NO.

REPORT ON THE MINERAL EXPLORATION IN THE HOPA AREA, THE REPUBLIC OF TURKEY CONSOLIDATED REPORT

FEBRUARY 2005

JAPAN INTERNATIONAL COOPERATION AGENCY
JAPAN OIL, GAS AND METALS NATIONAL CORPORATION

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PREFACE

The Japanese Government decided to conduct a mineral exploration program consisting of geological, geochemical, and drilling surveys in the Hopa area, in response to the request from the Government of the Republic of Turkey. The purpose of the program is to estimate its potential for mineral deposits. The Japanese Government entrusted the implementation of this plan to the Japan International Cooperation Agency (JICA), and JICA entrusted the enforcement of the program to the Metal Mining Agency oh Japan (the present, Japan Oil, Gas and Metals National Corporation; JOGMEC) due to the specialty of the program.

The survey was carried out in three phases from 2002 to 2005. The field survey program in the area has completed as scheduled in cooperation with the MADEN TETKİK ve ARAMA GENEL MÜDÜRLÜGÜ and the concerned governmental organizations of Turkey.

This report includes summary of the survey in three phases.

Finally, we would like to express a deep appreciation for the cooperation of the concerned governmental organizations of Turkey and Japan.

February 2005

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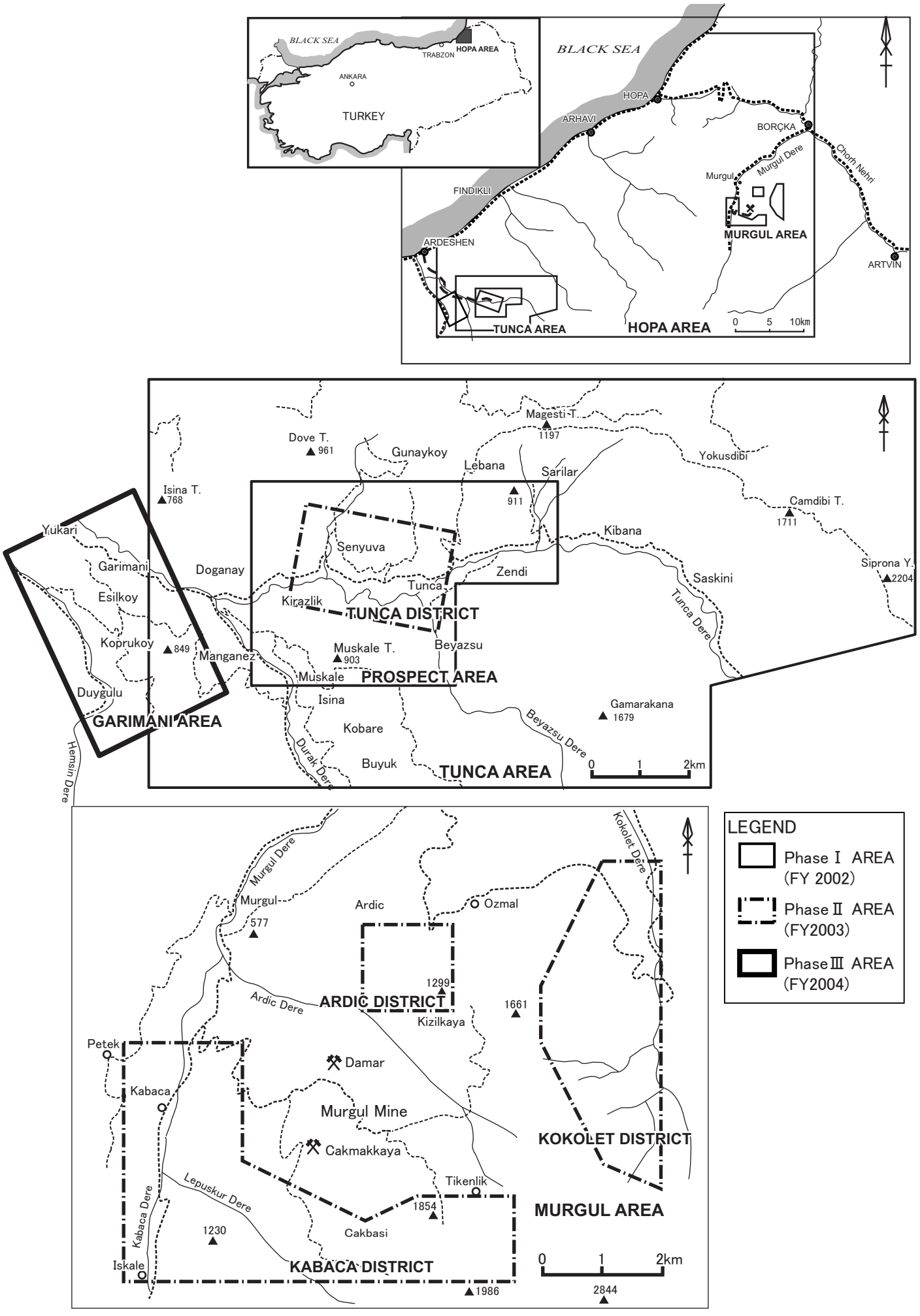

Fig.1 Location Map of the Survey Area

Summary

The survey has been conducted to discover economically valuable volcanogenic massive sulphide ore deposits in the Hopa area of the Republic of Turkey through various surveys and interpretation of the geology and the state of the mineralization. The transfer of the technology relevant to the mineral exploration to the counterpart organizations is also important object of the program. The survey programs have been performed from October, 2002 to February, 2005.

The survey has been performed principally in the Tunca area in the western area and the Murgul area in the eastern area.

[Tunca area]

The Tunca area is underlain by the upper Cretaceous Alemağaç Formation consisting of the upper and lower members, Çağlayan Formation, Sivrikaya Formation, Tertiary Hamidiya Formation, and intrusive dacite bodies. The volcanogenic massive sulphide mineralization has taken place associated with the phreatic explosion on the flank of the lava dome of the lower member of the Alemağaç Formation, and its ore horizon ranges up to the below of the lowermost reddish calcareous mudstone (Cms) of the Çağlayan Formation.

The Tunca, Şenyuva, and Muskale Mineralized Zones are formed by this mineralization, but their alteration zones are in small-scale and their ore grade is low. It is, therefore, thought that the potential is low for large-scale ore deposits. Also it is judged that the economical potential is low for the vein-type mineralized zone in the watershed of the Hemsin River. However, the ore horizon of the Çayeli Deposit extends to the surrounding areas of the area, therefore it has some potential there.

[Murgul area]

The Murgul area is underlain by the lower Cretaceous Murgul Formation, consisting of the lower and upper members, Ardiç Formation, Küre Formation, and intrusive granitic rocks.

The dacitic rocks (Mdcl) of the lower member of the Murgul Formation have broadly undergone volcanogenic massive sulphide mineralization. Its trend of the alteration zoning structure, and alignment of the strong alteration intensity zones and mineral occurrences extend southwest to northeast through the Murgul Deposit swarm. It is, accordingly, said that the volcanogenic massive sulphide mineralization has taken place along this zone. The ore horizon has already been eroded out in the southwestern

side of the zone, however that in the northeastern side is covered by the Ardiç Formation, and extends to the mountain block in between the Ardiç district and Kokolet district.

Followings are the recommendation for the future exploration activity, judging from the result of the survey at present.

[Tunca area]

Exploration for the surrounding area of the surveyed area.

[Murgul area]

Drilling survey in the mountain block to the east of the Ardiç district.

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Part I General Remark

Chapter 1 Outline of the Survey

1-1 Object of the Survey

The coastal area of the Black Sea in Turkey is one of a high potential area for massive sulphide ore deposits similar to the Japanese Kuroko deposits containing multi-metal elements. The head office of MTA, "MADEN TETKİK ve ARAMA GENEL MÜDÜRLÜGÜ: Mineral Research and Exploration Institute" has aggressively conducted many mineral exploration programs. The government of the Republic of Turkey has planned to conduct a new exploration program for metallic minerals in the Hopa area in the eastern part of the coastal area, and requested the cooperation from the Japanese government. In response to the request, the Japanese government has decided to conduct a survey program for the area, to extract potential areas for gold, silver, copper, lead, zinc etc. by means of surveys and interpretations for the geological environment and the status of ore deposits in the area. Another purpose of the program is to transfer the technology for mineral exploration to the Turkish counterpart.

1-2 Survey Area

Figure 1 shows the location of the survey area. The Hopa area is situated in the northeastern part of the Turkey, near the boundary with the Republic of Georgia, ranging around 41 degrees 10 minutes to 41 degrees 30 minutes north in latitude, and 41 degrees 10 minutes to 41 degrees 45 minutes east in longitude, having approximately 1,800 square kilometers. The northern edge faces to the Black Sea, and the Eastern Black Sea Mountains are situated to the south, extending northeast to southwest.

Many volcanogenic massive sulphide deposits such as the Murgul, Cerattepe, and Çayeli Deposits are distributed in the Hopa and surrounding areas.

The surveys have been carried out around the Tunca area and the Murgul area.

1-3 Survey Method and Contents

Survey flow sheet and flowchart for extracting promising zones are shown in Fig.I-1-1 and Fig. I -1-2, and survey amount are listed in Table I -1-1.

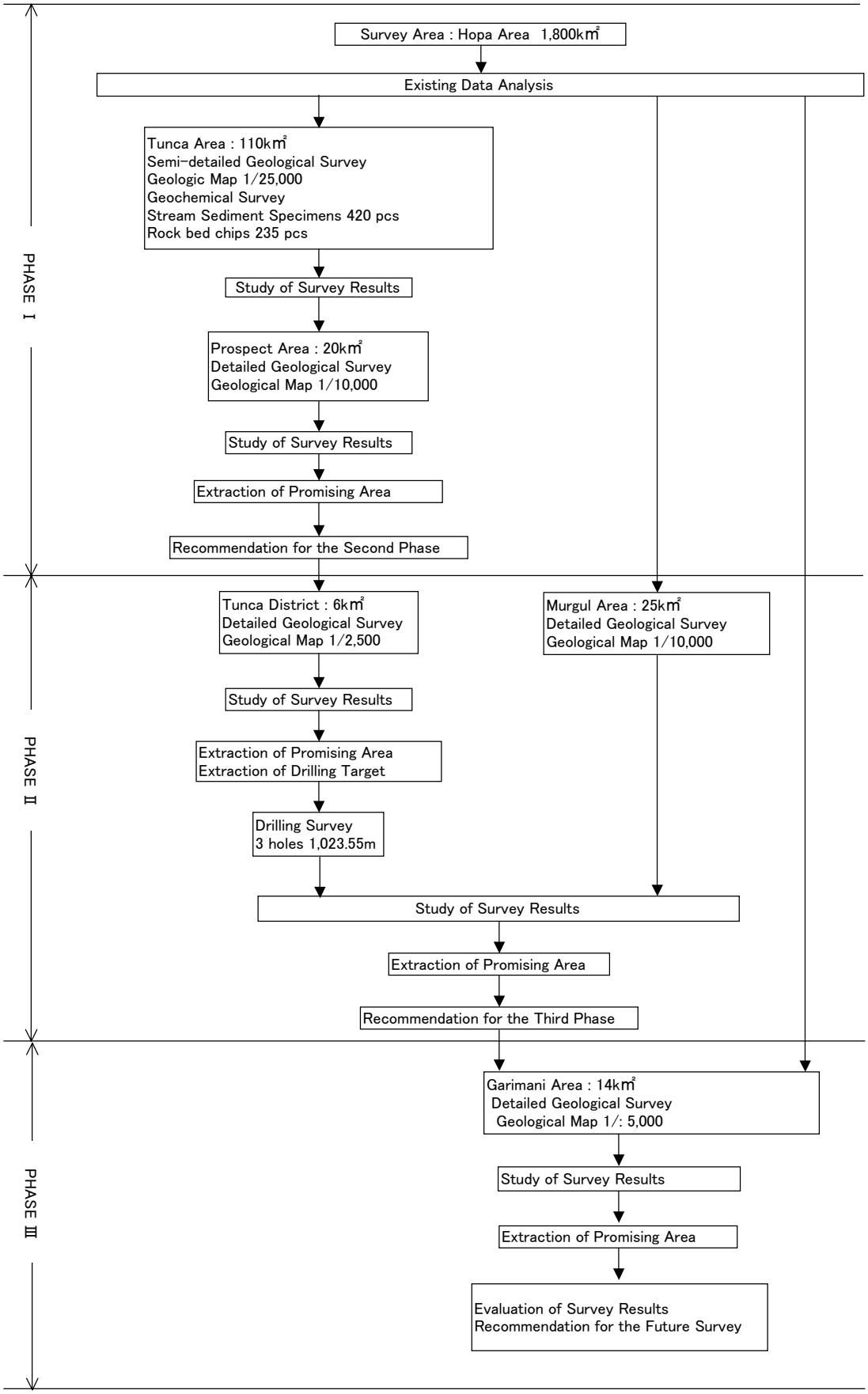


Fig. Ⅰ-1-1 Flowchart of the Survey

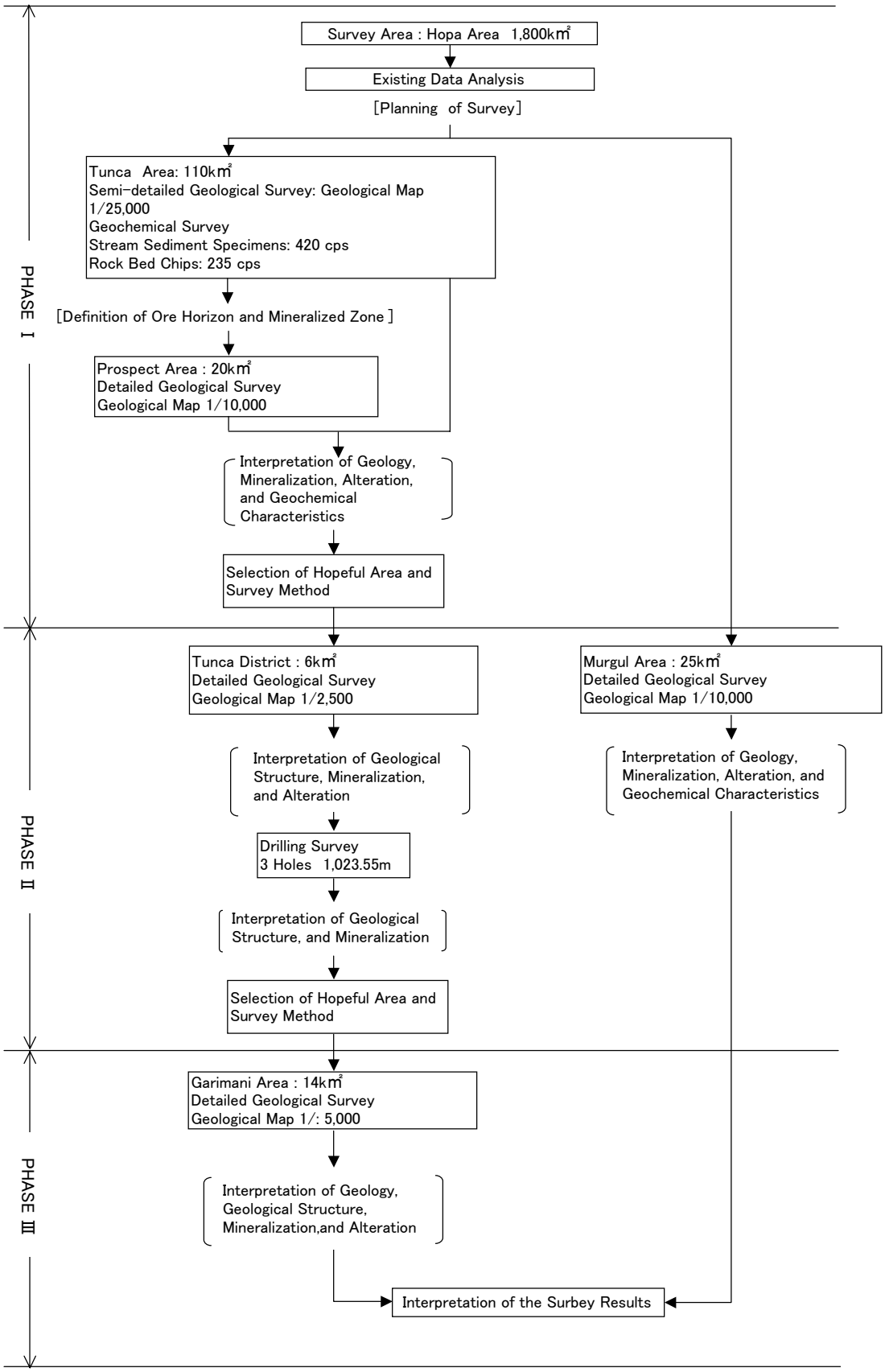


Fig. Ⅰ -1-2 Flowchart of Selection for the Promising Area

Table Ⅰ-1-1 List of Survey Amount

	Survey	Area	Contents	Amount
PHASE Ⅰ	Existing Data Analysis	Hopa Area		
	Geological Survey	Tunca Area : 110 km^2 Survey Routes : 220 km	* Thin Section	100
			* Polished Section	100
			* X-ray Diffraction	100
			* Whole Rock Analysis (Ag,Al,As,B,Ba,Be,Bi,Ca,Cd,Co,Cr,Cu,Fe,Ga,Hg,K,La,Mg,Mn,Mo,Na,Ni,P,Pb,S,Sb,Sc,Sr,Ti,Tl,U,V,W,Zn,Au)	420
			* Trace Elements Analysis(REE+HFS+LIL) (Ag,Ba,Ce,Co,Cr,Cs,Cu,Dy,Er,Eu,Ga,Gd,Hf,Ho,La,Lu,Mo,Nd,Ni,Pb,Pr,Rb,Sm,Sn,Sr,Ta,Tb,Th,Tl,Tm,U,V,W,Y,Yb,Zn,Zr)	60
			* Ore Assay (Au,Ag,Cu,Pb,Zn,Ba,S,Ga,Ge,In,As)	50
			* Isotope: $\delta^{13}C$, $\delta^{18}O$ on carbonate	20
			* Isotope: $\delta^{18}O$ on Silicate	20
			* Isotope: $\delta^{34}S$ on Sulphide and Sulphate	15
			* Fluid Inclusion (with Salinity)	15
			* K-Ar Dating Determination	20
			* Micro Fossils	20
	Geological Survey	Prospect Area : 20 km^2 Survey Routes : 120 km		
	Geochemical Survey	Tunca Area 110 km^2 Stream Sediment	* Whole Rock Analysis (Ag,Al,As,B,Ba,Be,Bi,Ca,Cd,Co,Cr,Cu,Fe,Ga,Hg,K,La,Mg,Mn,Mo,Na,Ni,P,Pb,S,Sb,Sc,Sr,Ti,Tl,U,V,W,Zn,Au)	235
PHASE Ⅱ	Geological Survey	Tunca District : 6 km^2 Survey Routes : 30 km	* Thin Section	30
			* Polished Section	10
			* X-ray Diffraction	30
			* Whole Rock Analysis (Au,Ag,Al,As,Ba,Be,Bi,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Mo,Na,Ni,P, Pb,S,Sb,Sr,Ti,V,W,Zn)	60
			* Ore Assay (Au,Ag,Cu,Pb,Zn,Ba,S,Ga,Ge,In,As)	10
	Geological Survey	Murgul Area : 25 km^2 Survey Routes : 70 km	* Thin Section	30
			* Polished Section	10
			* X-ray Diffraction	30
			* Whole Rock Analysis (Au,Ag,Al,As,Ba,Be,Bi,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Mo,Na,Ni,P, Pb,S,Sb,Sr,Ti,V,W,Zn)	60
			* Ore Assay (Au,Ag,Cu,Pb,Zn,Ba,S,Ga,Ge,In,As)	10
			* Ore Isotope Analysis (Pb Isotope: SIMS Mesuremeı	7
	Drilling Survey	Tunca District Total Nomber : 3 holes Total Length : 1,023.55 m	* Thin Section	30
			* Polished Section	30
			* X-ray Diffraction	30
			* Whole Rock Analysis (Au,Ag,Al,As,Ba,Be,Bi,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Mo,Na,Ni,P, Pb,S,Sb,Sr,Ti,V,W,Zn)	30
			* Ore Assay (Au,Ag,Cu,Pb,Zn,Ba,S,Ga,Ge,In,As)	30
PHASE Ⅲ	Geological Survey	Garimani Area : 14 km^2 Survey Routes : 70 km	* Thin Section	39
			* Polished Section	12
			* X-ray Diffraction	48
			* Whole Rock Analysis (Au,Ag,Al,As,Ba,Be,Bi,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Mo,Na,Ni,P, Pb,S,Sb,Sr,Ti,V,W,Zn)	77
			* Ore Assay (Au,Ag,Cu,Pb,Zn,Ba,S,Ga,Ge,In,As)	23
			* K-Ar Dating Determination	3

1-4 Survey Terms and Members

Members participating the surveys are listed in Table Ⅰ-1-2.

1-5 Outline of the Survey Area

1-5-1 Location and Access

Trabzon City can be reached from the capital city of Ankara by air in one hour. The paved highway connects Trabzon City and Arhavi Town, base camp of the survey, along the Black Sea coast, and it takes about three hours by car.

From Arhavi to the Tunca and Murgul areas, it takes about one and half hour.

1-5-2 Geography, Climate, and Vegetation in the Survey Area

Within this survey area belonging to the Black Sea coast part, a fold mountain range having been formed in the early Alpine Orogeny stage, called as the East Black Sea Mountain Ranges falls sharply into the vicinity of the coast, and there is little flat land. For this reason, the Hopa area is steep and rich in undulations.

The Tunca area is in a basin of the Tunca and Durak Rivers, which are branches of the Fırtına River flowing into the Black Sea. The area is from 100 meters to 2,200 meters high above the sea level. The Murgul area is in a basin of the Murgul River, which is a branch of the Çhorh River flowing into the Black Sea in Batumi, Georgia. The area is from 500 meters to 2,000 meters high above the sea. The drainage patterns are well developing in the areas, and the quantity of flow is abundant.

1-5-3 Outline of the Geology (Fig. Ⅰ-1-3 to Fig. Ⅰ-1-7)

The Anatolia Peninsular constitutes a part of the Alpine-Himalaya-Indonesia Mountains, and four tectonic belts extending east to west, the Pontides, Anatolides, Taurides, and Border Folds, align from the north to south. Figure Ⅰ-3-3 shows the stratigraphic units of the northeastern Pontides. The survey area is situated in the coastal area of the Black Sea, and geologically in the northeastern part of the Pontides. The basement rocks of the Pontides consist of Devonian to Carboniferous metamorphic rocks such as gneiss and schist, and Paleozoic intrusive granitic rocks. Six stratigraphic unites overlie the basement rocks, upper Carboniferous to lower Cretaceous, upper Cretaceous to lower Eocene, middle to upper Eocene, Oligocene to Miocene, and Pliocene to Quaternary from the bottom.

The coastal area of the eastern Black Sea is underlain by the upper

Table I -1-2 List of Participant Members

	Survey Term	Japanese Side		Turkish Side	
PHASE I	From Oct. 1st,2002 To Feb. 28th, 2003	Planning and Negotiation			
		Naotoshi Sugiuchi	(MMAJ)	A. Kemal Işiker	(MTA)
		Manabu ishizuka	(MITI)	Ali İşcan	(MTA)
		Yuki Ebara	(JICA)	Yusuf Ziya Özkan	(MTA)
		Hiroyuki Takahara	(MMAJ)	Mesude Aydan	(MTA)
		Hiroshi Shimotori	(MMAJ)	İskender Kurt	(MTA)
		Survey Team			
		Koichi Hisatani	(DEC)	Deniz Göç	(MTA)
		Hiroshi Miyamoto	(DEC)	İskender Kurt	(MTA)
		Susumu Takeda	(DEC)	Mustafa Özkan	(MTA)
		Masaru Fujita	(DEC)	Şenol Karslı	(MTA)
		Yoshizo Ohmori	(DEC)	Turgut Çolak	(MTA)
				Mustafa Kemal Revan	(MTA)
		Supervisor in Turkey			
		Hiroyuki Takahara	(MMAJ)		
PHASE II	From Jun. 4th, 2003 To Jan. 31st, 2004	Survey Team			
		Koichi Hisatani	(GEOTECHNOS)	İskender Kurt	(MTA)
		Hiroshi Miyamoto	(GEOTECHNOS)	Mustafa Özkan	(MTA)
		Takuya Nishikawa	(GEOTECHNOS)	Şenol Karslı	(MTA)
		Hiroyasu Muraoka	(GEOTECHNOS)	Turgut Çolak	(MTA)
				Mustafa Kemal Revan	(MTA)
				Avni Akdeniz	(MTA)
				Resul Varlik	(MTA)
				Ramazan Daştan	(MTA)
				Baki Yılmazer	(MTA)
		Supervisor in Turkey			
		Hiroyuki Takahara	(MMAJ)		
PHASE III	From Sep. 13th, 2004 To Feb.18th, 2005	Survey Team			
		Koichi Hisatani	(GEOTECHNOS)	Şenol Karslı	(MTA)
		Shigehisa Fujiwara	(GEOTECHNOS)	Mustafa Özkan	(MTA)
		Seiju Ikeda	(GEOTECHNOS)	Turgut Çolak	(MTA)
		Hiroyuki Nakado	(GEOTECHNOS)	Mustafa Kemal Revan	(MTA)
		Hirohisa Shingu	(GEOTECHNOS)	İskender Kurt	(MTA)
		Supervisor in Turkey			
		Kouji Yamamoto	(JOGMEC)		

MITI: Ministry of Economy, Trade and Industry
JICA: Japan International Cooperation Agency
MMAJ: Metal Mining Argency of Japan
JOGMEC: Japan Oil, Gas and Metals National Corporation
DEC: Dowa Engineering Company Limited
GEOTECHNOS: Geothecnos Company Limited

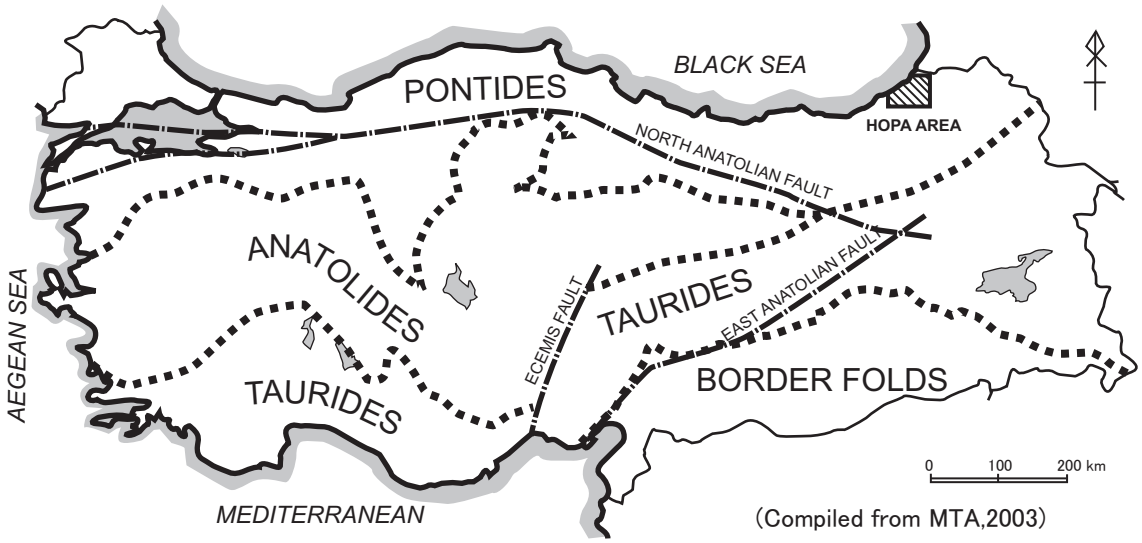


Fig. I -1-3 Tectonic Zones of Anatolia

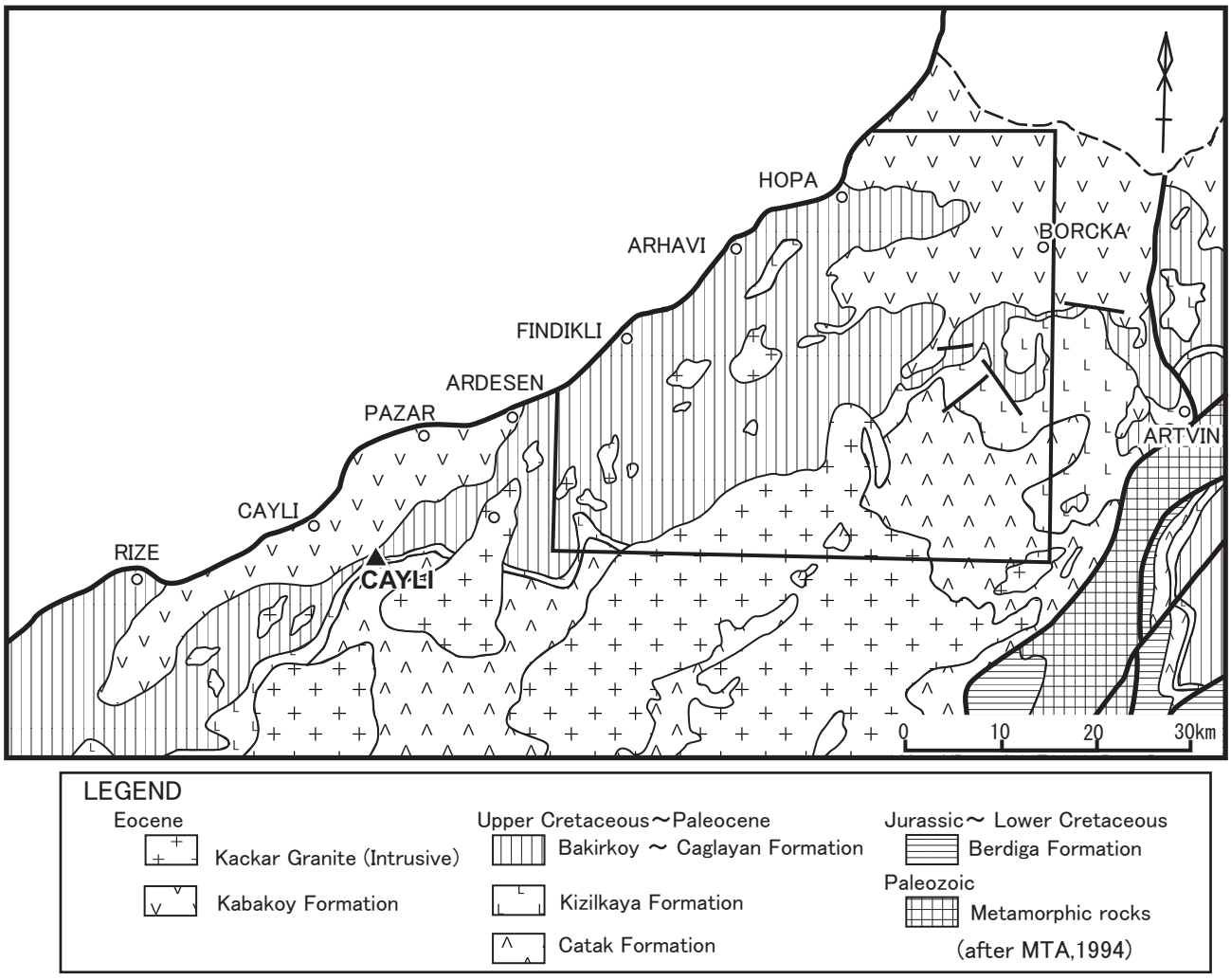
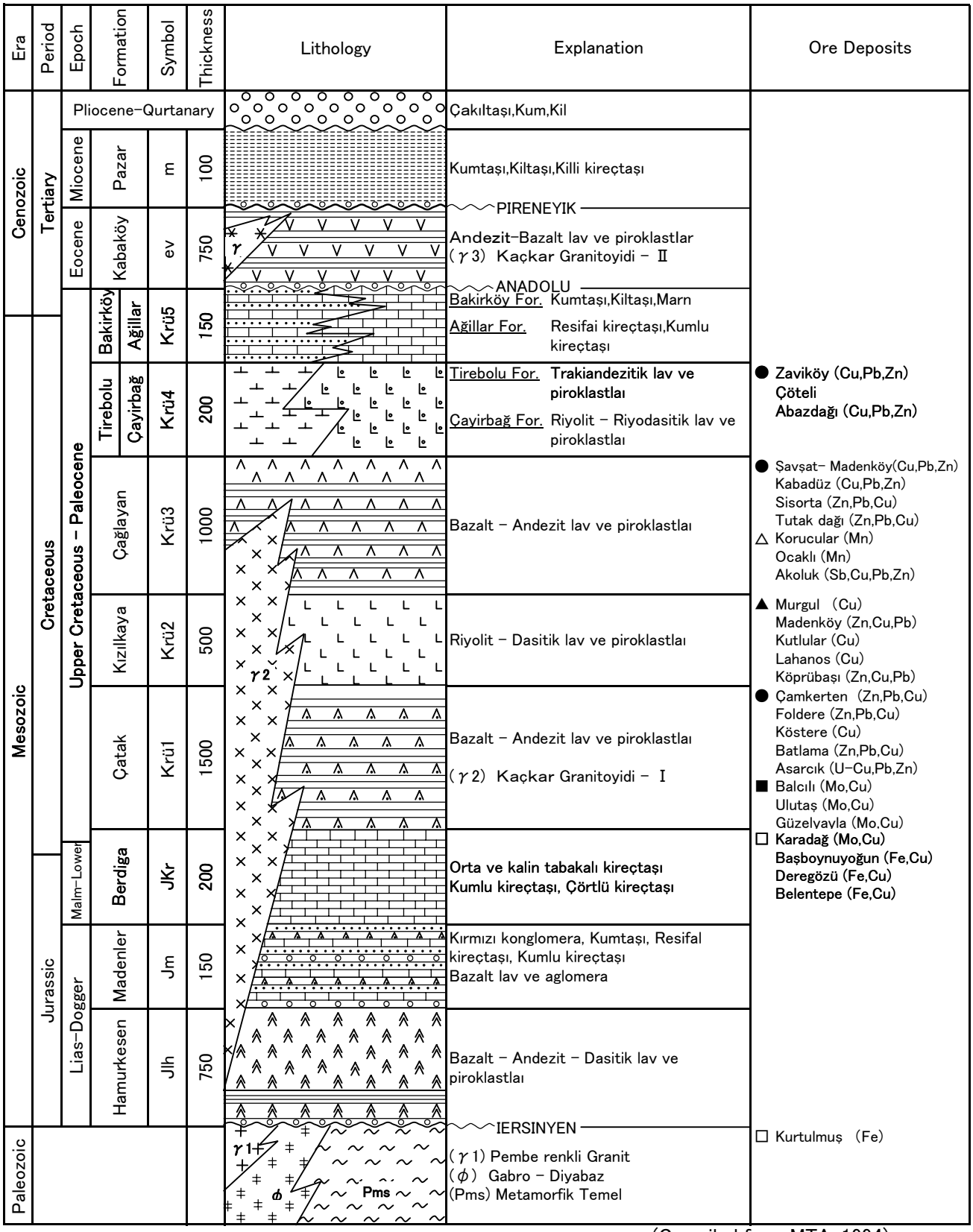


Fig. I -1-4 Geological Map of the Northeastern Pontides



(Compiled from MTA, 1994)

Fig. I-1-5 Stratigraphic Units of the Eastern Pontides

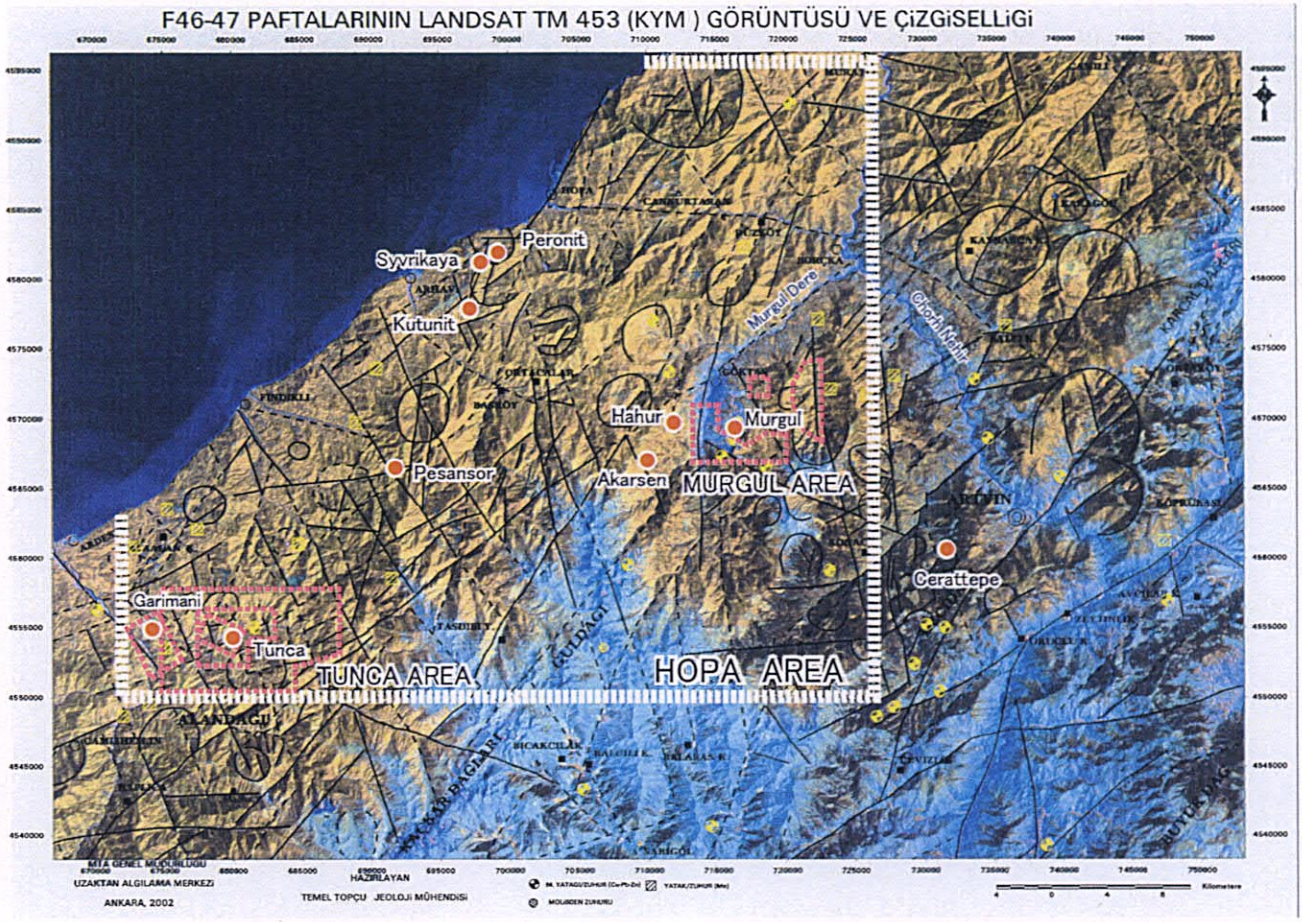


Fig. I -1-6 Photogeological Interpretation Map and LANDSAT TM Image of the Hopa Area

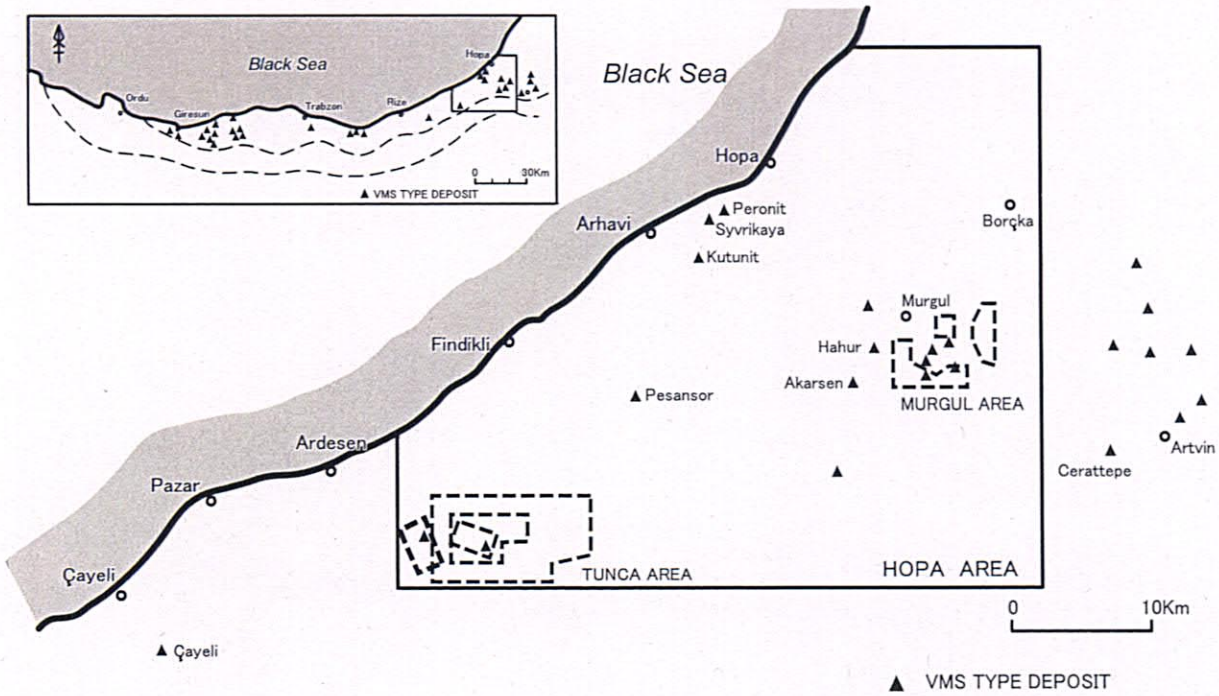


Fig. I -1-7 VMS Type Deposits Around the Hopa Area

Cretaceous to the lower Paleocene volcanic rocks, which are accompanied by volcanogenic massive sulphide deposits such as Murgul, Çayeli, and Cerattepe etc.

Güven et al (1992) classified the upper Cretaceous to the lower Paleocene into the Çatak Formation mainly composed of andesitic-basaltic volcanics, and Kızılkaya Formation mainly composed of dacitic volcanics, and Çağlayan Formation composed of andesite-basaltic lava, pyroclastics, and part of dacitic volcanics in ascending order.

The Kızılkaya and Çağlayan Formations are correlated with the Alemağaç and Çağlayan Formations in the Tunca area respectively.

The Kaçkar granitic rocks are distributed in the south of the Hopa area.

1-5-4 Mines and Mining Activity

The eastern coastal area of the Black Sea is the important source of copper resources in Turkey, and has been very active for the mining in the past. It is said that the Genovese had mined copper in Murgul and Peronit in the middle ages, and some German and Russian enterprises had been active for copper mining in Akarşen, Kuvarshan, Kutunit, Sucana etc. from the end of the 19th century to the beginning of the 20th century.

The modern exploration activity has been performed since 1935, after the foundation of MTA, and systematic geological, geochemical, and geophysical surveys have been performed by this organization. MTA has applied various modern exploration methods such as the satellite imagery analysis recent years. These efforts have resulted the great success of the discovery of some large-scale, high-grade ore deposits such as the Cayeli Deposit, 16 million tons ore reserve (3.6 % Cu, 5.7 % Zn) and Cerattepe Deposit, 1 million tons gold beacircular oxide ore (3 g/t Au, 150 g/t Ag), 1.2 million tones high-grade sulphide ore (10 % Cu), and 3.8 million tones low-grade ore (2.1 % Cu). Many international enterprises pay attention to the eastern coastal area of the Black Sea, and are progressing exploration programs.

Geoffroy (1960) reported the first academic paper on the Tunca area, describing the geology and ore deposits in the Cayali-Pazar-Ardeşen area. A geological survey program was jointly performed by Turkey and Yugoslavia in the beginning of 1970th , and the Tunca Deposit was discovered as the result. of the program.

Many mineral occurrences exist in the Murgul area, showing old pit sites in many places. The Murgul Deposit was developed in the beginning of the 20th century ducircular Russian occupation by Caucasus Copper Co. Ltd. Since then, Etibank

participated in the operation, and a large-scale investigation by geological, geophysical, and drilling surveys since 1963. Dardanel Co. Ltd, subsidiary company of Inco Canada, has been performing exploration program targeting volcanogenic massive sulphide ore since 1996.

It is judged that the area has high potential for buried new ore bodies, but sufficient exploration has not been performed for the area until now due to its rugged topography and thick forest.

Chapter 2 Conclusion and Recommendation

2-1 Conclusion

2-1-1 Tunca Area

The Kızılkaya Formation, the ore horizon of the Cayeli Deposit, corresponded to the Alemağaç Formation, extends to the area. In the area, the phreatic explosion occurred on the flank of the dacite lava dome (Adcl) of the lower member of the Alemağaç Formation, and then the volcanogenic massive sulphide mineralization occurred in the stage of the dacitic pyroclastic rocks (Atf) deposition. The purple dacite (green dacite) intruded ducircular the mineralizations weaken, then some sulphide dissemination occurred in the dacitic pyroclastic rocks (Attf). Accordingly, it is presumed that the ore horizon ranges from the dacitic pyroclastic rocks (Atf) to below the reddish calcareous mudstone (Cms) of the lowest bed of the Çağlayan Formation.

The Alemağaç Formation is the lowest one in the area. It is overlain by gentle thick formations. The topography of the area is steep and rugged. It is thought that the possible target areas for prospecting are within several hundreds meters, maximum 1,000 meters, from the boundary with the Çağlayan Formation, considecircular economical conditions. The survey has revealed many volcanogenic massive sulphide mineralized zones and occurrences, however the grade of copper and zinc is low due to its principal constitution mineral, and the alteration zones are sporadic compared with that of the Murgul area. Regarding the Tunca Deposit, only a very weak occurrence has been confirmed in the drill hole MJTH-2. Therefore, it is thought that the main body of the ore deposit should be small-scale. The alteration mineral zone related with vein-type mineralization exists along the Hemsin River, but it is low grade, and no lateral and vertical change in the mineralization state is seen. Accordingly, it is judged that the potential for large-scale ore deposits is low in the economic sense.

2-1-2 Murgul Area

The dacitic rocks of the lower member of the Murgul Formation, having undergone volcanogenic massive sulphide mineralization, are broadly distributed in the area. The knowledge obtained on the mineralization is as follows.

- The center part of the alteration zone related with mineralization consists of the quartz-kaolinite-sericite zone, and extends to the southwest to northeast or south-southwest to north-northeast through the Çakmakkaya Deposit to Kızılkaya.

- The strong alteration intensity zone, over 90 percent AI, extends through the Murgul Deposit swarm trending south-southwest to north-northeast.
- The mineral occurrences in the area align southwest to northeast in global view. In the northeast end of the alignment, the Upper Kokolet Occurrence containing barite ore is emplaced in the uppermost of the lower member of the Murgul Formation.

Above-mentioned knowledge indicates that the volcanogenic massive sulphide mineralization has been occurred along the northeast to southwest trending zone through the Murgul Deposit swarm. The ore horizon of the southwestern side of the Murgul Deposit swarm has been eroded out already. On the other hand, that of the northeastern side, i.e. the mountain block from the Ardiç district to the Kokolet district, is overlain by the basic volcanic rocks of the Ardiç Formation, and it is strongly expectable to discover new ore deposits underneath the overlying basic volcanic rocks.

2-2 Recommendation for Future

As the result of the survey program, the following conclusions have been obtained; 1) the potential for the economically important large-scale ore deposit is low in the Tunca area, 2) it is highly possible to expect unknown new volcanogenic sulphide ore deposits underneath the basic volcanic rocks in the mountain block in between the Ardiç section and Kokolet section in the Murgul area.

The followings are the recommendation for future exploration activity.

[Tunca area]

The potential for economically important ore deposit is low in the area. However, the ore horizon of the Cayeli Deposit extends to the area. Therefore it is recommended to expand survey areas to the surrounding areas.

[Murgul area]

It is recommended to perform a drilling survey program in the mountain block to the east of the Ardiç district.

Part Ⅱ

Details of the Surveys

Part Ⅱ Details of the Surveys

Chapter 1 Tunca Area

The geological, stream sediment and rock bed chip geochemical, and drilling surreys have been performed in the area. The geological survey has been performed in the Tunca area (110 square kilometers, 1 to 25,000 in scale), Prospect area (20 square kilometers, 1 to 10,000 in scale), Tunca district (6 square kilometers, 1 to 2,500 in scale), and Garimani area (14 square kilometers, 1 to 5,000 in scale).

1-1 Geological Survey

1-1-1 Geology (Figures Ⅱ-1-1 to Ⅱ-1-11)

The area is underlain by the Alemağaç, Çağlayan, and Sivrikaya Formations of the upper Cretaceous, and the Hamidiya Formation of the Tertiary from the bottom, having been intruded by intrusive bodies.

The Alemağaç Formation is correlated with the Kızılkaya Formation, emplacing the volcanogenic massive sulphide deposits in the eastern Pontides, and divided into two members. The lower member is composed of the aphyric dacite (Adcu), dacite lava (Adcl), and dacitic pyroclastic rocks (Atf), and the aphyric dacite (Adcu) mainly consists of hyaloclastite. Phenocrysts are scarce in the dacite lava. The dacite (Adcl) forms a lava dome centecircular Muşkale Mountain, extending northeast to southwest, and is characterized by the autobrecciated structure. The overlying dacitic pyroclastic rocks (Atf) is composed of tuff and lapilli-tuff, containing dacitic fragments of the dacite lava (Adcl), and has been formed by phreatic explosion occured on the flank of the lava dome. The upper member is composed of the purple dacite (Adcp), green dacite (Adcg), and dacitic pyroclastic rocks (Attf). These are the different facies of the same igneous body, i.e. the purple dacite for intrusive facies, green dacite for lava facies, and dacitic pyroclastic rocks for pyroclastic facies.

The Çağlayan Formation is characterized by the dominant basic volcanic activity, and the lowest reddish calcareous mudstone (Cms) is overlain by the thick basaltic rocks (Cbs). The basaltic rocks are intercalated by the sedimentary rocks (Cms and mudstone (Cmd)), acidic tuff (Ctf) and basic tuff (Cbtf).

The Sivrikaya Formation consists of acidic tuffaceous rocks (Stf), sandstone (Sss), and mudstone (Smd), being distributed high elevation zones. The Hamidiya Formation (Hd) is composed of poorly-sorted sedimentary rocks, unconformably overlying the lower formation.

The intrusive rocks are distributed in many places, consisting of granitic rocks (Kgr), dacitic rocks (Dci, Dcp, Dcb), and dolerite (Dol). The granitic rocks are correlated

Fig. Ⅱ-1-1 Geological Map of the Tunca Area

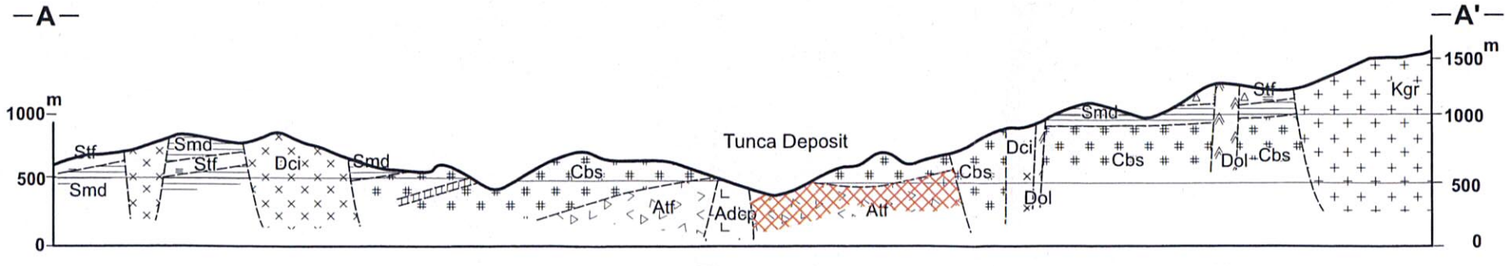


Fig. Ⅱ-1-2 Geological Cross Section of the Tunca Area

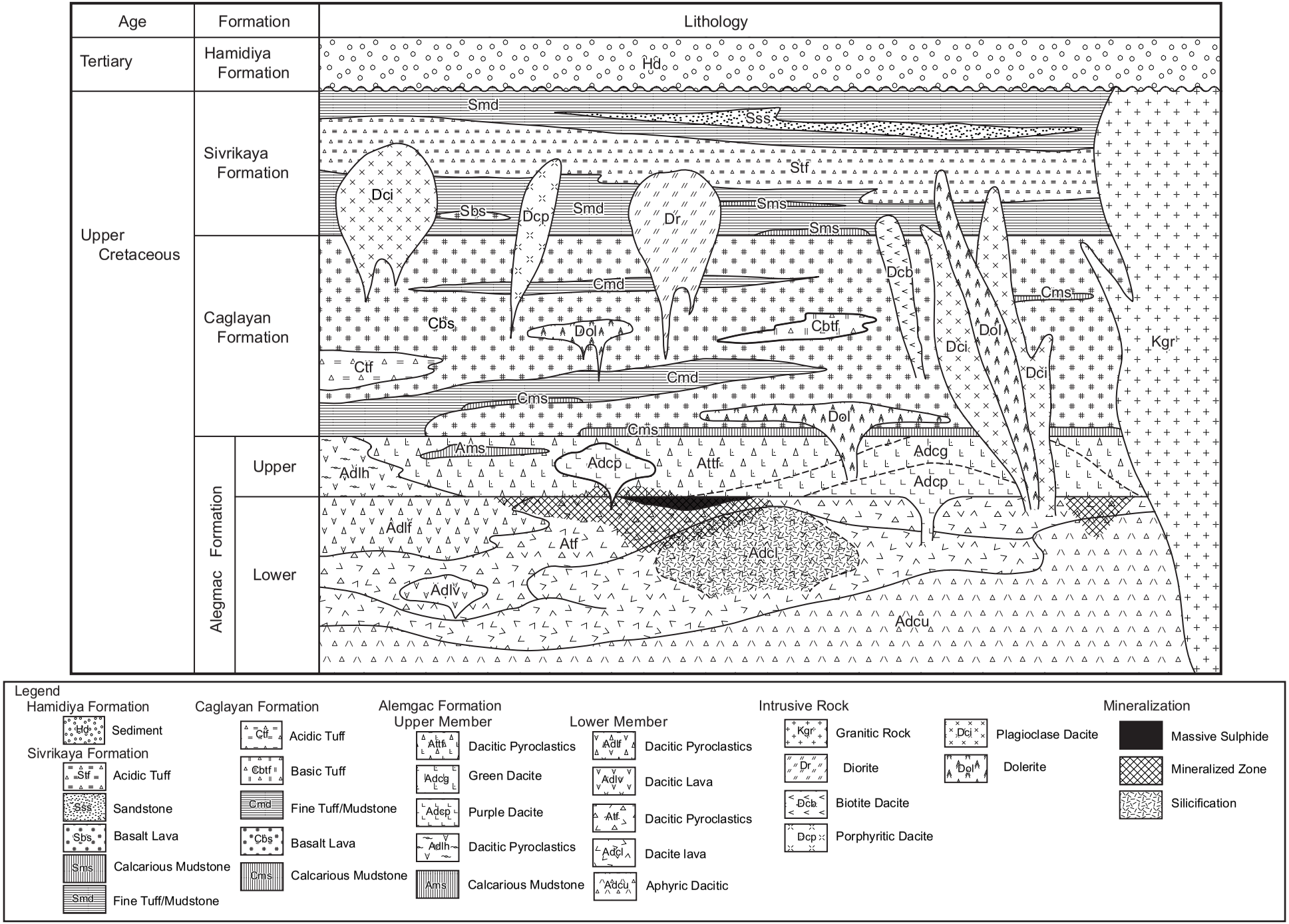


Fig. Ⅱ-1-3 Schematic Stratigraphic Column of the Tunca Area

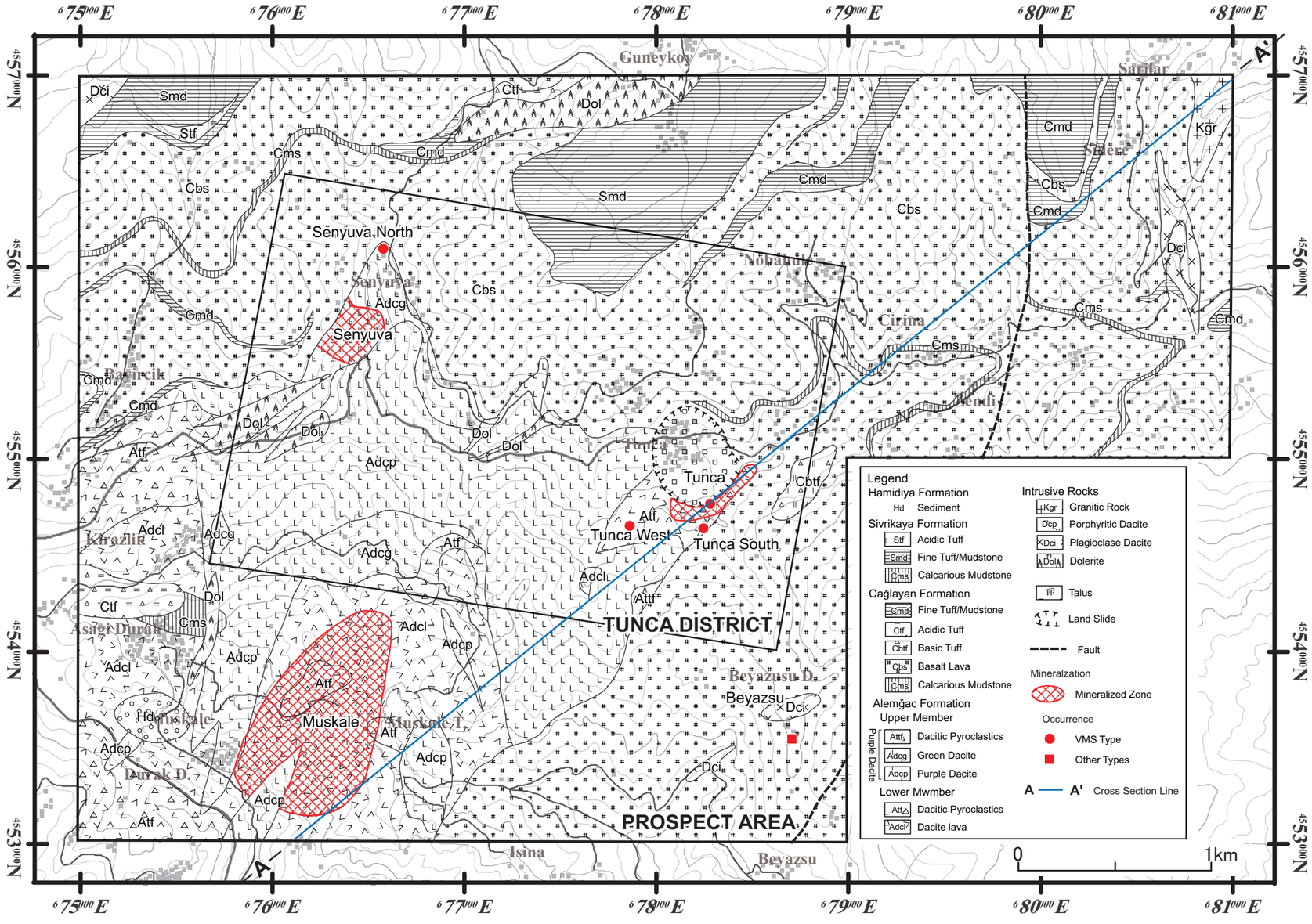


Fig. Ⅱ-1-4 Geological Map of the Prospect Area

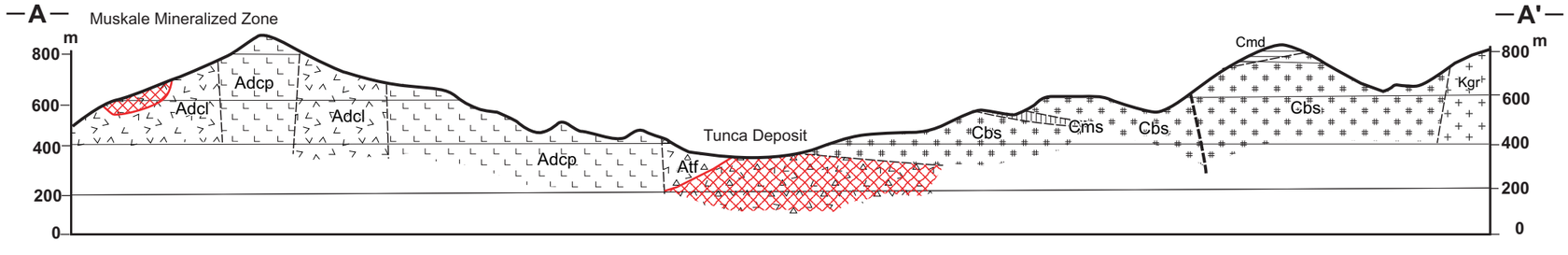
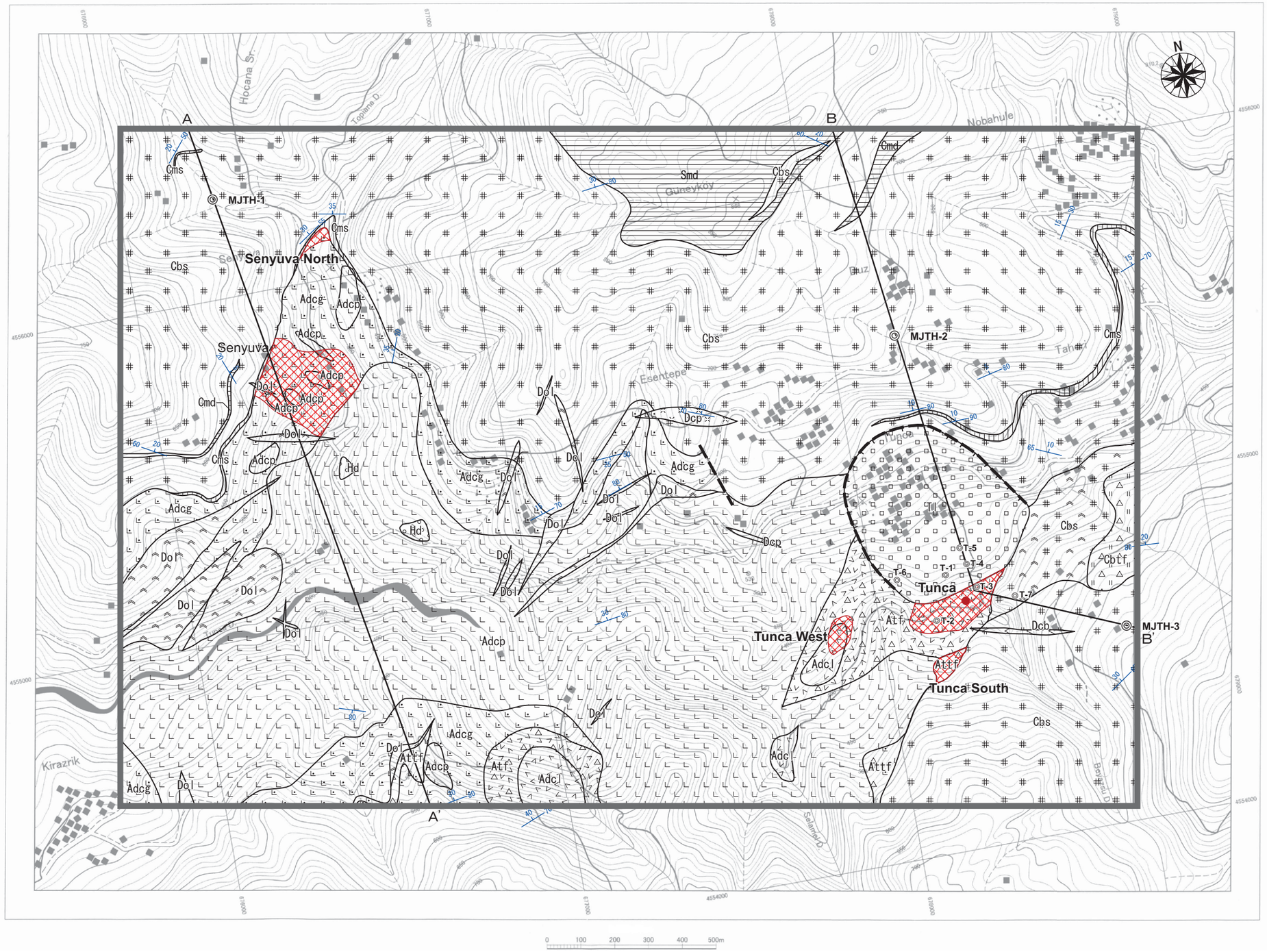


Fig. Ⅱ-1-5 Geological Cross Section of the Prospect Area



Legend

Land Slide
- Talus

Intrusive Rocks
- Porphyritic Dacite
- Biotite Dacite
- Dolerite

Hamidiya Formation
- Sediment

Sivrikaya Formation
- Mudstone

Çağlayan Formation
- Mudstone
- Basic Tuff
- Doleritic Basalt
- Basalt Lava
- Calcarious Mudstone

Alemağac Formation

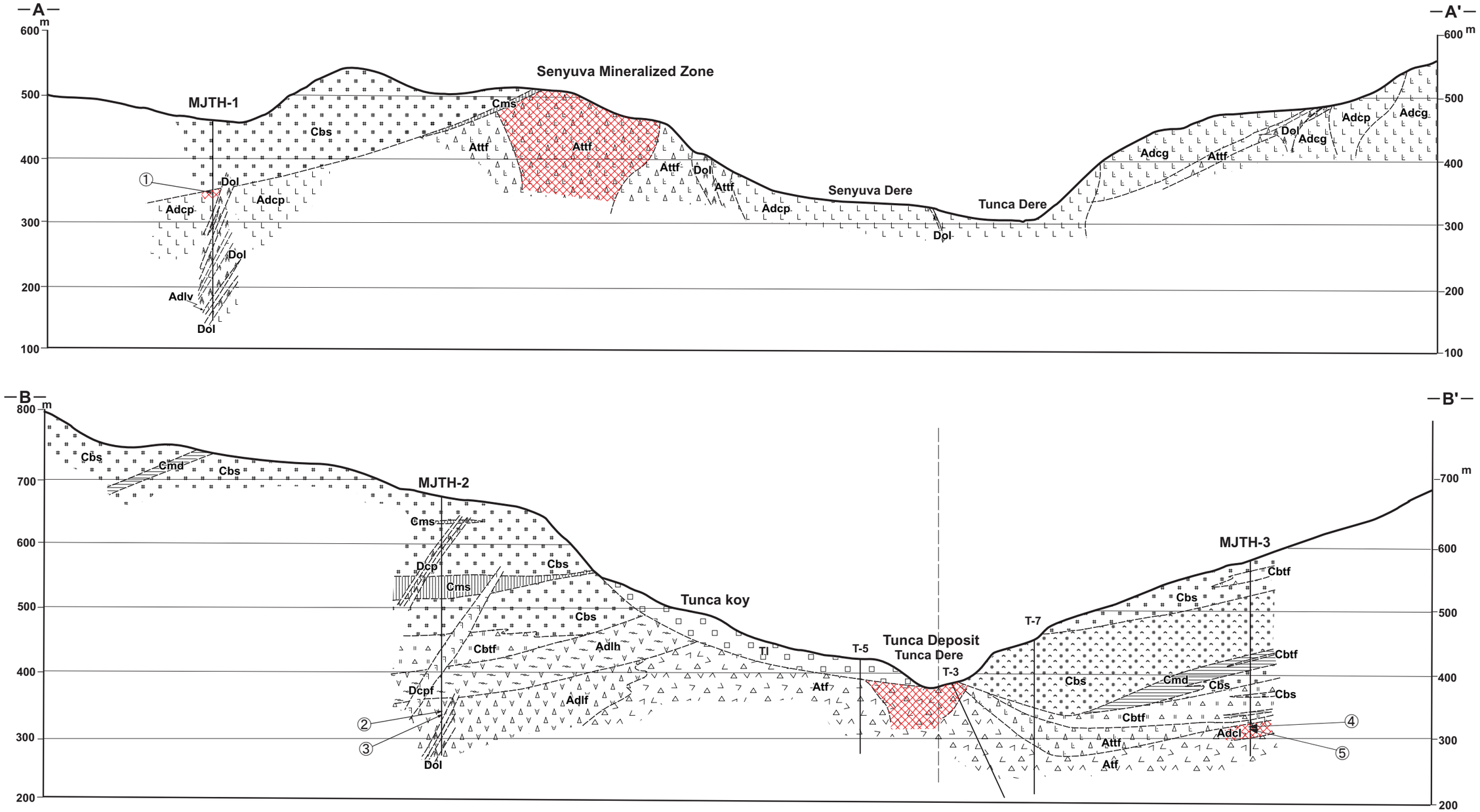
Upper Member
- Dacitic Pyroclastics
- Green Dacite
- Purple Dacite

(Purple Dacite)

Lower Member
- Dacitic Pyroclastics
- Dacite lava

- Strike and Dip
- Fault
- Occurreuce
- Massive Sulphide
- Drilling point
- A——A' Cross Section Line

Fig. Ⅱ-1-6 Geological Map of the Tunca District



Legend

Cağlayan Formation
- Cmd — Fine Tuff/Mudstone
- Cbtf — Basic Tuff
- Cbs — Basalt Lava
- Cbs — Doleritic Basalt
- Cms — Calcarious Mudstone

Alemğac Formation

Upper Member
- Attf — Dacitic Pyroclastics
- Adcg — Green Dacite
- Adcp — Purple Dacite
- Adlh — Dacitic Pyroclastics

Lower Member
- Adlf — Dacitic Pyroclastics
- Adlv — Dacite lava
- Atf — Dacitic Pyroclastics
- Adcl — Dacite lava

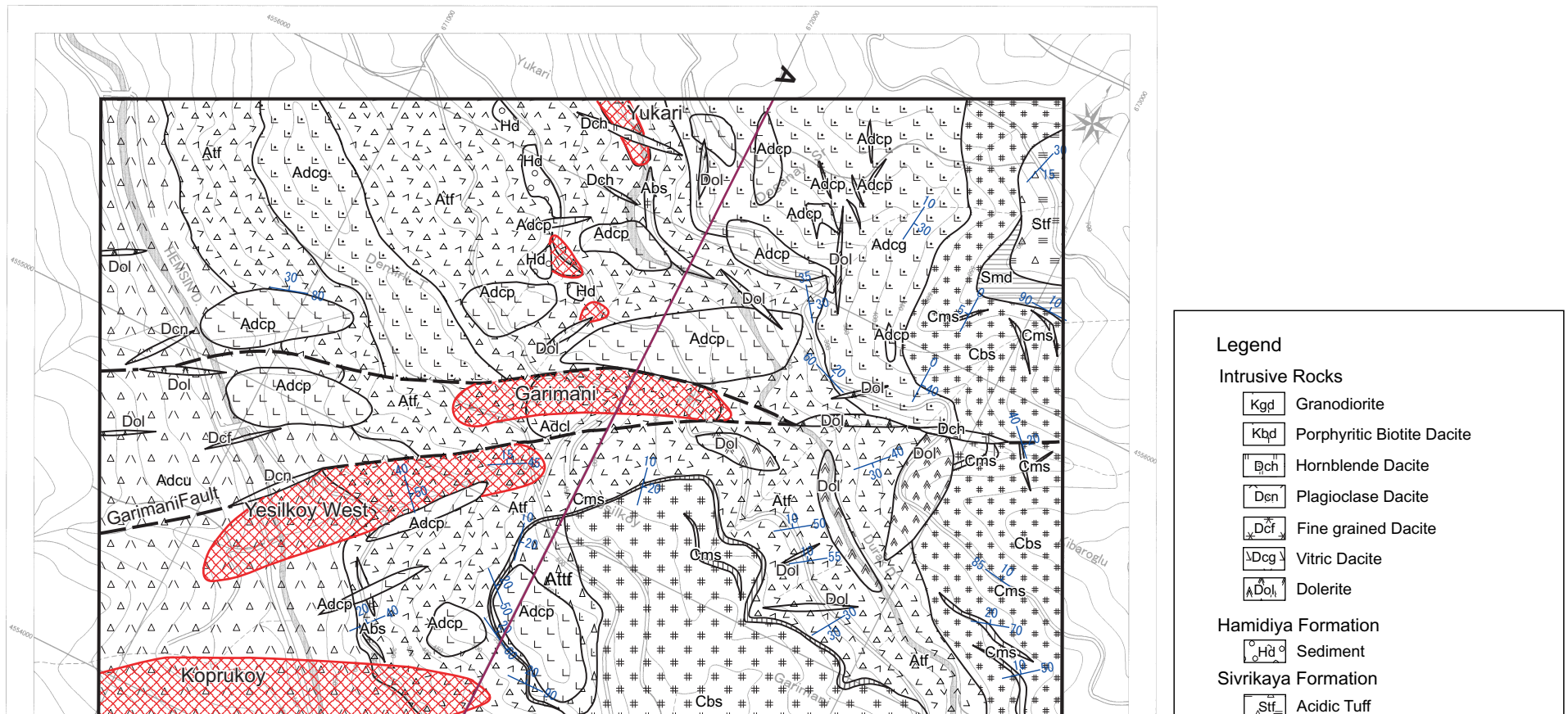
Intrusive Rocks
- Dcp — Porphyritic Dacite
- Dcpf — Porphyritic Dacite
- Dcb — Biotite Dacite
- Dol — Dolerite

Mineralization
- Mineralized Zone

Land Slide
- Tl — Talus

No.	Drilling No.	Depth(m) From	To		Au (ppm)	Ag (ppm)	Cu (%)	Pb (%)	Zn (%)	S (%)	Remarks
①	MJTH-1	113.50 –	115.00	1.50	0.001	0.08	<0.01	<0.01	<0.01	2.35	Argilized Purple Dacite. (Py) diss.
②	MJTH-2	342.20 –	342.40	0.20	0.034	3.35	0.02	0.02	0.02	3.20	Silicified Tuff Breccia. ((Cp)) diss.
③	MJTH-2	352.30 –	352.50	0.20	0.046	8.20	0.01	0.01	0.02	1.37	Silicified Tuff Breccia. ((Cp)) diss.
④	MJTH-3	271.30 –	273.00	1.70	0.009	1.14	<0.01	<0.01	0.01	1.24	Argilized TuffBreccia. (Py) diss.
⑤	MJTH-3	274.00 –	275.00	1.00	0.005	1.98	0.01	0.02	0.05	1.16	Silicified Tuff Breccia. (Py) diss.

Fig. Ⅱ-1-7 Geological Cross Section of the Tunca District



Legend

Intrusive Rocks
- Kgd Granodiorite
- Kbd Porphyritic Biotite Dacite
- Dch Hornblende Dacite
- Dcn Plagioclase Dacite
- Dcf Fine grained Dacite
- Dcg Vitric Dacite
- Dol Dolerite

Hamidiya Formation
- Hd Sediment

Sivrikaya Formation
- Stf Acidic Tuff
- Smd Fine Tuff/Mudstone

Cağlayan Formation
- Cmd Fine Tuff/Mudstone
- Ctf Acidic Tuff
- Cbtf Basic Tuff
- Cbs Basalt Lava
- Cms Calcarious Mudstone

Alemğac Formation
Upper Member
Purple Dacite
- Attf Dacitic Pyroclastics
- Adcg Green Dacite
- Adcp Purple Dacite

Lower Member
- Abs Basalt Lava
- Atf Dacitic Pyroclastics
- Adcl Dacite lava
- Adcu Aphyric Dacite

- 20 80 Strike and Dip
- Fault
- Mineralized Zone
- A—A' Cross Section Line

Fig. Ⅱ-1-8 Geological Map of the Garimani Area

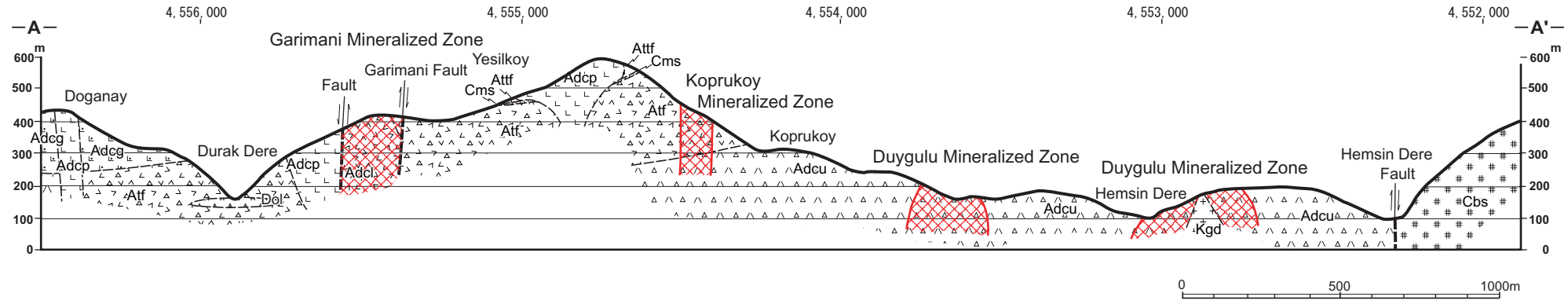


Fig. Ⅱ-1-9 Geological Cross Section of the Garimani Area

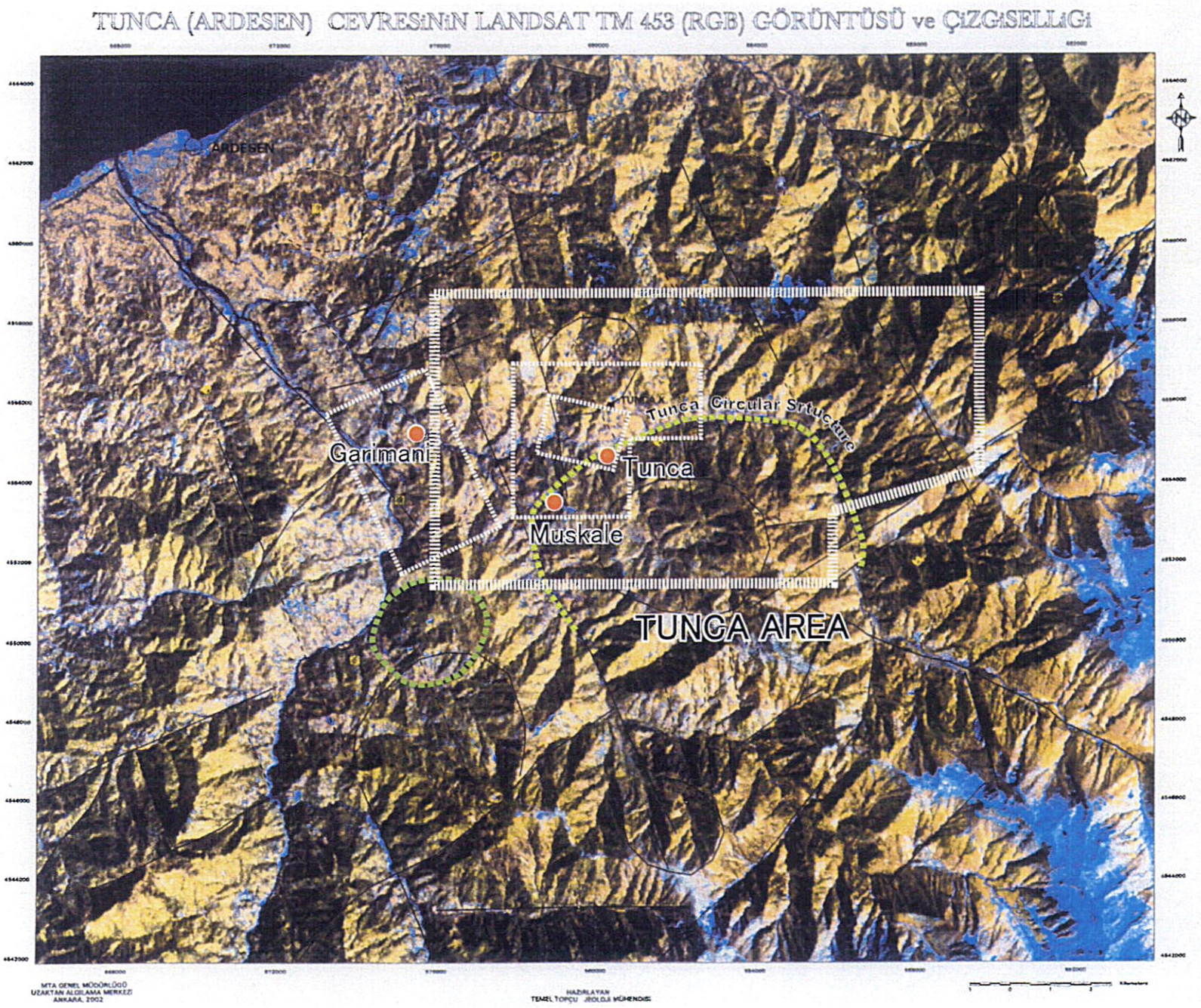


Fig. Ⅱ-1-10 Photogeological Map and LANDSAT TM Image of the Tunca Area