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アルゼンティン共和国

ネウケン州北部地熱開発計画調査

(第3年次)

最終報告書

(付図集)

1984年11月

国際協力事業団

国際協力事業団	
受入 月日 '85. 4. 25	701
登録No. 11378	643
	MPN

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1. 総 説

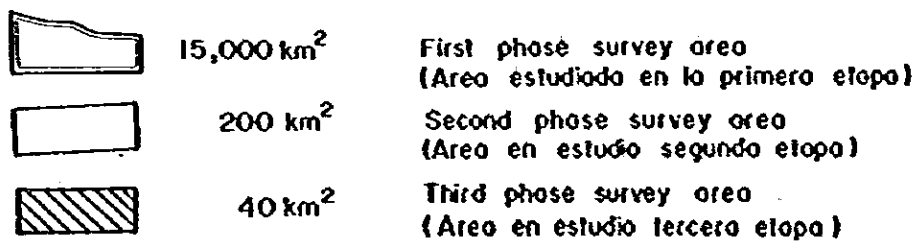
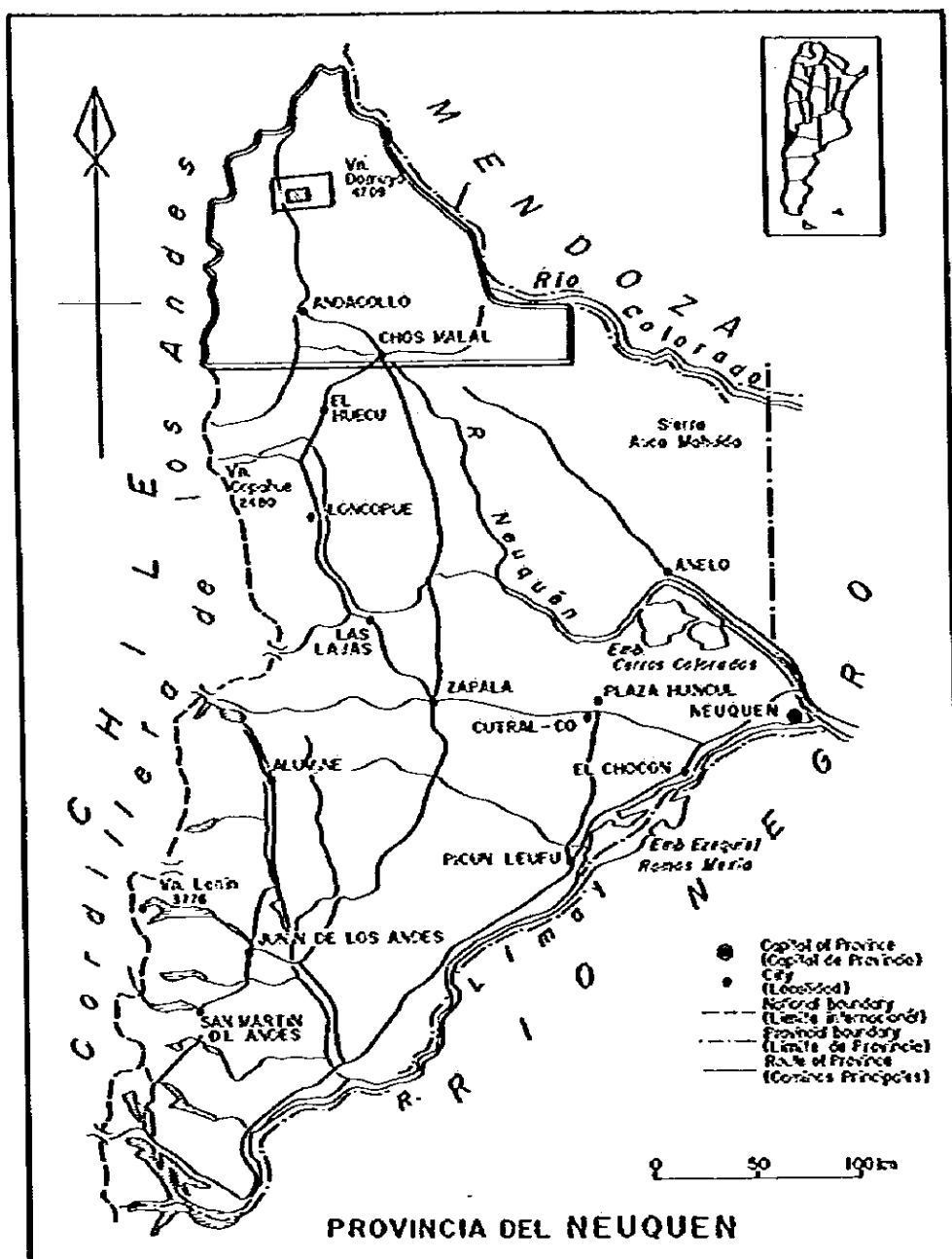


Fig. 1-1 Location map of the survey areas

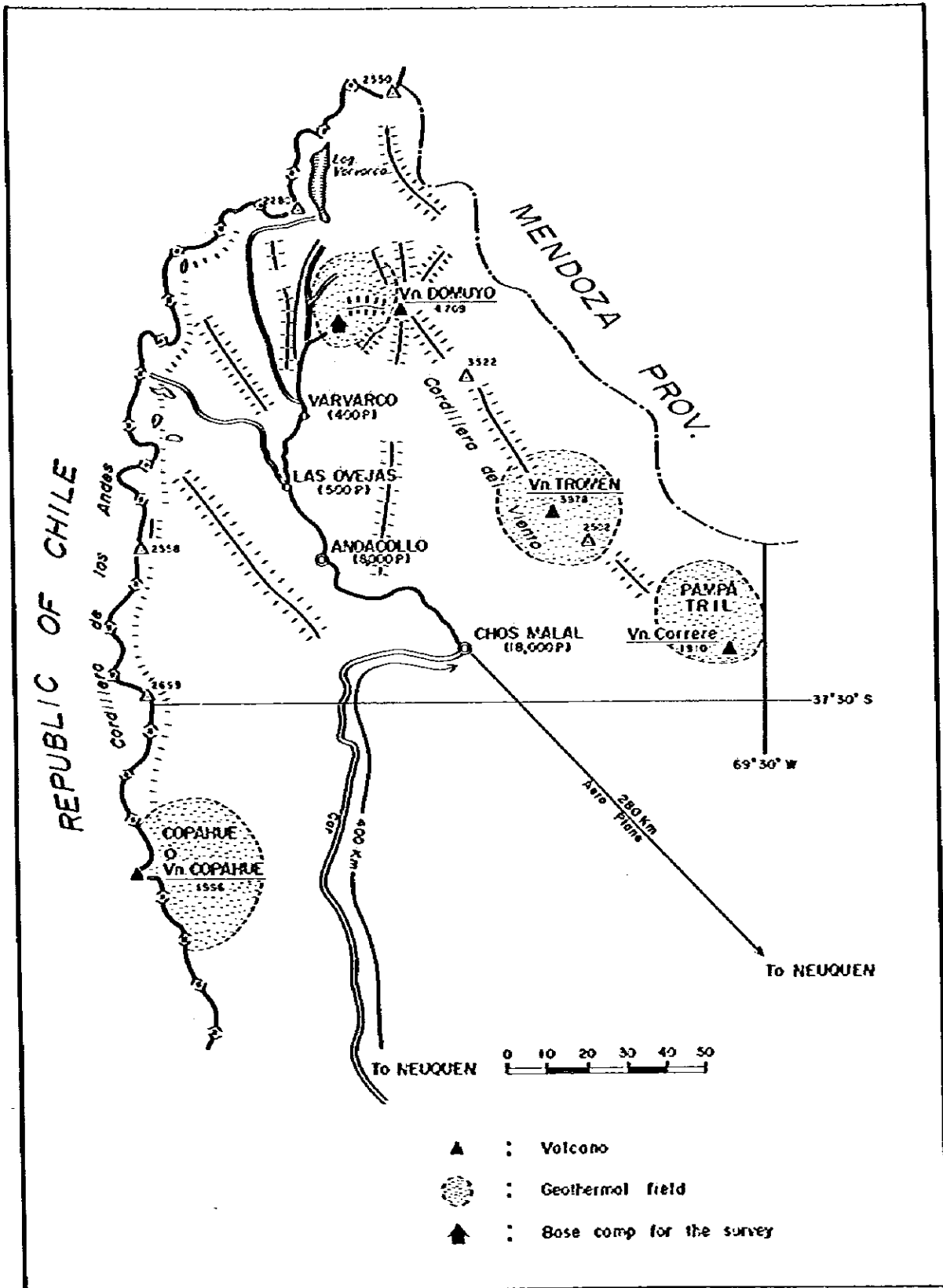
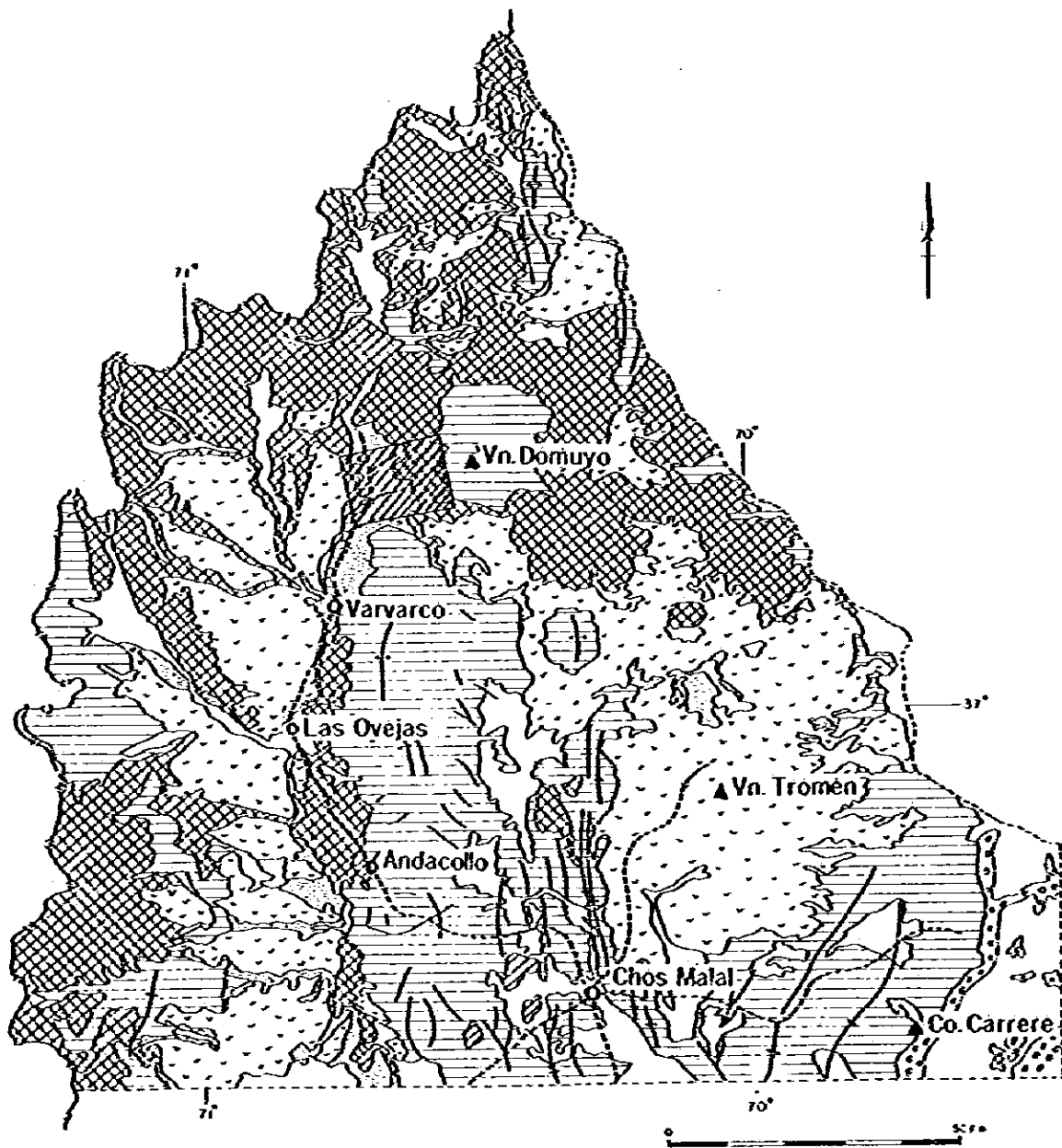


Fig. 1-2 Explanatory map of northern parts of the Province of Neuquén

2. 第1次調査(広域調査)の概要



REGENO











Quaternary		Alluvia		Folding axis
		Andesite, Basalt		Road
Tertiary		Andesite, Basalt, Rhyolite		Selected area: 200 Km ²
		Andesite (volcanics, pyroclastics)		Village
		Andesite, Dacite		
Pre-Tertiary		Basement		

Fig. 2-1 Geological interpretation map of Landsat image



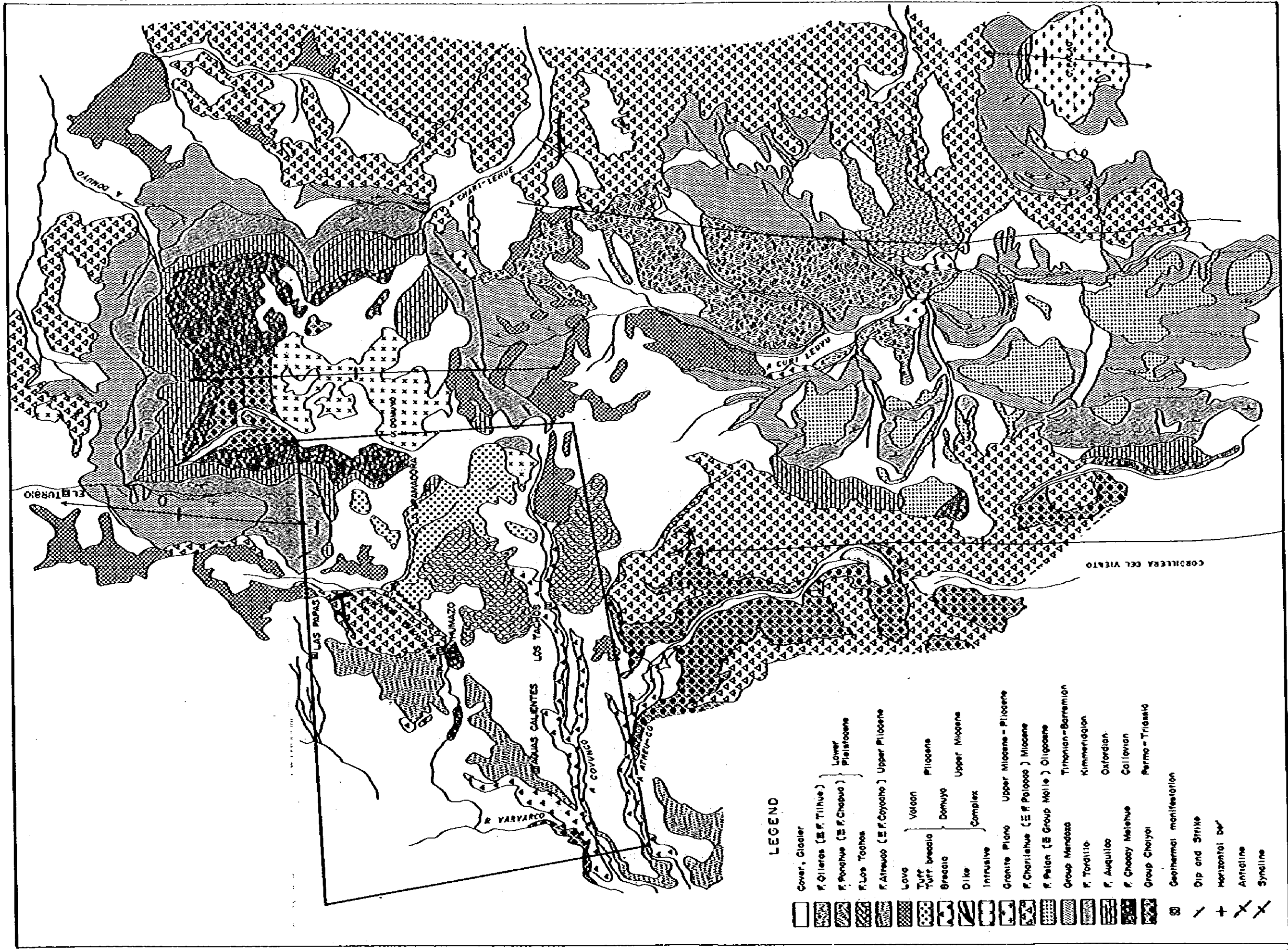


Fig. 2-2 Regional geological map

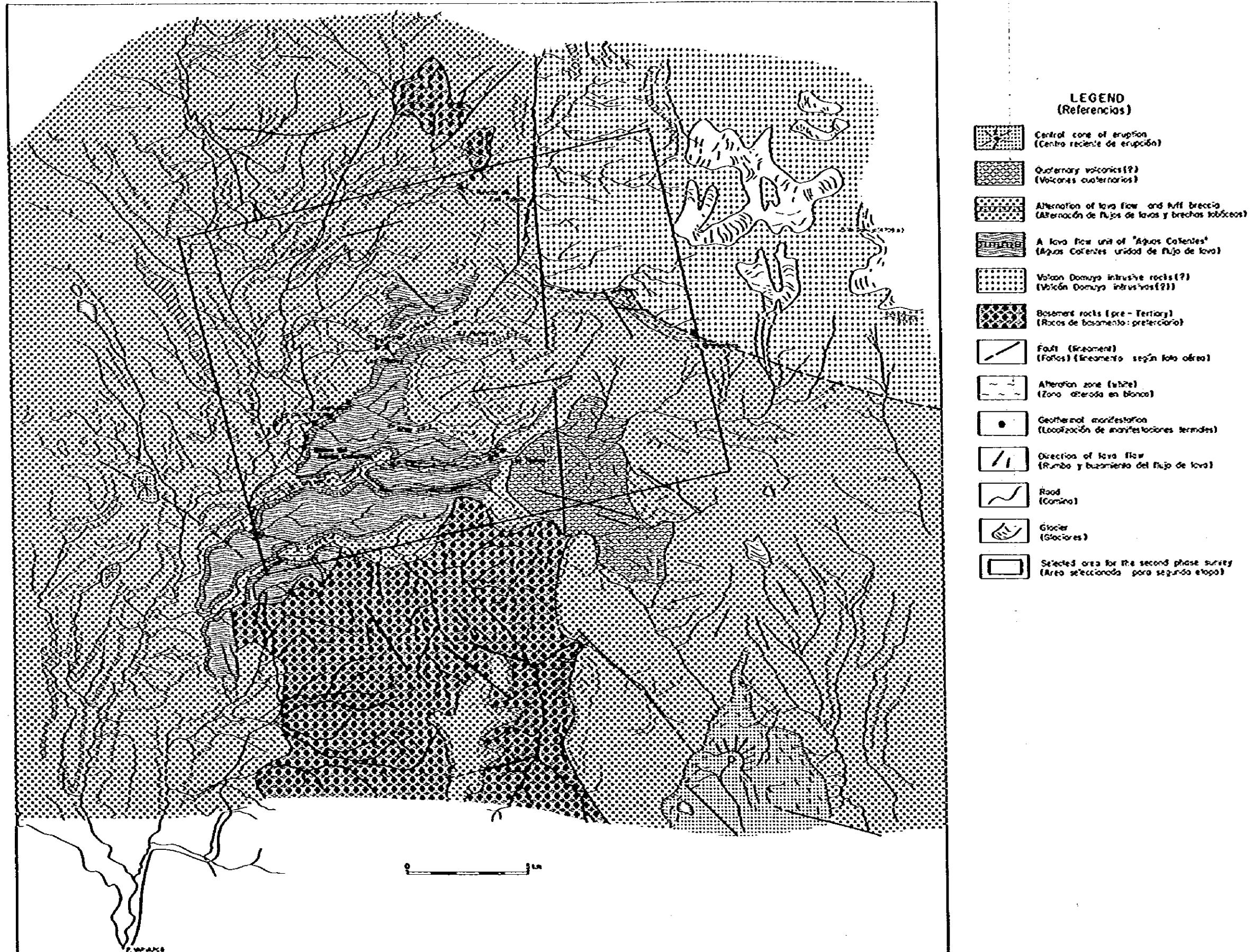
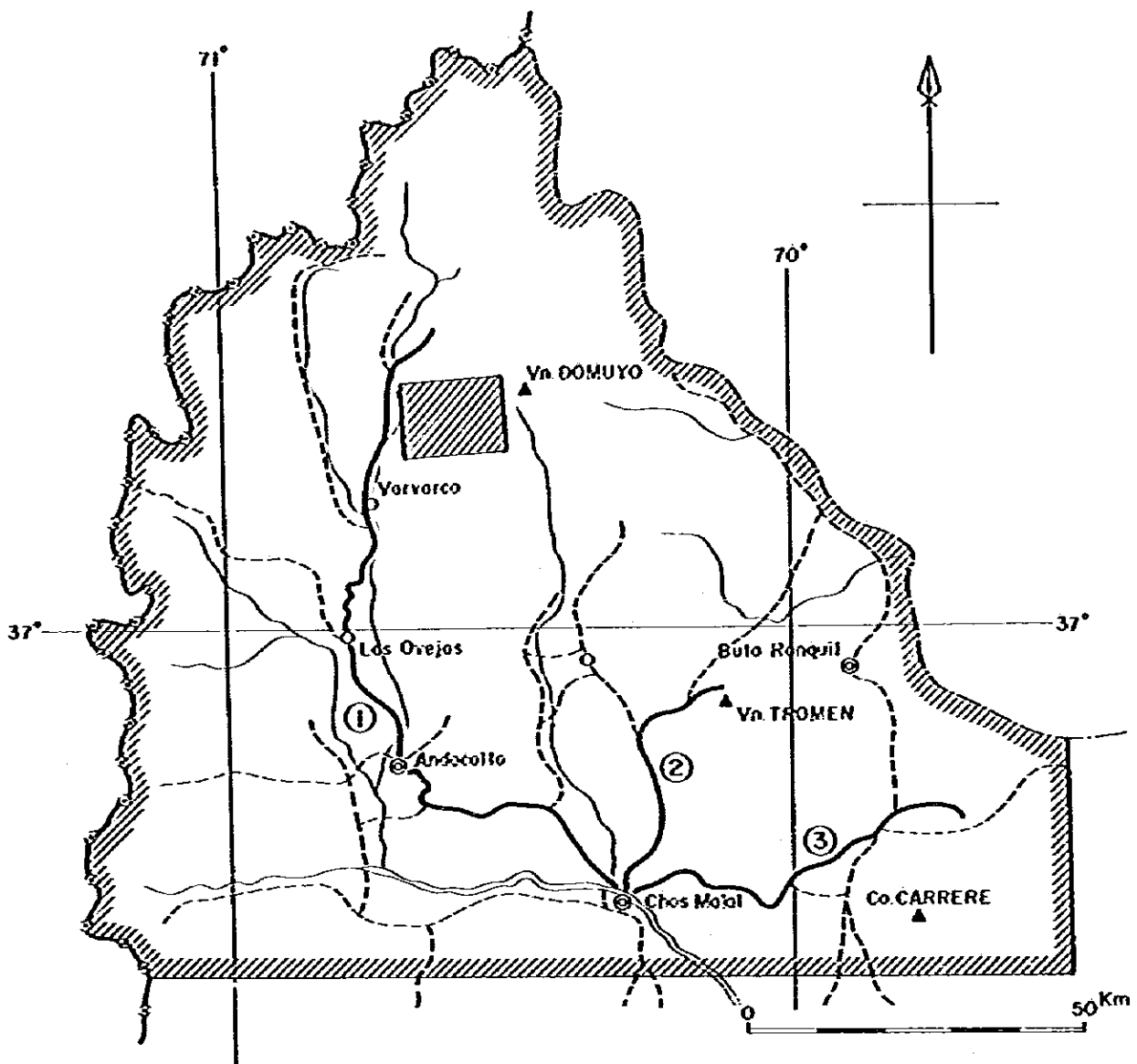


Fig. 2-3 Geological interpretation map of aerial photographs




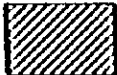

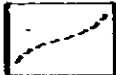
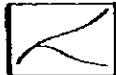
- 
 First phase survey area : 15,000Km²
 (Limite del area de 15,000Km²)
- 
 Second phase survey area : 200Km²
 (Area seleccionada de 200Km²)
- 
 Routes of reconnaissance geological survey
 (Rutas de reconocimiento efectuadas)
- 
 Roads
 (Rutas y accesos a la zona)
- 
 Rivers
 (Detalle de drenaje)

Fig. 2-4 Map of the survey areas and routes of reconnaissance geological survey



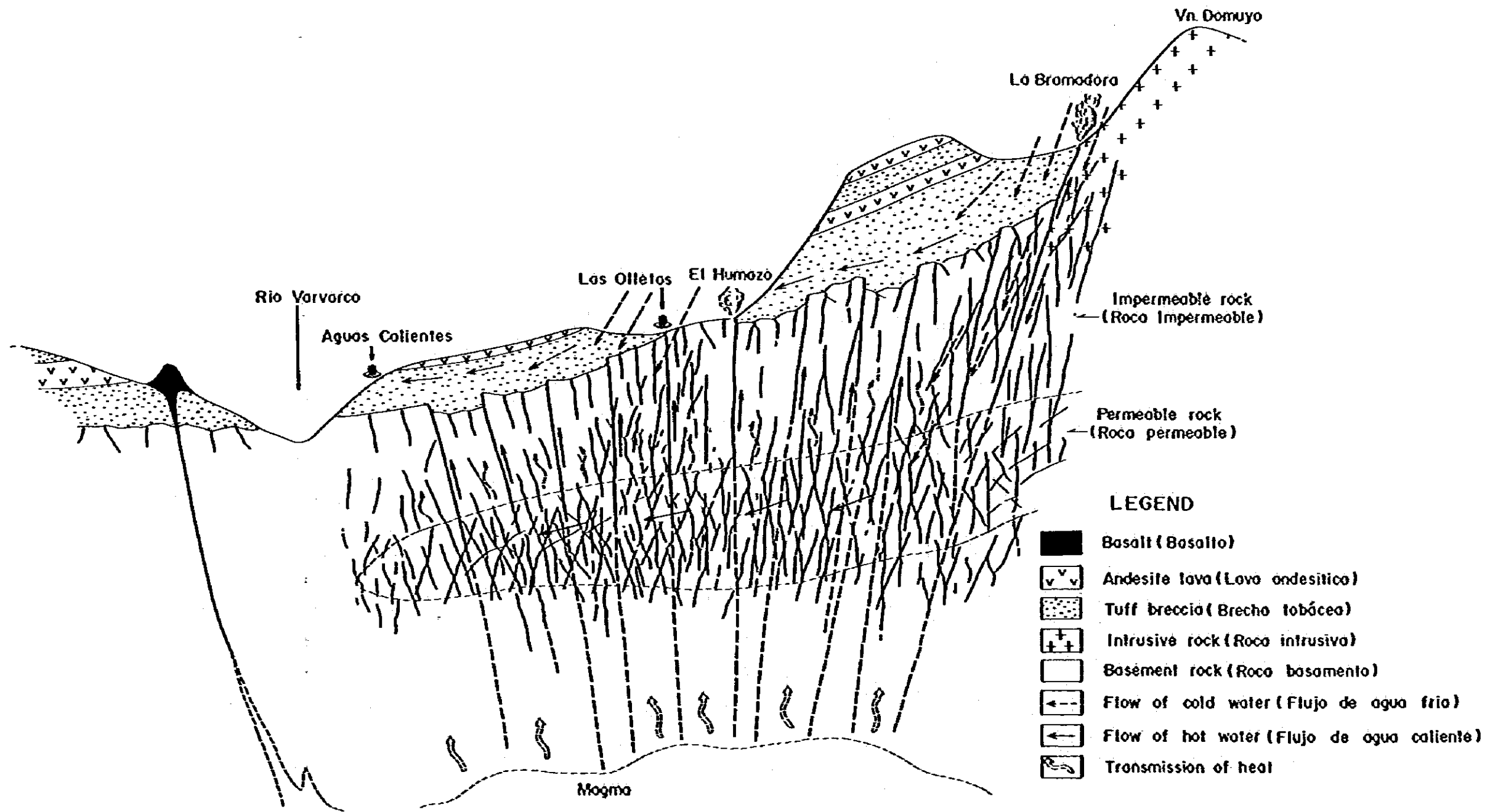


Fig. 2-5 Schematic profile of geology and geothermal system

3. 第2次調査の概要

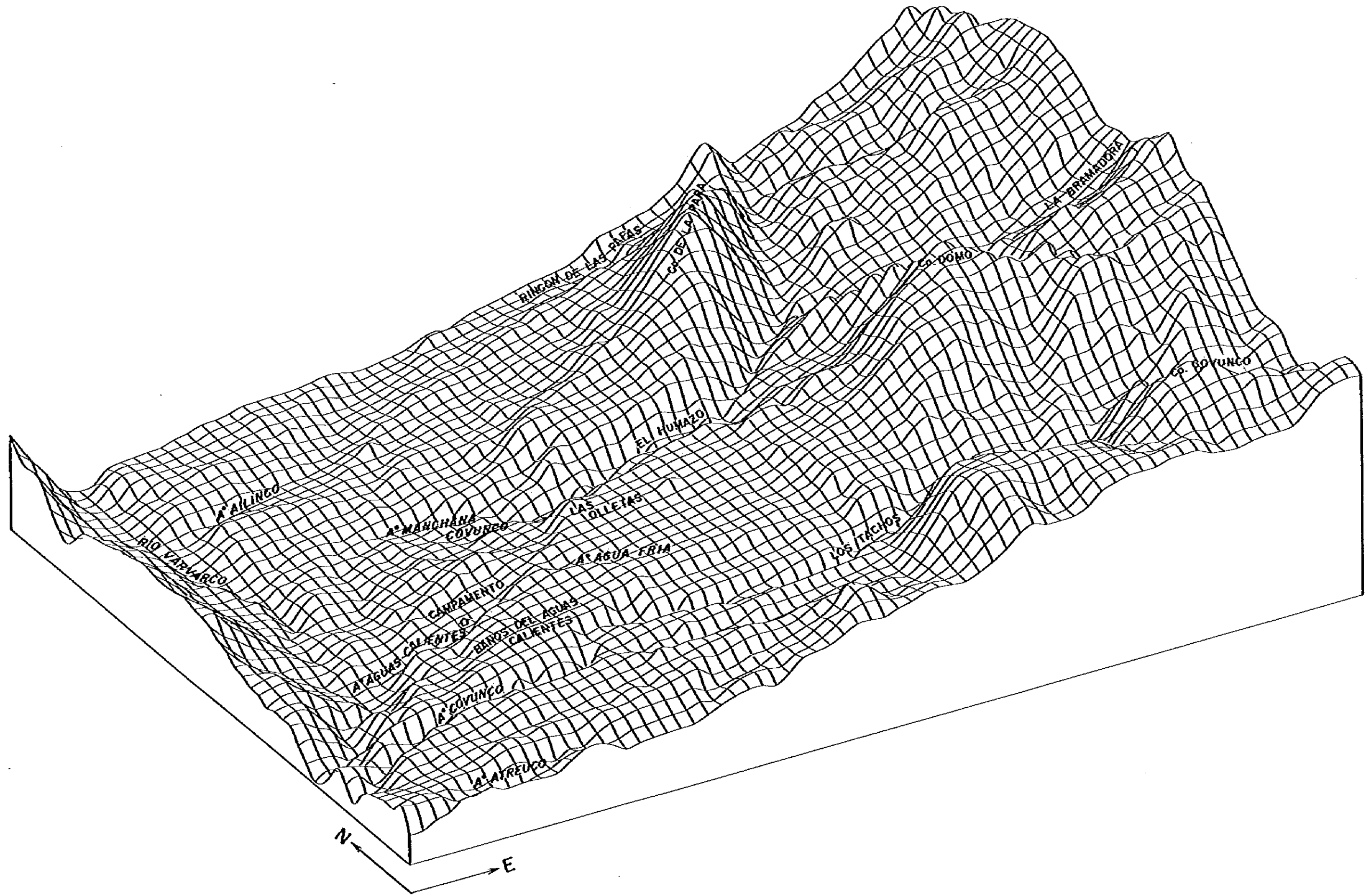
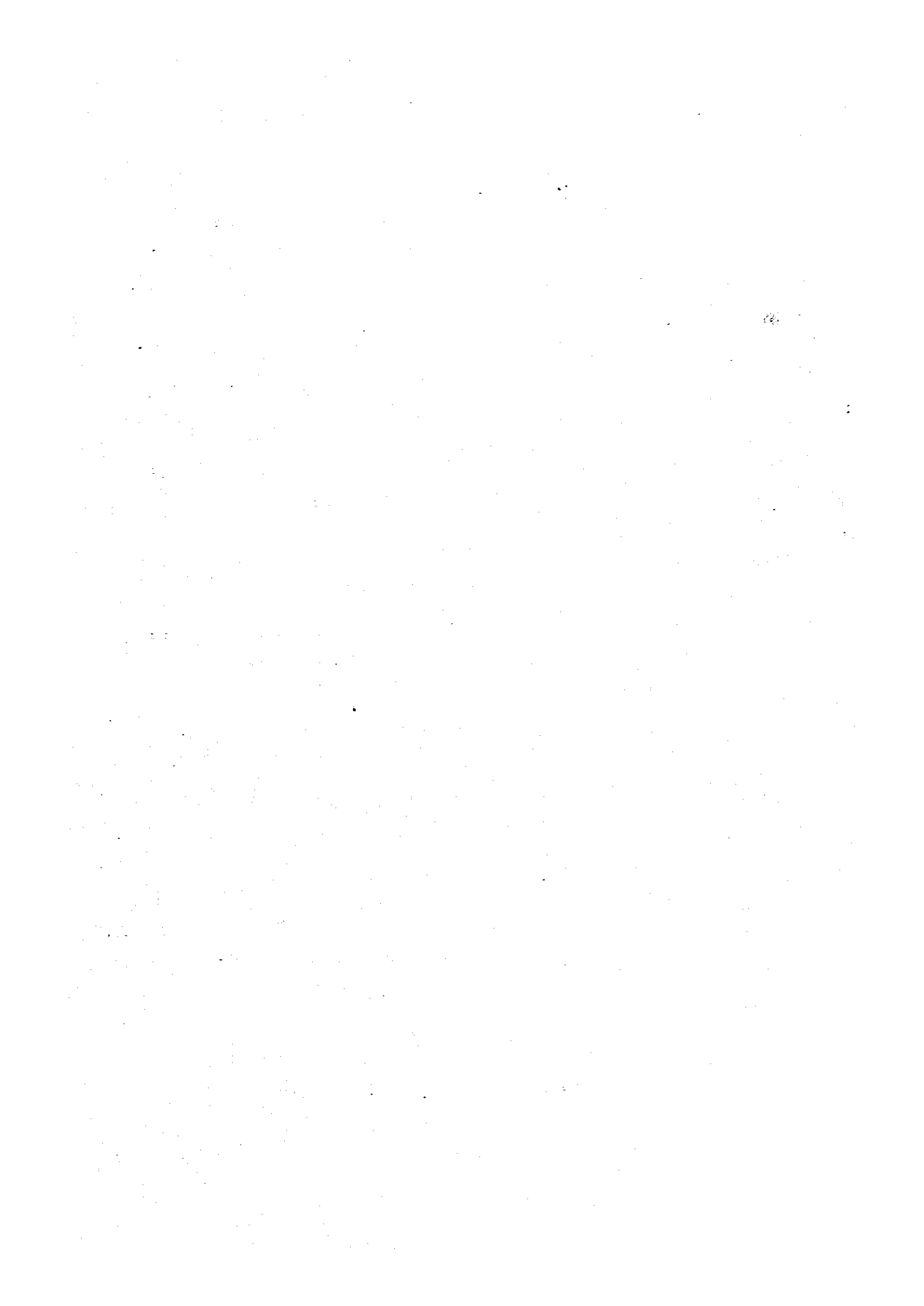
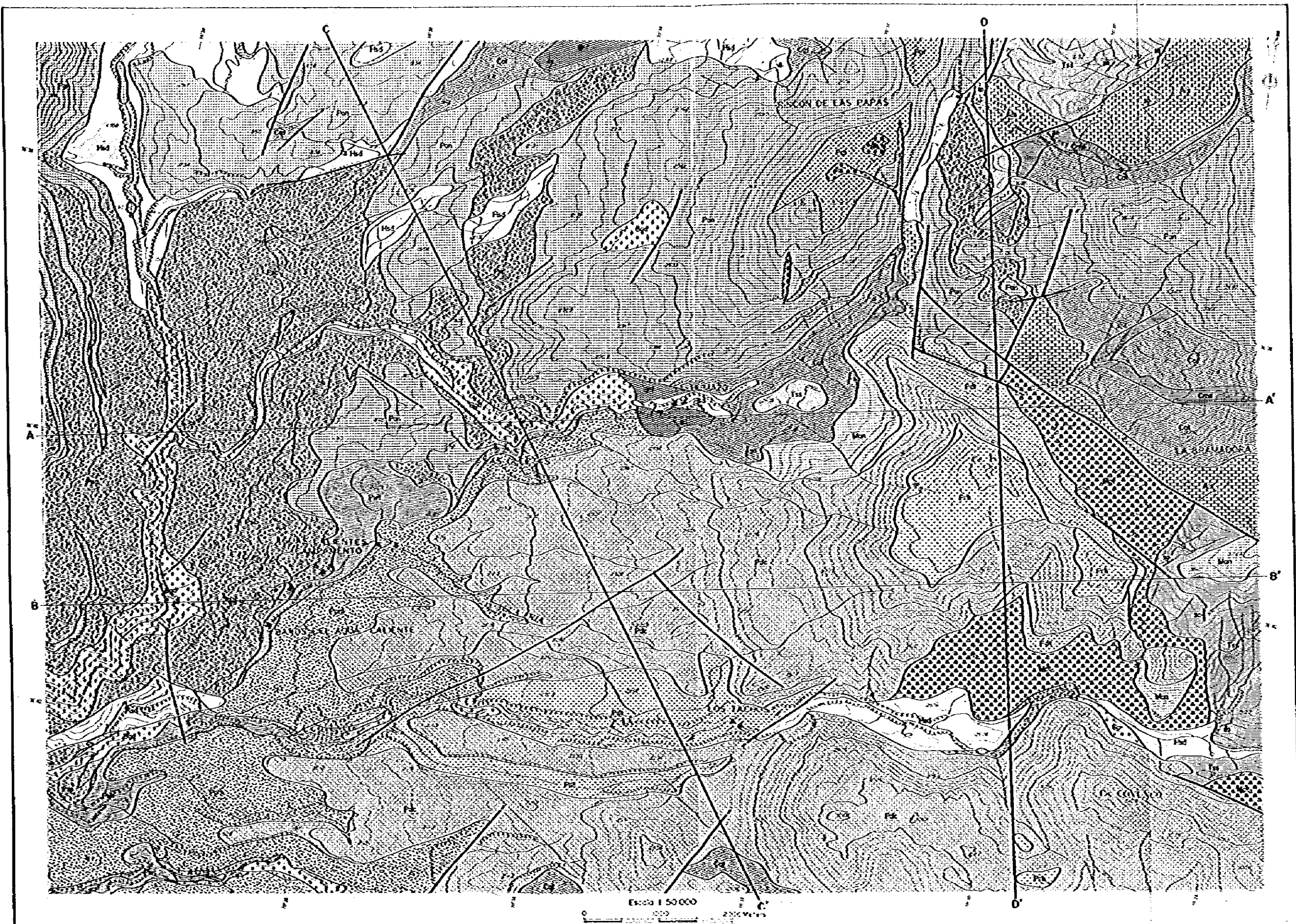


Fig.3-1-1 Bird's-eye view map of the survey area

Época		Formación	Columna Geológica	Espesor	Litología	Observaciones
Cuaternario	Holoceno				Arenas, Gravas, Terrazas Depósitos glaciales (Aluvial)	
	Pleistoceno	Megrolítico Ocoite		200 m 1,200 m	Lava silícea (con parte pumicea) Lava básica (Incluye brecha perlítica) Brecha tabeada básica	Distribución: Mitad Austral del Área Estudiada
Terciario - Cuaternario	Plioceno - Pleistoceno	Piroclásticos ácidos F. Sierra de Flor F. Atreuco		200 m 1,000 m	Toba pumicea Brecha volcánica andesítica Dique andesita Toba soldada Brecha tabeada andesítica (Toba oscura) Lava andesita	Distribución: Mitad Noroeste del Área Estudiada
Terciario		Volcanismo andesita		100 m 500 m	Lava andesita Dique pérfido granodiorita Brecha tabeada andesita	Localidad: Este del Co Ocho o Los Tachos
Jurásico	Malm Dogger	F. Terdita		100 m 450 m	Toba fina básica, Toba gruesa Galiza, Uña Colón (Marga?), Arcilla roja - verde (granulosa) - Falsa roja - verde	Localidades: Sector de La Branda Este del Co Ocho
		F. Arquico		100 m 500 m	Falsa blanqueada grano medio y Arcilla verde Celiza Bancos de yeso	Localidad: Sector de La Branda
		F. Chocoy Melanca		550 m 1,000 m	Falsa roja Brecha tabeada andesítica Falsa roja Lava andesítica Toba lapilítica andesítica Arcilla roja fina de 1-2m de espesor Lava basáltica Toba lapilítica basáltica - andesítica	Localidades: Este de los Sectores El Huma y La Branda Oeste de Rinca de los Pepes
		Basoandito			Hornos pérfido y psamítico Hornos básicos (en parte andesita) (recristalizado por metamorfismo de contacto) Esquistos pérfido y psamítico Granito estético Granodiorita (Incluye Toba silicificada) Dique basáltico	Pieloncino del Intrusivo Varvarco Localidades: El Huma Oeste de Rinca de los Pepes Localidades: Río Varvarco A Atreuco, A Curruco, A Monchano Curruco.

Fig. 3-2-1 Geological columnar section of the survey area





LEGEND

Quaternary	Q1	Sand, gravel
	Q2	Rhyolite tuff
	Q3	Loess
	Q4	Loess
Pleistocene	P1	Andesitic tuffic breccia
	P2	Andesite
	P3	Andesitic tuff
	P4	Andesitic tuff
	P5	Andesitic tuff
Tertiary	T1	Andesite tuff
	T2	Andesitic tuff breccia
Jurassic	J1	Red sandstone, dacitic tuff, limestone
	J2	Limestone, sandstone, mudstone, gypsum
	J3	Black mudstone
	J4	Andesitic tuff breccia, sandstone
Basement	B1	Granite
	B2	Granite
Metamorphic rocks	M1	Andesite
	M2	Granite porphyry
		Bedding plane
		Fault
		Section line

Fig.3-2-2 Geological map of the survey area

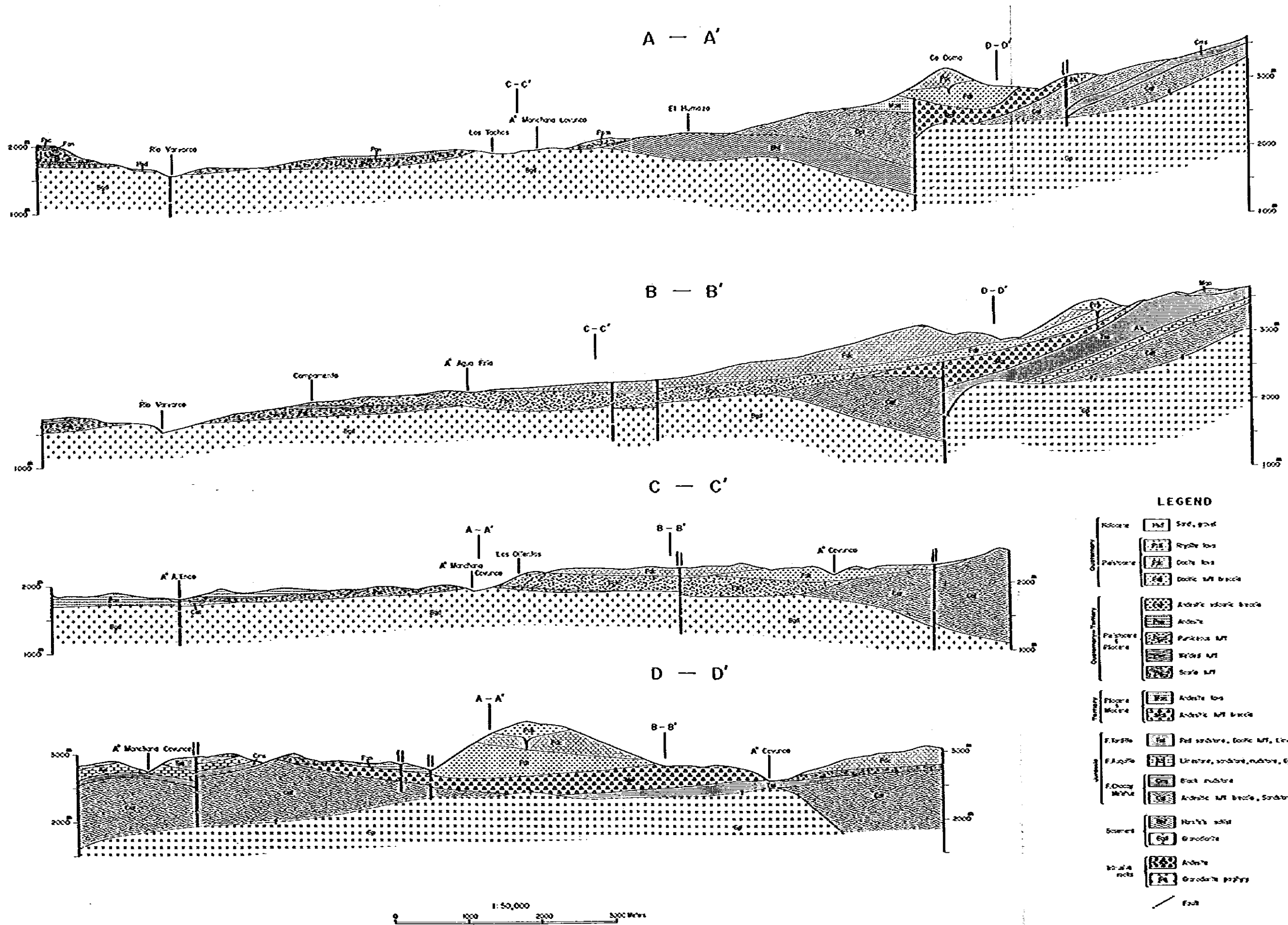
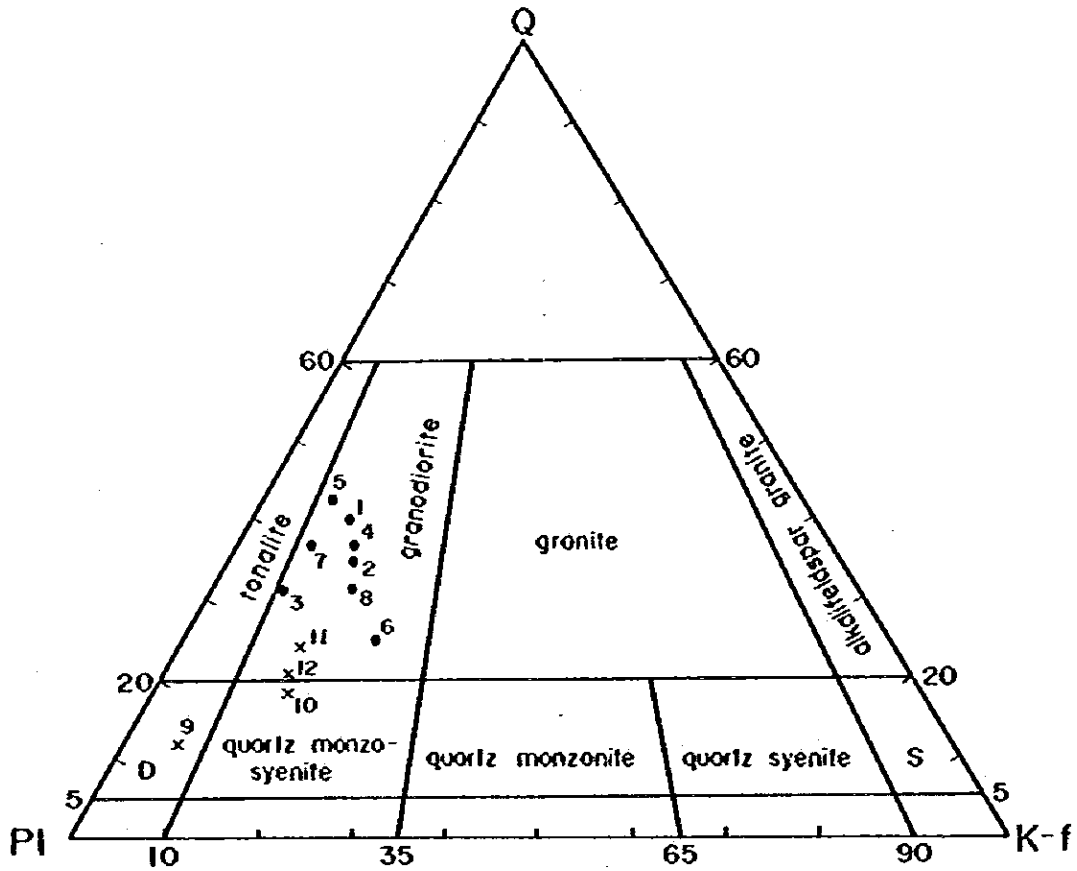


Fig.3-2-3 Geological cross-sections

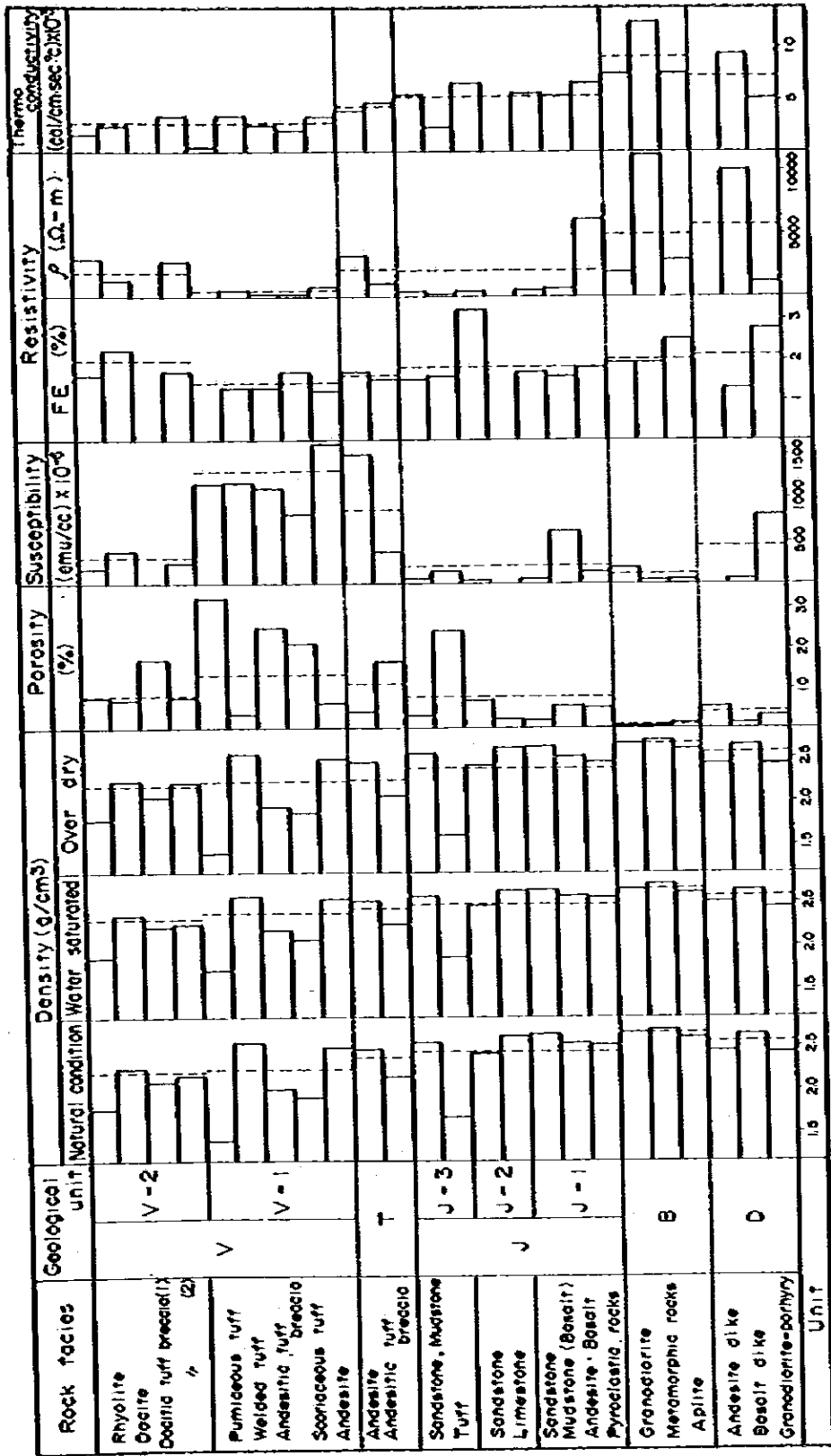


Vorvorco intrusive	{	1 : F-1	5 : TM-11
		2 : F-26	6 : TM-16
		3 : F-42-2	7 : TM-27
		4 : TM-8	8 : 83-2-12-5
Domuyo complex	{	9 : F-14	10 : TM-12
		11 : TM-48	12 : TM-201

D : quartz diorite etc

S : alkali feldspar-quartz syenite

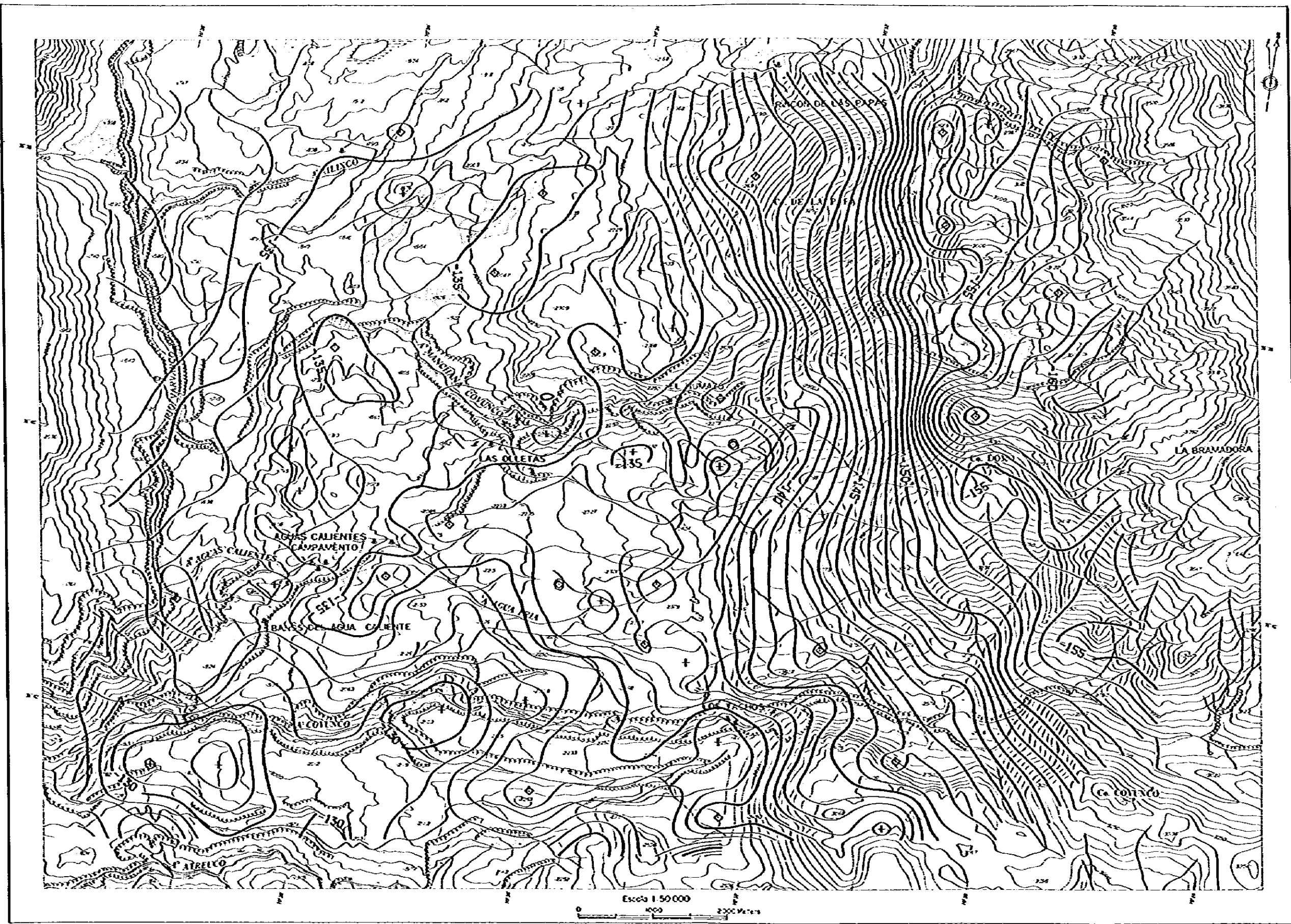
Fig. 3-2-4 Modal diagram of quartz - potash feldspar - plagioclase



Mean value of rock facies, ----- Mean value of geological unit

- V : Quaternary - Tertiary
- V-2 : Pleistocene, Volcanics of Co. Como
- V-1 : Pleistocene - Pliocene, Acidic Pyroclastics
- Sierra de Flores Formation
- Atreuco Formation
- T : Tertiary, Pliocene - Miocene, Andesite
- J : Jurassic, Dogger - Malm, J-3 : Torralba Formation
- J-2 : Aduclico Formation
- J-1 : Chocoy Melahue Formation
- B : Basement
- D : Dike rock etc.

Fig. 3-2-5 Physical properties of rocks



- LEGEND**
- Station by level and theodolite
 - △ Station by barometer
 - + Anomaly maximum
 - ◇ Anomaly minimum
 - Contour interval 10m

Fig. 3-3-2 Bouguer anomaly map ($\rho = 2.30 \text{ g/cm}^3$)

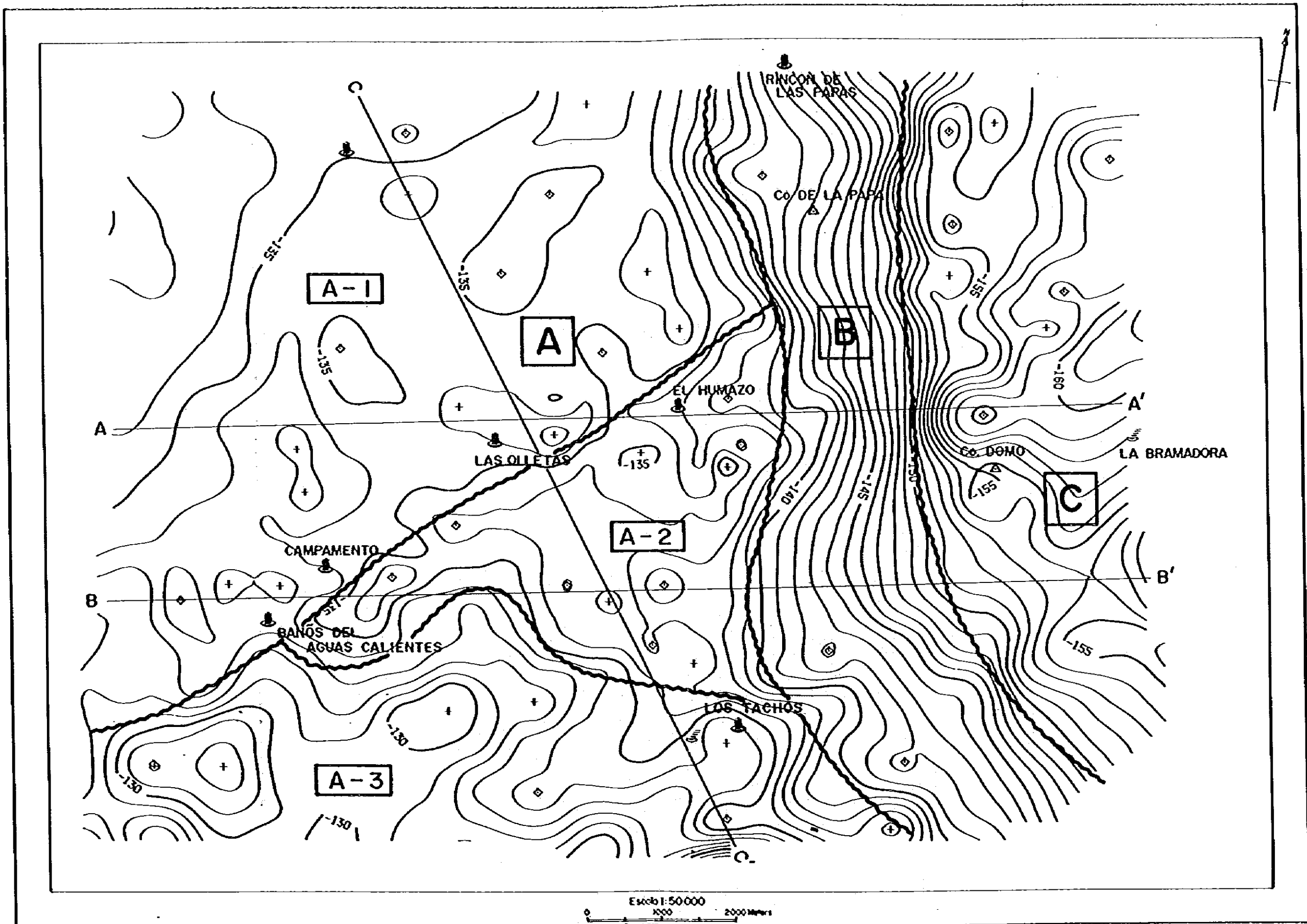


Fig. 3-3-3 Zoning of Bouguer anomaly map

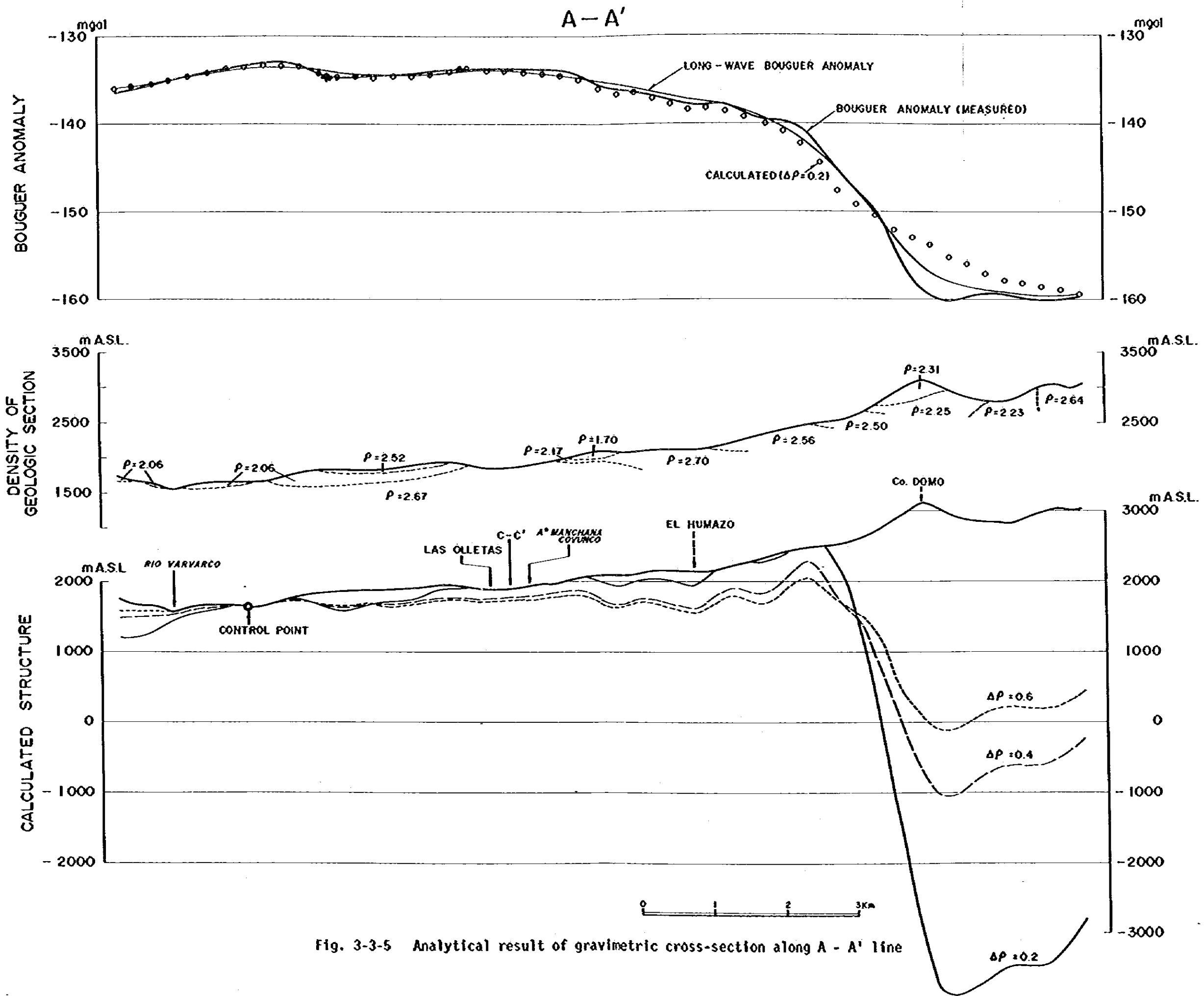


Fig. 3-3-5 Analytical result of gravimetric cross-section along A - A' line

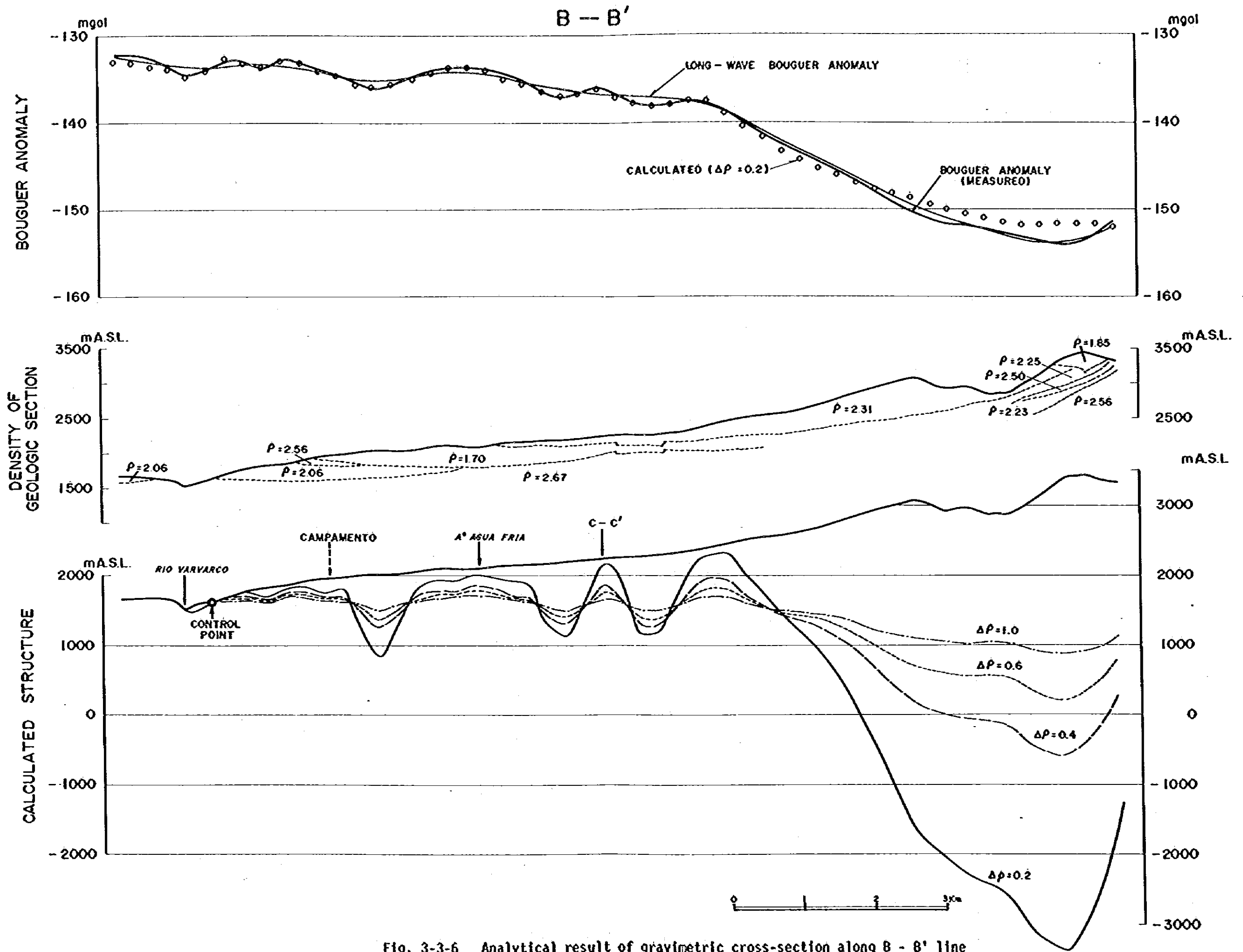


Fig. 3-3-6 Analytical result of gravimetric cross-section along B - B' line

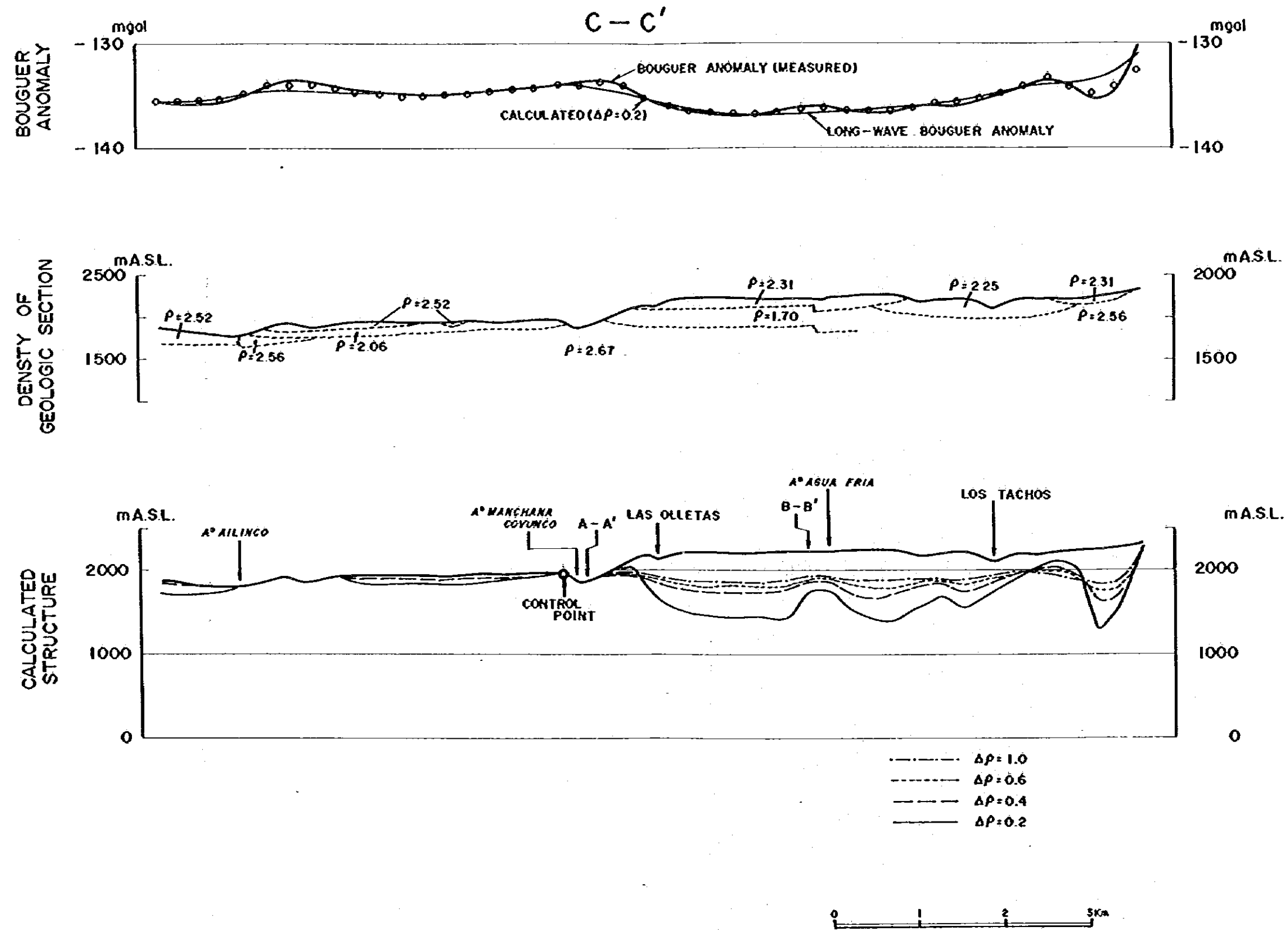


Fig. 3-3-7 Analytical result of gravimetric cross-section along C - C' line

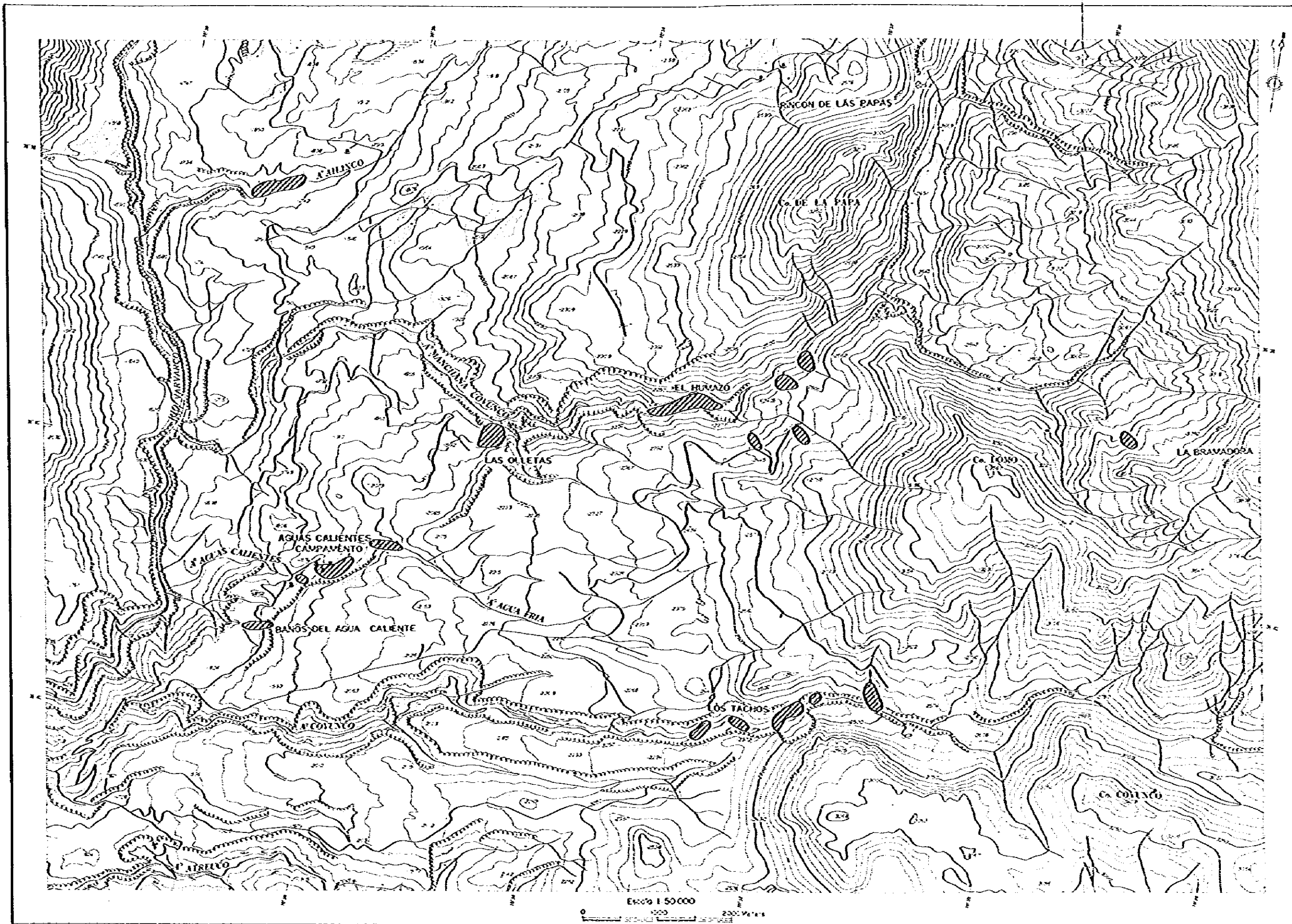


Fig.3-4-1 Location map of alteration zones

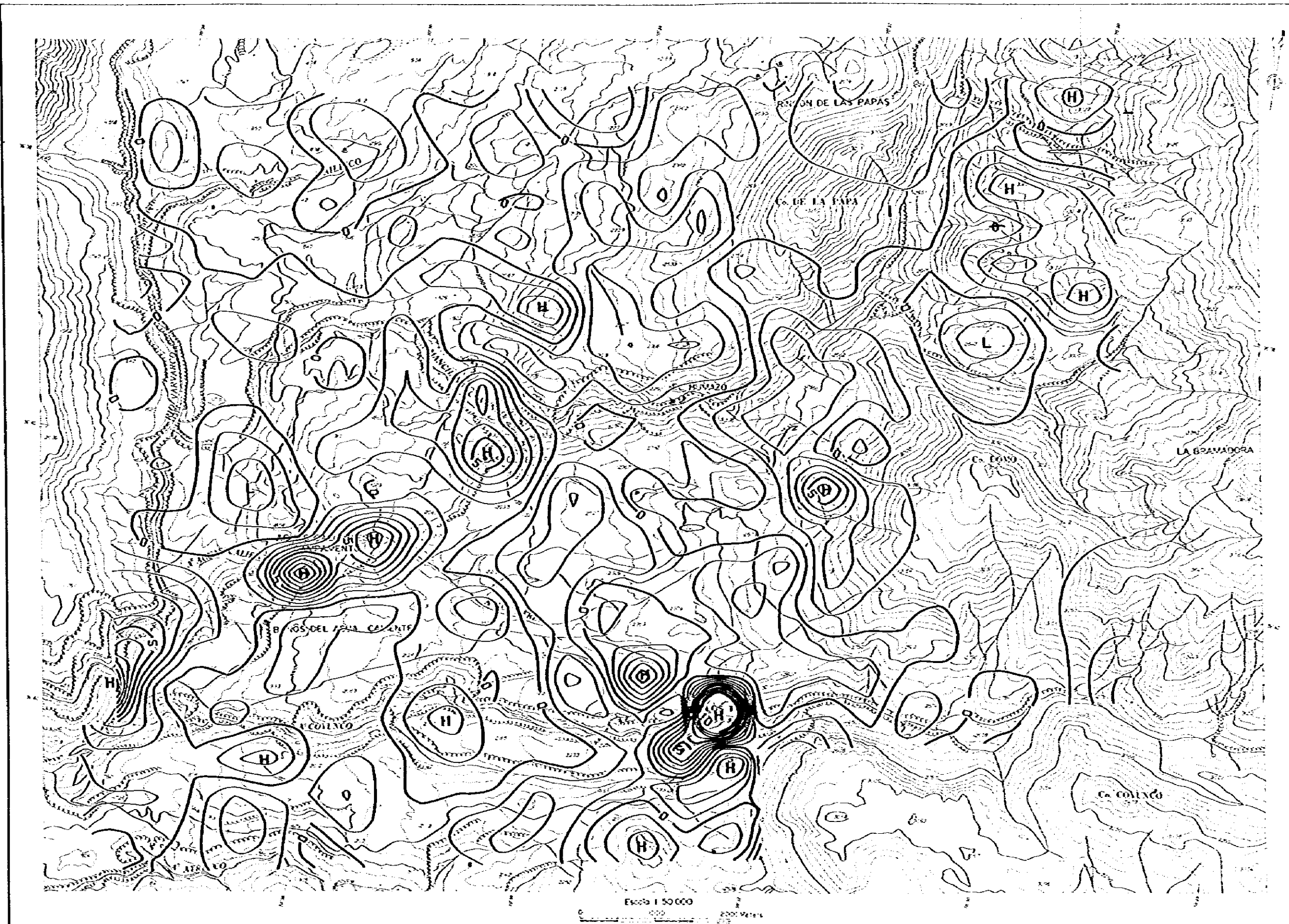


Fig.3-4-2 Distribution map of residual ground temperature at 1 meter depth (calculated by linear equation)

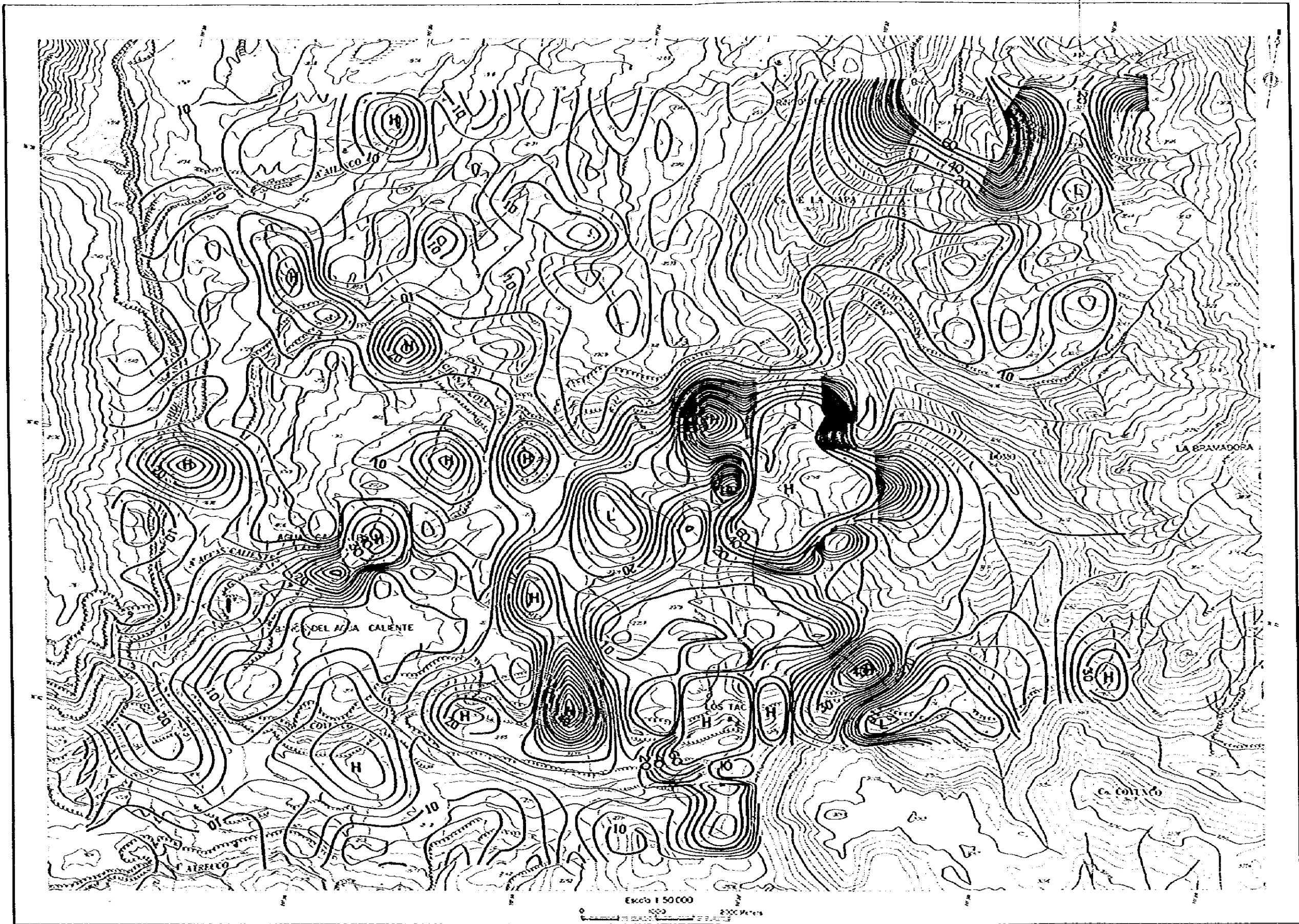


Fig.3-4-3 Distribution map of Hg - concentration in soil

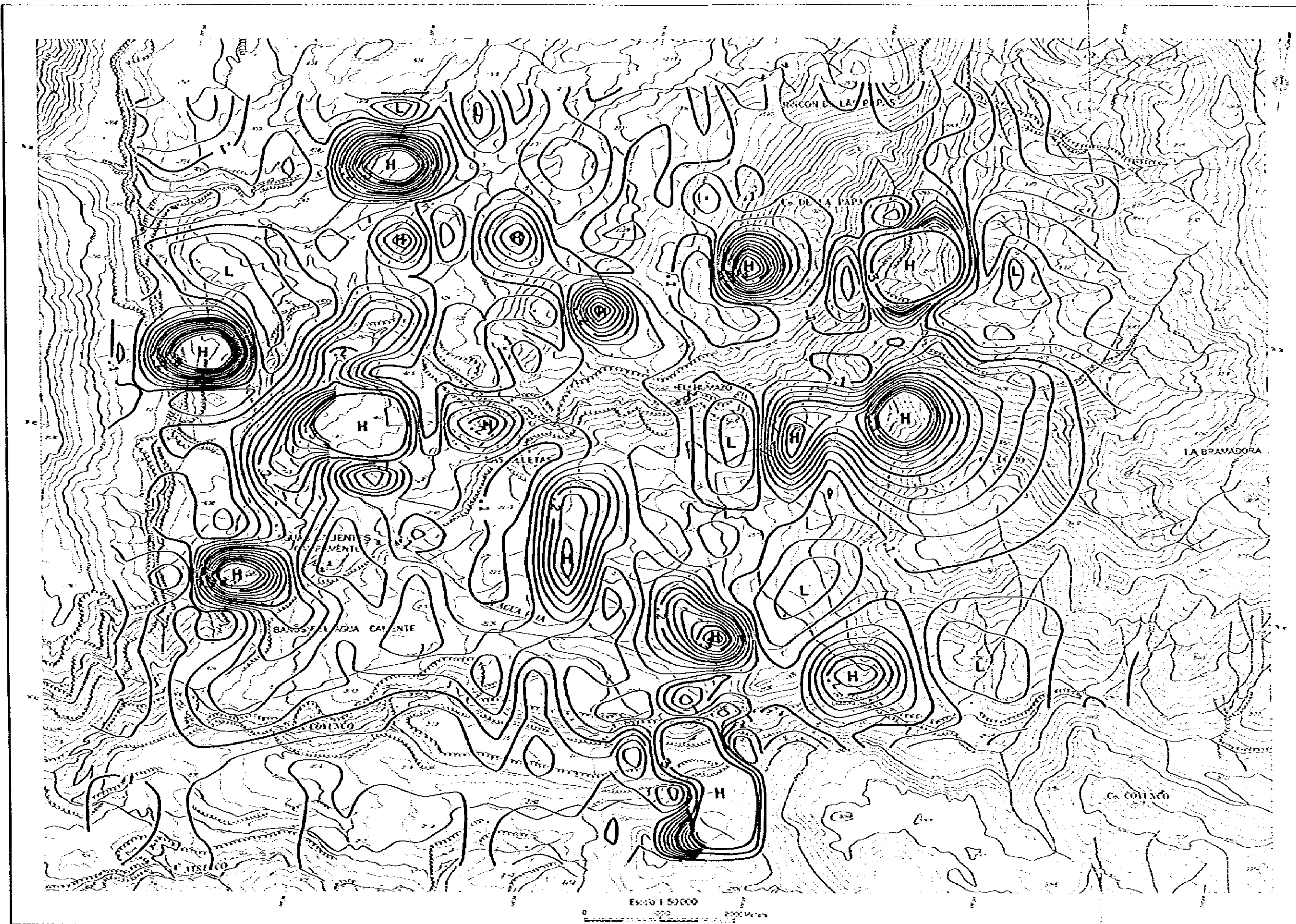


Fig.3-4-4 Distribution map of CO₂ - concentration in soil-air

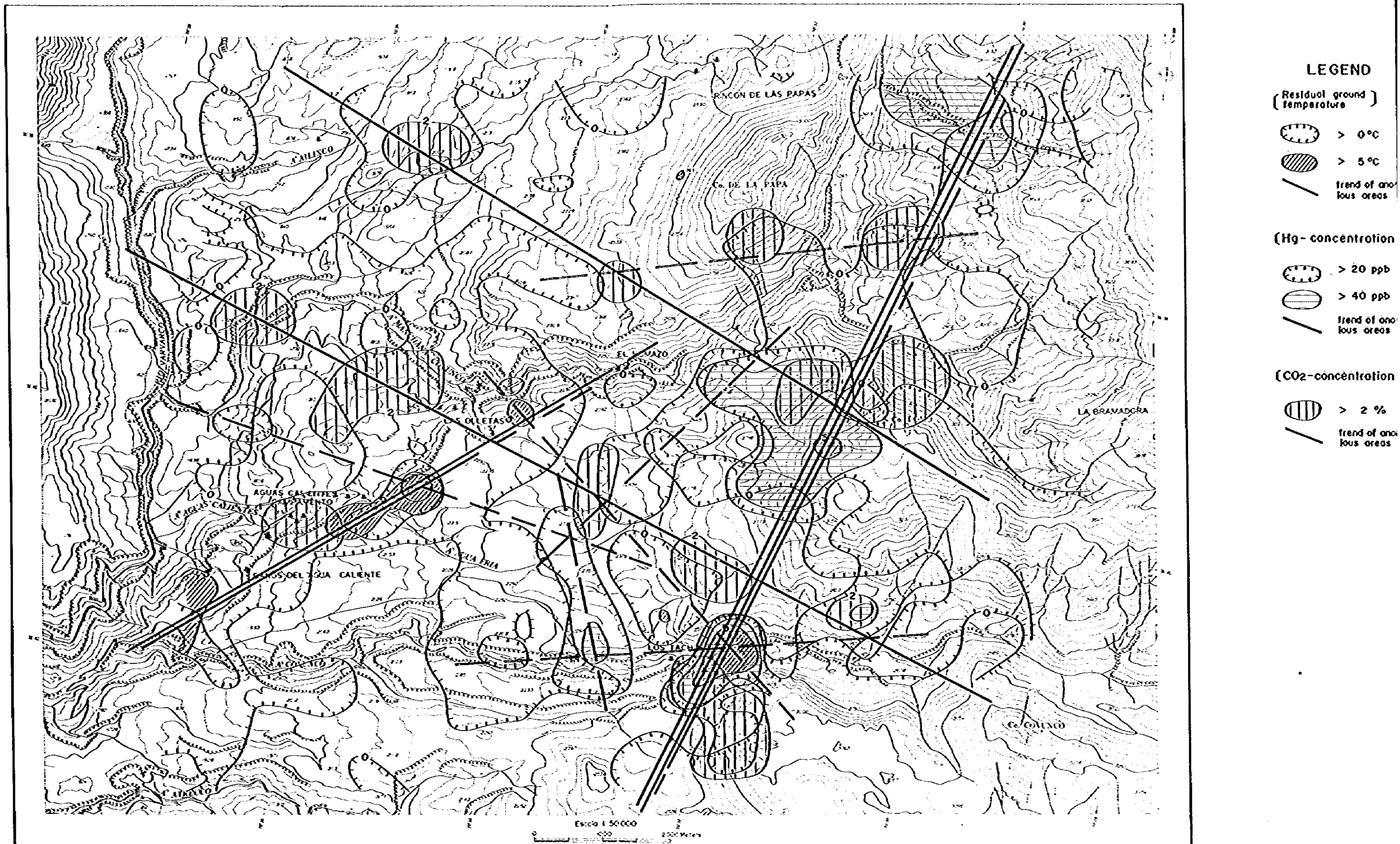


Fig.3-4-5 Composite map of anomalous areas of ground temperature and Hg - CO₂ geochemistry

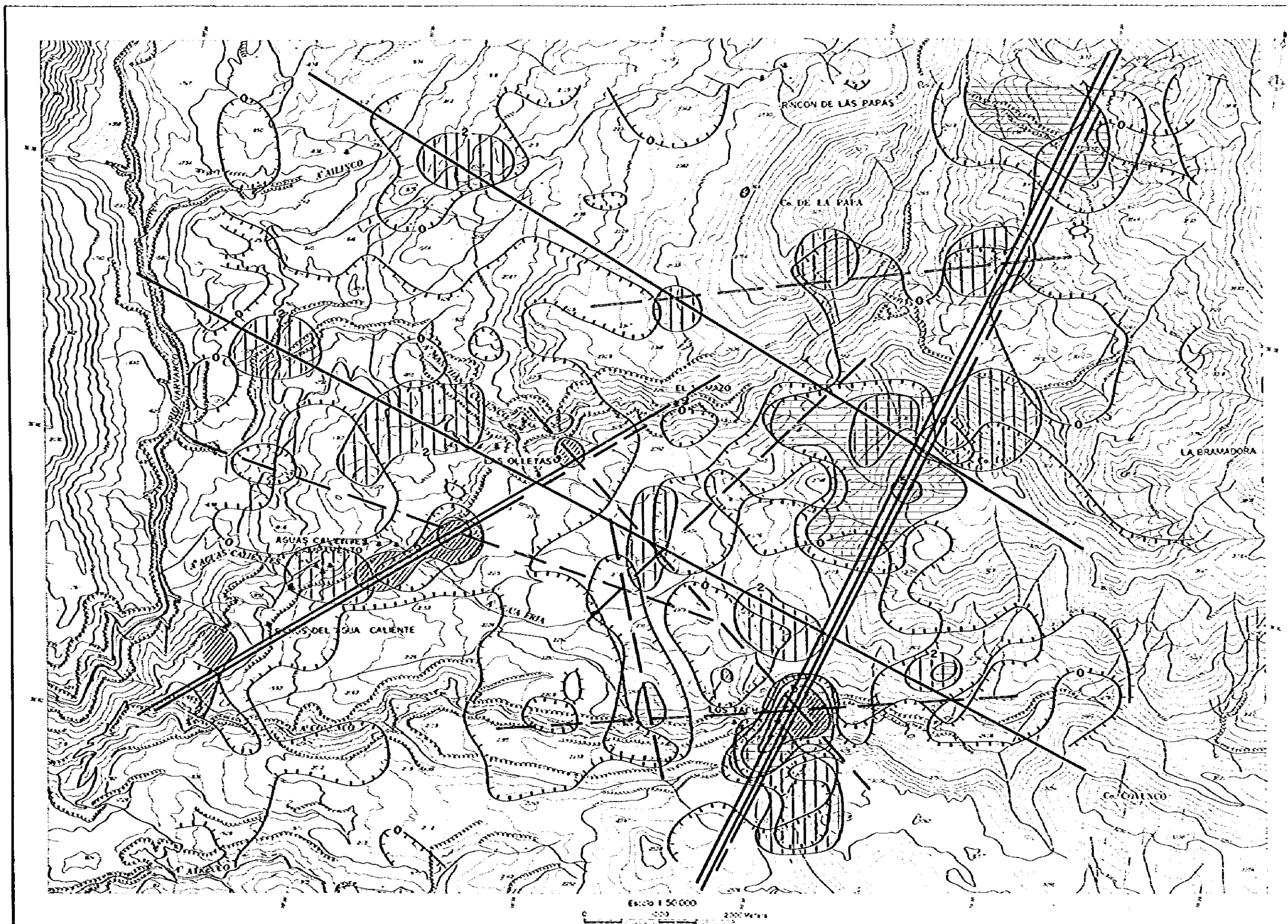
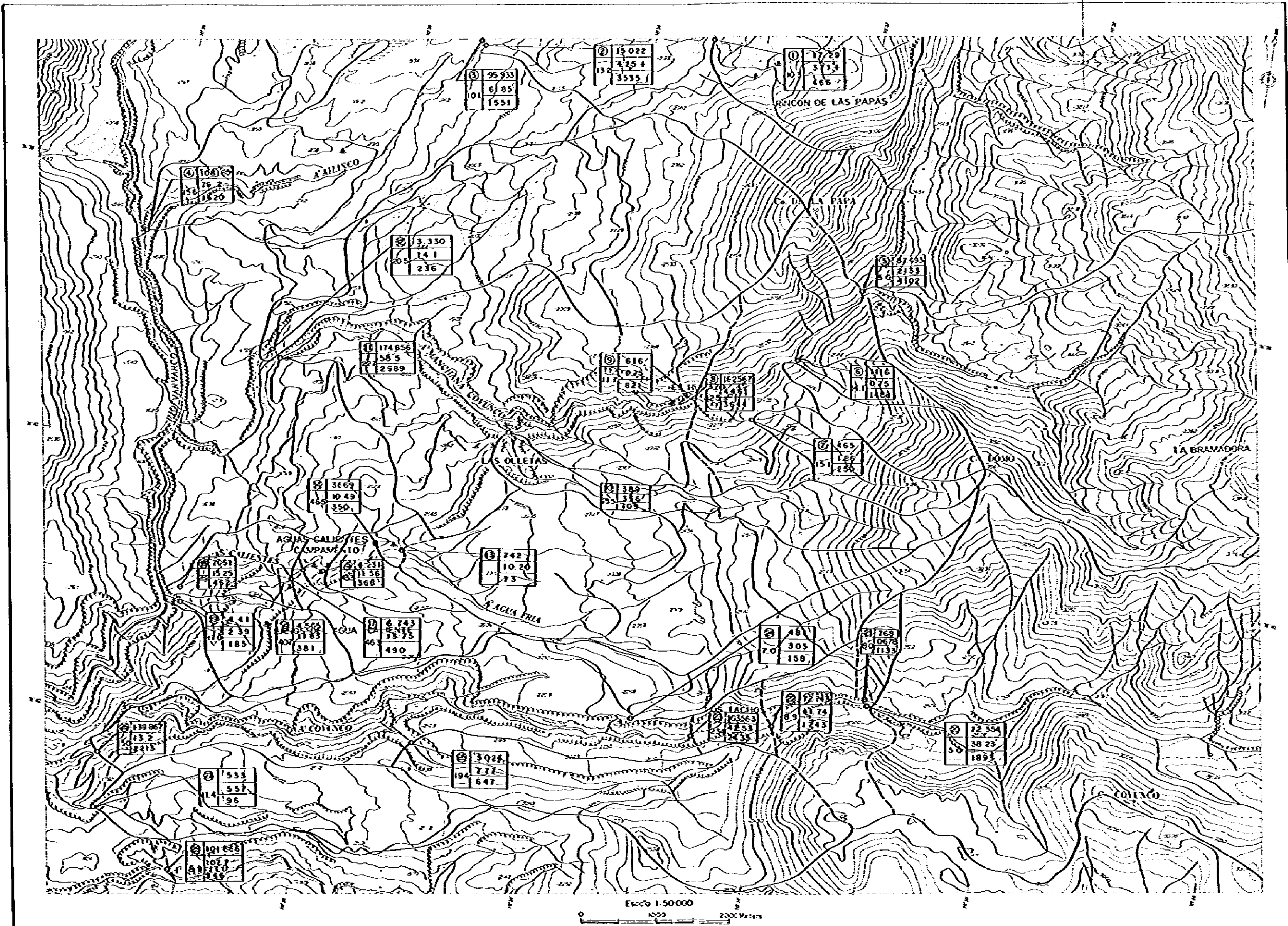


Fig.3-4-5 Composite map of anomalous areas of ground temperature and Hg - CO₂ geochemistry



LEGEND

No.	rate of flow (Caudal) l/min
	Contributory area
Temp ($^{\circ}C$)	Area km^2
	Specific rate of flow (Caudal específico)

Fig.3-5-1 Location map of measurements of water discharge and calculations of specific rate of flow