

SUMMARY

Based on the Scope of Work concluded between the Governments of Japan and Brazil on the 30th May, 2001, the present survey of nonferrous metal resources will be carried out for two years with the purpose of extracting promising areas in the Paraná area situated in the south eastern part of Brazil. The survey may develop into a government-to-government exploration or a private company may participate in a new survey project.

In Phase I, the present fiscal year, we analyzed existing data and satellite images of the entire survey area and conducted a geological survey. We analyzed the geological structure of flood basalt, Noril'sk ore deposit, and basement rock in the existing data analysis. In the satellite images analysis, we have analyzed JERS-1 SAR images. In the geological survey, we have conducted a whole rock analysis, trace elements analysis, and isotope analyses of Paraná flood basalt.

As the result, in the existing data analysis, we considered the origin of the flood basalt magma of the Noril'sk region that caused the mineralization of platinum group elements (PGE). These analyses clarified that the existence of the magma undersaturated to sulfur, the crustal contamination, and the merging with a large quantity of silicate magmas are important for the generation of the ore deposit of Noril'sk type. For the tectonics of Paraná basin, judging from the high attenuation zone, the high-gravity anomaly zone, a large amount of dolerite sills and dikes, the thick sedimentary sequences in the basin, and the eruption of a thick flood basalt lava pile etc., we concluded that the NE-SW direction along the Paraná River is a rift, the NW-SE direction a transform fault and the ENE-WSW direction a shear fracture zone. The ore deposits seem to be well formed at the intersection among these structural directions.

In the satellite images analysis, we prepared digital mosaic images of an area that traverses the central part of the Paraná basin from east to west, using the SAR data of JERS-1, to read and analyze them for investigating the geological structure. The survey area is 500,000 km² in area. We used 131 scenes of JERS-1/SAR data to cover this area. We extracted a large number of doleritic dikes considered as a feeder of flood basalt, as clear lineaments in Ponta Grossa Arch, the northeastern part of the survey area. We also extracted a group of NE-SW direction lineaments in the central part of the flood basalt distribution area.

The geological survey clarified the following. The Paraná basin flood basalt can be classified into a "Low-Ti" type (Gramado and Esmeralda), a "Intermediate-Ti" type (Paranapanema-Ribeira), and a "High-Ti" type (Pitanga and Urubici) according to the geochemical features. The Gramado and Esmeralda of "Low-Ti" type contain relatively large quantities of crustal enriched elements such as Th, U, and Rb. As to the magma of "High-Ti" type and that of "Intermediate-Ti" type, magmas what were originated from the mantle, might have directly erupted to the surface of the earth. The Paranapanema-Ribeira of

“Intermediate-Ti” type is the highest in average content of Pt and Pd, and the PGE contents of “Intermediate-Ti” type magmas are higher than that of lava richest in PGE of the Noril’sk region. The study of the chemical composition of Paraná flood basalt revealed that magma having a high content of PGE, which may generate an orthomagmatic sulfide ore deposit of the Noril’sk type, would exist in the Paraná basin.

The EPMA revealed that the sills and dikes in Ponta Grossa Arch and the northeastern part of the Lomba Grande area contain a trace of chalcopyrite. In particular, we detected cobalt arsenic mineral containing nickel as well as a trace of sphalerite from the sills and dikes in Ponta Grossa Arch.

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