japan International Cooperation Agency (JICA) from 2003 to 2006

1. Scope of the Project

The Islamic Republic of Mauritania extend over 1.09 million km^2 and is bordered by Atlantic Ocean in the west, Mali in the east, Morocco and Algeria in the north, and Senegal in the south. Mauritania has been famous for iron resources and production since late 1950s. Exploration of other mineral resources, in particular, diamond and gold, have been activated in recent years because of the confirmation of high gold potential in neighboring countries and discovery of diamond-bearing kimberlites in northern Mauritania. The government of the Islamic Republic of Mauritania planed to establish a strategic project of mineral resurces development in order to attract more investment to mining sectors of the country.

Location map of Mauritania.



A view of the Akjoujt deposit

The Mauritanian Government asked the Japan International Cooperation Agency (JICA) a cooperation project, which was agreed in March, 2003, and realized as the Japan-Mauritania project entitled "Study on Strategic Plan of Mineral Resources Development in the Islamic Republic of Mauritania". The Institute for Geo-Resources and Environment, AIST, is involved in the project not only as a supervisor of the project, but also as a scientific cooperator for the Mauritanian Office for Geological Researches (OMRG), which has been practically conducting the project under the Mauritanian Government.

2. Outline of the Project

The project started from October, 2003 and willl be completed in March, 2006. The project is composed of the following researches and studies:

- Compilation and review of economic geology information
  1) Review of geology publications and exploration reports in Mauritania
  2) Remote sensing data analysis
  3) Review of infrastructure and environment

- Data production and analysis
  1) Field geological survey and mineral deposits assessment
  2) Integration of earth science data (geology, geophysics, geochemistry, hydrology)
  3) Upgrade of the existing GIS

- Ore deposits modeling and metallogenic interpretation
  1) Ore deposits modeling of each type of ore species
  2) Metallogenic interpretation
  3) Strategic prospectivity review

- Strategic planning for mineral exploration promotion
  1) Establishment of economic geology survey policy
  2) Publication of book and CD on Mauritanian economic geology and mineral deposits
  3) Promotion seminar for Mauritanian mineral sector

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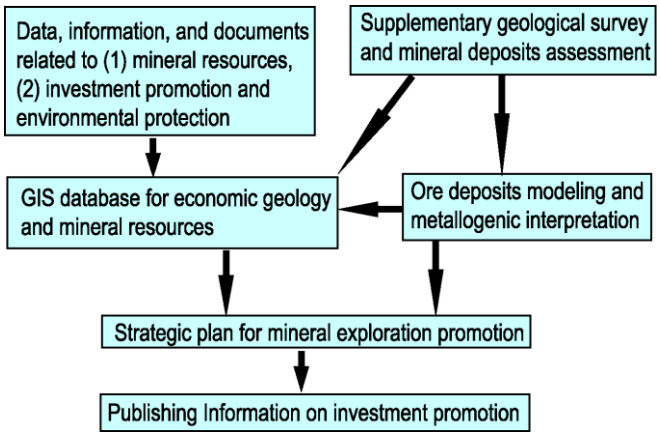
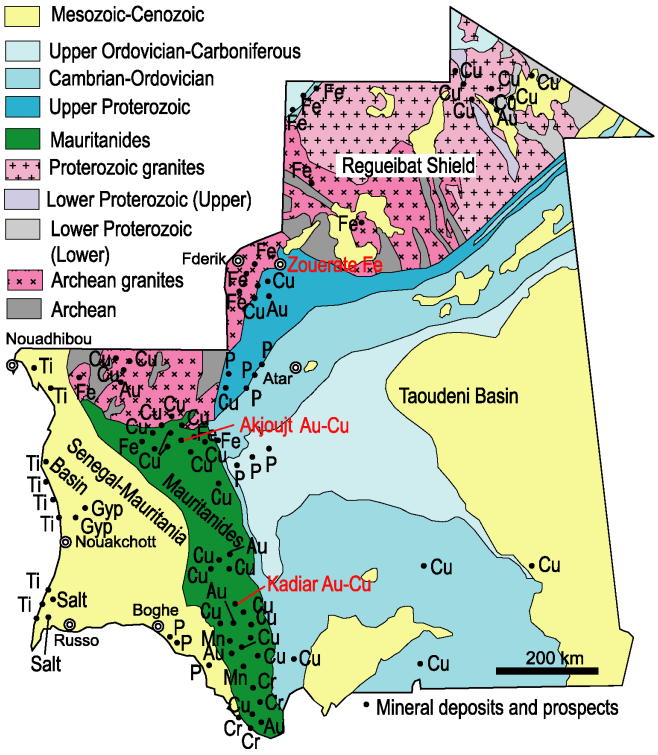


Flow chart showing the researches and studies in the Project.

3. Mauritanian geology and mineral resources

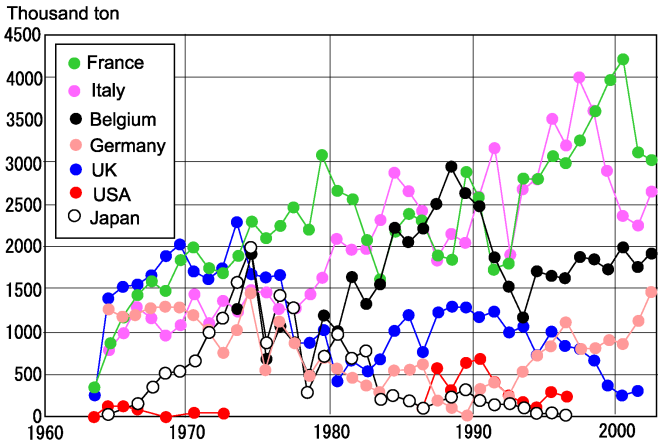
Outline of geology and mineral resources

West Africa is based by Archean and early to middle Proterozoic crystalline rocks of the West-African craton. This craton is exposed in the Reguibat and Leo Shields, and a central part underlies the late Paleozoic to Mesozoic Taoudeni Basin. The Pan-African and Mauritanides Fold Belts truncate the West-African craton in the east and west, respectively. The Mauritanides, a poly-phase deformation zone from late Proterozoic to late Paleozoic age, separate the Taoudeni Basin from the Senegal-Mauritania Basin that started forming in the Triassic time due to the spreading of the Atlantic Ocean. Thus, the geology of Mauritania consists mainly of four units; the Reguibat Shield, Mauritanides, Taoudeni Basin and Senegal-Mauritania Basin.



Simplified geology and mineral deposits in Mauritania.

Major mineral resources of Mauritania up to now are iron, phospate, gypsum, titanium, copper and gold. More than 14 Mt of iron ore are annually produced from the banded iron formations at the Guelb El Rhein, Kedia d'Idjill and M'Haoudat deposits in the Zouerate region in the Reguibat Shield. 22.6 Mt of copper and 30t of gold is estimated at the Akjoujt deposit in the Mauritanides near the contatct with the Reguibat Shield. Phospate deposits occur in the Early Cambrian in the Taoudeni Basin and in the Eocene in the Mauritania-Senegal Basin. Ilmenite placer deposits occur near the Atlantic coast in the Senegal-Mauritaina Basin. A few meter-thick gypsum deposit occurs in recent evaporites at Ndrhamcha Sebkha in the Senegal-Mauritaina Basin as well as several tens-centimeter-thick salt layers at Aftout es Saheli.

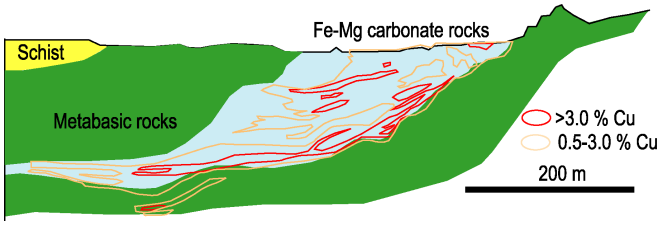


Amounts of iron ore exprted from Mauritania to other countries.

Akjoujt copper-gold deposit

The Akjoujt area in the Mauritanides consists of supracrustal suite of metamorphosed volcanic, volcaniclastic rocks that overthrust northwards and eastwards onto the Reguibat Shield and sedimentary rocks in the Taoudeni Basin.

Copper production from the Akjoujt deposit began in 1952. Oepn pit mining started in 1967 and oxide copper ores were exploited. A recent exploration work confirmed 23.6 Mt of ore at 1.88 % Cu, 1.4 g/t Au and 143 ppm Co. The host rocks of the Akjoujt deposit consist of chlorite schist, meta-gabbroic schist with minor amounts of amphibolite and limestone.



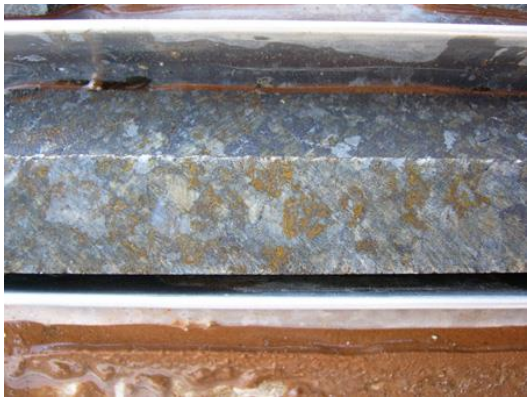
Cross section of the Akjoujt orebody by Strickland and Martyn (2001).

The orebody is lenticuler in shape and hosted mainly by carbonate rocks within metabasic rocks. The orebodies vary in size and reaches more than 50 meters thick. The boundary between the ore body and schist is

consistent with local schistosity.

Ore minerals are chalcopyrite, pyrrhotite, cubanite, arsenopyrite and cobaltite. Magnetite is dominantly associated. Gangue minerals are actinolite, tremolite and anthophyllite.

Boundary of magnetite ore (lower) and chlorite schist (upper) at Akjoujt.

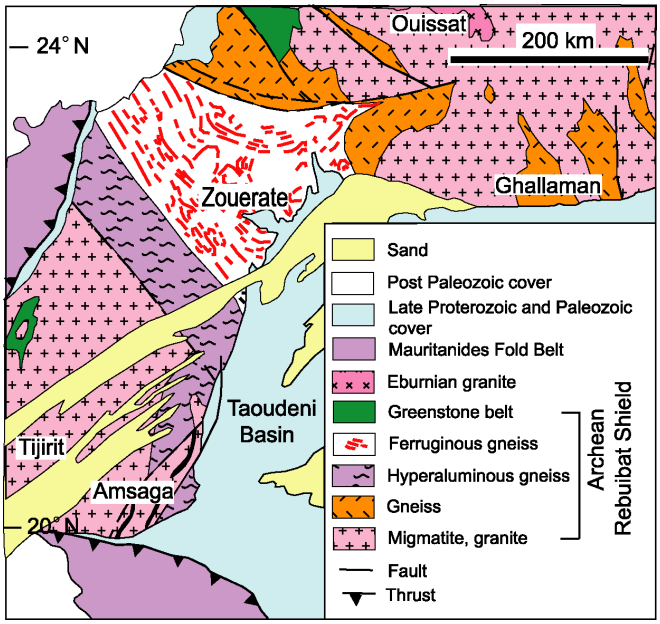


Disseminated chalcopyrite in siderite-bearing magnetite ore at Akjoujt

Surface oxidized ore with malachite dissemination at Akjoujt.

Iron deposits at Zouerate

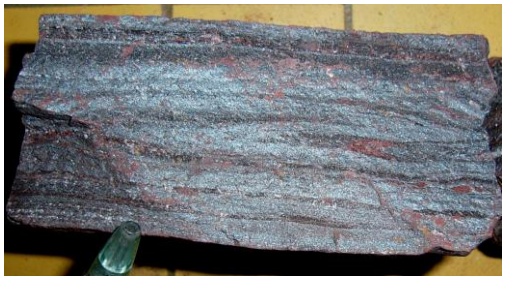
The Archean shield contrasts with the Eburnean shield by the occurrence of high-grade metamorphism at 3000 Ma, and by the abundance of migmatites and ferruginous quartzites. The main structural feature is a migmatitic core 300 km in diameter where gneiss septa remain. The migmatite core is surrounded in the north and the east by concentric and continuous belts of gneisses. From core to margin, aluminous (sillimanite gneiss), ferruginous (magnetite quartzite), siliceous and calcareous (marble) metamorphic rocks occur. Towards the southwest, in the Tijirit and Tasiast, remaining septa of greenstone belts increase in size, because of lesser erosion. In the Zouerate region, the Ijil Group, allochthonous units less metamorphosed than the basement, is intercalated between the Tiris Group and the lower part of the Upper Proterozoic series (1,000 Ma) of the Taoudeni Basin.



Lithologic map of the Archean Reguibat Shield.

The Zouerate region contains eight major iron deposits of “Superior“ type. These iron deposits consist of layer-parallel ferruginous beds associated with siliceous clastic sediments including conglomerate, sandstone, quartzite and mica schist.

Open pit at Zouerate.



High-grade ore of specularite and hematite.

Kadiar copper-gold prospect

The kadiar district in the southern Mauritanides is underlain by three zones consisting of eastern chlorite schist, central sericite schist and western granite schist. The chlorite schist and granite schist are believed to be Precambrian in age, whereas the sericite schist is Cambrian in age. The Kadiar prospect consists of lenticular iron oxide orebodies in chlorite shcist. A major ore body is 60 m thick and 500 m long, forming a north-trending hill, parallel to the regional bedding planes.

The major iron oxide orebody at Kadiar.

The ore at the surface consists mainly of hematite and geothite, whereas sulfide minerals including chalcopyrite are confirmed at depth by drilling. Analytical data indicate that the major orebody contains 120-135 ppm Au, 600-4000 ppm Cu and 900-1200 ppm Zn. The mineralization style is similar to that at Akjoujt, where iron oxides with sulfide minerals replace carbonate rocks

4. Publications

Koie, M., Kurokawa, K., Nito, K. and Watanabe, Y. (2002) Report of the Project Formation Survey in the Islamic Republic of Mauritania. Japan International Cooperation Agency, JR02-169, 65p. (in Japanese).

Koie, M., Kojima, G., Watanabe, Y., Goto, H and Naito, K. (2003) Report on the preliminary research for the project "Strategic Plan of Mineral Resources Development in the Islamic Republic of Mauritania". Japan International Cooperation Agency, JR03-083, 98p. (in Japanese).

Watanabe, Y. and Naito, K. (2003) Geological Surveys in the world-Office Mauritanien de Récherches Géolgiques (OMRG). Chishitsu News, no. 583, p. 71-72 (in Japanese).

5. Future itinerary

2004. 05-06 Sample analyses, Data compilation and construction of database and website
2004. 09 Progress report
2004. 10-11 Field geological survey
2005. 01-03 Field geological survey and sample analyses
2005. 06 Ore deposit modeling and metallogenic interpretation
2005. 06-07 Operation of database
2005. 10 Strategic planning of mineral resources development
2005. 11 Final report making
2006. 02 Submission of final reports
2006. 03 Presentation of the project results at PDAC

Gold geochemical prospecting in the Sfariat area, northern Mauritania.

Participants of the Japan-Mauritania Project

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