PART III : CONCLUSIONS AND PROPOSALS

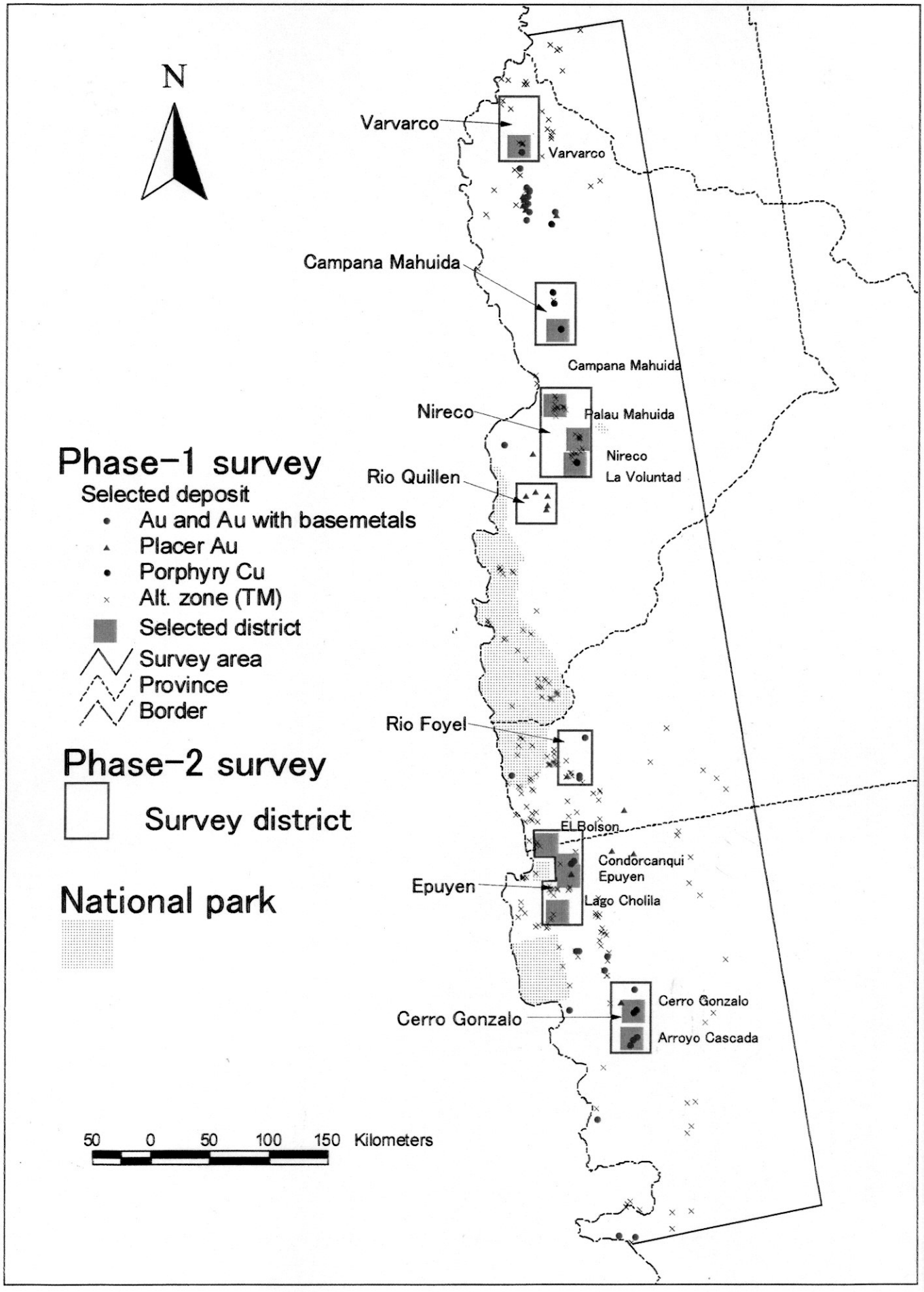

Fig. II-4-3 Location map of the survey districts of Phase-2 survey.

Chapter 1 Conclusions

In this survey area, porphyry Cu-Au deposits, high- and low-sulfidation epithermal Au deposits and auriferous polymetallic vein deposits are thought to be important from the metallogenesis viewpoint and economic viability for mine development

In the whole Southern Andes including the survey area, igneous activities of the magmatic arcs were generated by the collision- and Cordillera-type orogeny since Carboniferous in the margin of the South American continent. Mineralization of above mentioned types are closely related with the activities of magmatic arcs of each period. Based on the evolution of tectonic setting, porphyry Cu-Au deposits are expected in upper Cretaceous to Paleogene magmatic arcs by the Chilean-type subduction rather than in Permian to lower Cretaceous magmatic arcs by the Mariana-type subduction. On the other hand, in Neogene magmatic arcs, high- and low-sulfidation epithermal Au deposits and auriferous polymetallic vein deposits are expected rather than porphyry Cu-Au deposits because the erosion has not been advanced.

In the LANDSAT TM image analyses, false color images and ratio images were used for photogeological interpretation, lineament analyses and extraction of alteration zones. The extracted alteration zones were confirmed in the field by the ground truth survey. The validity of ratio image analysis for exposed rock region was confirmed.

31 districts were selected for the ground truth survey of Phase-1 based on the results of existing data analysis and satellite image analysis. It is designed to understand the outline of whole geology of the survey area and to recognize the characteristics of many typical mineral deposits as much as possible. Moreover, remote regions were excepted to conduct the survey for many districts as much as possible in a short period, and consultation results with SEGEMAR was also considered.

Based on the survey results of Phase-1, 7 districts were selected for objectives of Phase-2 survey. These are Varvarco, Campana Mahuida, Nireco, Rio Quillen, Rio Foyel, Epuyen, Cerro Gonzalo districts.

In Varvarco district, Permian to Triassic magmatic arcs and Neogene magmatic arcs are distributed. In the former, high-sulfidation epithermal Au deposits and porphyry Cu-Au deposits are expected, while in the latter, high- and low- sulfidation epithermal gold deposits are expected. In Campana Mahuida district, upper Cretaceous to Paleogene magmatic arcs are distributed, and porphyry Cu-Au deposits are expected. In Nireco area, Permian to Triassic magmatic arcs and Neogene magmatic arcs are distributed, and porphyry Cu-Au deposits are expected in the former, while epithermal Au deposits are expected in the latter. In Rio Quillen district, Permian to Triassic magmatic arcs are distributed, and gold deposits are expected as sources of the placer gold. In Rio Foyel district, Paleogene magmatic arcs are

distributed, and gold deposits are expected as sources of placer gold. In Epuyen district, upper Cretaceous to Paleogene magmatic arcs are distributed, and porphyry Cu-Au deposits and high-sulfidation epithermal Au deposits are expected. In Cerro Gonzalo area, upper Cretaceous to Paleogene magmatic arcs are distributed, and porphyry Cu-Au deposits are expected.

This survey is technical cooperation project through the governmental agreement. The purpose is evaluation of potential of non-ferrous metallic mineral resources in the survey area, and extraction of promising districts, and provision of the information for further exploration. Therefore, survey districts of Phase-2 survey were selected for the areas without mining properties and the areas where public sector has set up mining properties. Moreover, the areas with mining properties of private companies were also included in Phase-2 survey districts, for the promotion of mining investment by opening the report to public.

Chapter 2 Proposals for Phase-2 survey

In the Phase-2 survey, the promising districts extracted by the Phse-1 survey should be followed-up in more detail. In addition, the ground truth survey for alteration zones that could not be approached by the time limit in the Phase-1 should also be executed in the Phase-2.

Meanwhile, the stream sediment samples collected by SEGEMAR in the past in Neuquen province should be geochemically re-analyzed, and these results can be utilized for extracting the promising area. Furthermore, SEGEMAR executed an airborne geophysical survey from lat. 37° 45' S to 39° 30' S, long. 70° 25' W to 71° W in the middle-west part of Neuquen province. The data from the magnetic and the radiometric surveys are desired to be interpreted geologically. This area includes Nireco districts and Campana Mahuida districts.

Optical Sensor (OPS) data of JERS-1 satellite which cover the area were, however, taken in the high gain mode and unavailable for extraction of alteration zones. Instead of OPS data, LANDSAT TM images are available for more detailed analysis of the alteration zones that were extracted from ratio images. This method should be applied to the area that cover the districts of the Phase-2 survey.

Fig. II-4-3 shows the objective districts of the Phase-2 survey. The following proposals are the tasks to be performed and the methods to be applied;

1) Varvarco district

This district includes the Varvarco district of Phase-1 survey. In this district, alteration zones of CM004 and CM005 were extracted by the satellite image analyses, and acid alteration zones and silicified rock ledges were confirmed in CM004 and acid alteration zones were confirmed in CM005. There is a possibility that these are corresponding to porphyry Cu litho cap. Besides, auriferous polymetallic vein deposits exist in this district. Therefore, it is necessary to identify the extension of the alteration zones and their characteristics, and to examine the possibilities of existence of high-sulfidation epithermal Au deposits and porphyry Cu-Au deposits. As to the auriferous polymetallic vein deposits, the size and the nature of the deposits should be investigated. In addition, it is necessary to execute the ground truth survey for the hydrothermal alteration zones with mineralization, such as Cerro Blanco de Vaca Lauquen, Laguna Pajaritos, Arroyo Pajaritos, etc., distributed in the Neogene volcanic rocks near the Chilean border.

2) Campana Mahuida district

This district includes the Campana Mahuida district of Phase-1 survey. In this district porphyry Cu deposits; Campana Mahuida and Pino Andino exist. These deposits were fully surveyed by drilling in the past, but there are potentials of another unknown deposits similar to these. It is desired to extract anomalies by the results of geochemical analyses of stream sediments collected by SEGEMAR and to extract alteration zones by detailed analyses of satellite images. The geology and mineralization of this district should be investigated through the ground truth survey.

3) Nireco district

This district includes Palau Mahuida, Nireco and La Voluntad districts of Phase-1. In Palau Mahuida district, Neogene volcanoes are preserved. Together with numerous lineaments, a lot of alteration zones are extracted near the summits. These alteration zones are considered to indicate the shallow phenomenon of hydrothermal activities. It is necessary to investigate the characteristics of the alteration zones and to examine the possibility of the existence of epithermal Au deposits. In Nireco area as well, areas of concentrated lineaments and 18 alteration zones, though small in scale, were extracted by the satellite image analyses. The alteration zones are distributed in Permian granitic rocks and Permian to Triassic volcanic rocks. As alteration zones were extracted in La Voluntad district likewise, it is desired to conduct the ground truth survey to investigate the characteristics of the alteration zones and the condition of the mineralization. As yet, there are no descriptions of known deposits in the alteration zones of Palau Mahuida and Nireco.

4) Rio Quillen district

Though this district was not included in the Phase-1 survey, placer gold deposits are known in this district where Permian to Triassic granitic rocks and Paleogene volcanic rocks are distributed. Alteration zones were not extracted by the satellite image analyses, and there is a possibility that gold deposits have already been eroded. It is, however, desired to conduct the ground truth survey for evaluation of potentials on gold deposits, as sources of placer gold deposits.

5) Rio Foyel district

Though this district was not included in the Phase-1 survey, Rio Foyel placer gold deposit is known in the area where Paleogene volcanic rocks are distributed. The alteration zones were extracted by the satellite image analyses. It is desired to conduct the ground truth survey for evaluation of potentials on gold deposits, as sources of placer gold deposits.

6) Epuyen district

The district includes El Bolson, Condorcanqui, Epuyen, and Lago Cholila districts of Phase-1. In Lago Cholila district, alteration zones were extracted by the satellite image analyses, and value of 0.24% Cu was obtained for a float sample of brecciated silicified rock in the downstream. Hence, the existence of porphyry Cu deposits is expected. It is desired to investigate the characteristics of mineralization in the alteration zones by ground truth survey. In Condorcanqui district, the sulfur isotopic composition of chalcopyrite indicates the possibility of high-sulfidation epithermal Au deposits, in addition to the chalcopyrite deposit. Accordingly, investigation for the whole epithermal system is desired by ground truth survey. In Epuyen and El Bolson districts, alteration zones were extracted by the satellite image analysis, and placer gold deposits exist in Epuyen. It is desired to execute the ground truth survey for investigation of alteration and mineralization.

7) Cerro Gonzalo district

The district includes Cerro Gonzalo and Arroyo Cascada districts of Phase-1. In this district, Cerro Gonzalo porphyry Cu deposits, hosted in upper Cretaceous to Paleogene acidic intrusive rocks, are described by SEGEMAR. As the results of Phase-1 survey, presence of hydrothermal breccias with Cu oxide, small-scale secondary enrichment intersected by drilling, and potassic alteration zones with chalcopyrite dissemination were confirmed. It is desired to conduct the ground truth survey for investigation of alteration and mineralization in more detail.

In addition, the geochemical samples of about 1,000 stream sediments, rock and soil were taken by SEGEMAR in the past. These samples should be re-analyzed in order to detect the

geochemical anomalies. In Arroyo Cascada district, the presence of gold mineralization was confirmed in quartz veins and silified rocks. It is necessary to investigate the size and the nature of the mineralization in more detail.