

9) Ojo de Agua 地域

a) 地質単元

本地域に分布する岩石と堆積物は合計で 25 種類の地質単元に区分された (Fig.II-2-27, Table II-2-10)。それらのうち、7 種類の地質単元はジュラ紀から第三紀までの堆積岩類に対比可能であり、9 種類の地質単元は石炭紀から第四紀までの火山岩類に対比可能である。また、4 種類の地質単元は第四紀の未固結ないし半固結堆積物に相当する。これらのほか、1 種類の地質単元は古生代の主として片岩類に対比可能であり、3 種類の地質単元は古生代から第三紀にかけて生成した貫入岩体に対比可能である。なお、1 種類の地質単元が変質帯と判定された。

b) 変質帯

本地域では西部に分布する第三紀の火山岩類 (地質単元 ; Tiv) 中に 11 箇所、白亜紀の花崗岩類 (地質単元 ; Ak) 中に 1 箇所、南西端部に分布する白亜紀の火山岩類 (地質単元 ; Kiv) 中に 1 箇所、北部に分布する石炭紀の火山岩類 (地質単元 ; Cv) 中に 1 箇所、中央部に分布する古生層の花崗岩類 (地質単元 ; α K) 中に 1 箇所、第三紀火山岩類 (地質単元 ; Kiv) 中に 2 箇所、石炭紀の火山岩類 (地質単元 ; Cv) 中に 1 箇所、南部に分布する古生層の変成岩類 (地質単元 ; Ps) 中に 3 箇所、第三紀の火山岩類 (地質単元 ; Tiv) 中に 1 箇所、合計 22 箇所の変質帯が抽出された (Fig. II-2-27, Table II-2-23)。これらの変質帯の分布傾向を見ると、本地区の西部に発達する NW-SE 方向及び N-S 方向に連続するリニアメントを境に西側では 13 箇所と比較的まとまって分布するが、東側では古生層中で 3 箇所がまとまる以外は散点的に孤立して分布する。これらのうち最も特徴的な分布を示す領域は、リニアメントの西側の第三紀の火山岩類 (地質単元 ; Tiv) 中の変質帯で 10 箇所が比較的まとまって分布する。

変質帯の分布形態は一般に、楕円状または不規則なアメーバ状を呈している。最大規模のものは西部の第三紀火山岩類に分布する変質帯で長軸方向にほぼ 2.8km の長さを有する。

c) リニアメント

本地域から判読・抽出されたリニアメントの分布や方向については、おおむね東部から中央部及び西部とに若干の差がみられ、地区ごとに以下のような特徴が認められた (Fig. II-2-27)。

東部から中央部域は、主として古生代の片岩類、石炭紀から第四紀までの火山岩類、ジュラ紀から第三紀までの堆積岩類及び第四紀の未固結堆積物から構成される。この領域は全体的にリニアメントの発達が少ない。これらの中で比較的多く判読される領域は南部及び中央部で、その方向は、前者で NW-SE, NNE-SSW、後者で WNW-ESE が卓越する。これらのうち延長の長いものは WNW-ESE 方向のもので約 25km あるが、そのほかの領域では多方向を示し、各所に点在する。これらの延長は北部で約 20km、多くは 5km 程度である。

西部域の地質は、主としてジュラ紀から第三紀の火山岩類、堆積岩類及び白亜紀の花崗岩類から構成され、N-S, NW-SE, WNW-ESE 及び E-W 方向の 4 系統のリニアメントが発達する。

Table II -2-9 Characteristics of photogeologic units of the Laguna Blanca area

Unit	Photo-Characteristics		Morphologic Expression						Superficial Cover		Probable Lithology (Correlation with available Geologic Map)
	Tone	Texture	Drainage		Section	Bedding	Vegetation	Cultivation			
			Pattern	Density					Rock Resistance		
Qa	gray, purplish red, green	very fine	meandering	very low	very low	none	partly dense	partly intense	Unconsolidated sediments composed of gravel, sand, silt and clay (Holocene : Recent alluvial deposits)		
Qis1	purplish	fine	sub-parallel	low	low	very gentle	rare	none	Unconsolidated sediments composed of gravel, sand, silt and clay (Pleistocene : Fluvial, talus deposits)		
Qivb	reddish brown	rough	radial	medium	low	none	none	none	Basic volcanic rocks (Pleistocene : Basalt, pyroclastic rocks)		
Tsv2	brown, gray	fine	sub-parallel	low	high	massive	partly	rare	Volcanic rocks (Pliocene : Andesite, basaltic andesite, basalt and pyroclastic rocks)		
Tsv1	reddish brown	medium	radial	low	high	massive	none	none	Basic volcanic rocks (Pliocene : Basalt, pyroclastic rocks)		
Tsv	brown	rough	sub-parallel	low	medium	none	none	none	Volcanic rocks (Pliocene: Basalt and pyroclastic rocks)		
Tmv2	brown	coarse	sub-dendritic	medium	medium	massive	partly	partly	Mainly pyroclastic rocks (Miocene :Pyroclastic rocks, basalt, andesite)		
Tmv1	brown	rough	sub-dendritic	medium	high	massive	none	none	Volcanic rocks (Miocene : Ignimbrite, basalt, tuff)		
Tiv	dark brown	coarse	sub-dendritic	medium	medium-high	massive	dense	partly	Andesitic volcanic rocks(Eocene-Oligocene : Andesite, basalt and pyroclastic rocks)		
Tis1	brown, dark purple	coarse	sub-dendritic	medium	low	partly	none	none	Sedimentary rocks (Eocene-Oligocene : Continental sedimentary rocks, Sarmiento Formation etc.)		
Tis	brown	coarse	sub-dendritic	high	medium	partly	medium	partly	Coarse grained sedimentary rocks (Paleocene : Sandstone conglomerate, mudstone, limestone and gypsum)		
Kss	gray	fine-medium	pinnate	medium	low-medium	bedded	none	none	Fine to medium grained sedimentary rocks (Upper Cretaceous : Sandstone, mudstone, conglomerate)		
Kis2	brown	fine-medium	sub-parallel	medium-high	medium-high	well bedded	none	none	Fine to medium grained sedimentary rocks (Lower Cretaceous : Sandstone, mudstone, gypsum, limestone etc.)		
Kis1	brown	medium	sub-parallel	medium-high	medium-high	well bedded	none	none	Medium grained sedimentary rocks (Lower Cretaceous : Lutite, limestone, fanglomerate, mudstone, sandstone)		
Jmv	brown	medium	sub-parallel	medium-high	medium-high	massive	partly dense	none	Volcanic rocks (Middle-Upper Jurassic : Intermediate volcanic rocks, Lago La Plata, Lonco Trapia Formations etc.)		
Jms	brown	medium	sub-parallel	medium-high	medium-high	well bedded	partly	none	Medium grained sedimentary rocks (Middle Jurassic : Conglomerate, sandstone, limestone, shale, tuff etc.)		

Table II -2-9 Characteristics of photogeologic units of the Laguna Blanca area

Unit	Photo-Characteristics		Morphologic Expression					Superficial Cover		Probable Lithology (Correlation with available Geologic Map)
	Tone	Texture	Drainage		Rock Resistance	Section	Bedding	Vegetation	Cultivation	
			Pattern	Density						
Jis	brown	medium	sub-parallel	low-medium	medium		partly	partly	none	Sedimentary rocks (Lower Jurassic : Marine and continental sedimentary rocks , Pitritiquitron Formation etc.)
TRes	brown	rough	sub-dendritic	medium	high		partly	partly	none	Sedimentary rocks(Upper Triassic: Marine and continental sedimentary rocks, Paso Flores Formation etc.)
TRif	gray	medium	sub-parallel	medium	medium		bedded	none	none	Sedimentary rocks (Lower Triassic : Tuffs composition andesitic to dacitic)
TRi	brown	coarse	sub-dendritic	high	high		rare	partly	none	Volcanic rocks (Lower Triassic : Breccia, ignimbrite, andesite, dacite and rhyolite)
TRiv	dark brown	coarse	sub-dendritic	high	high		massive	partly	none	Volcanic rocks (Lower Triassic : Breccia, ignimbrite, andesite, dacite and rhyolite)
Cv	brown	coarse	sub-dendritic	high	high		massive	none	none	Mainly pyroclastic rocks (Carboniferous-Devonian: Andestic tuff, sandstone, shale)
Ps	dark gray	rough	sub-dendritic	high	high		schistose	none	none	Schistose rocks (Paleozoic : Phyllite, schist, gneiss and migmatite)
dy	dark gray	rough	-	-	medium		-	-	-	Dyke rocks
αKT	brown	coarse	sub-dendritic, rectangular	medium	high		massive	partly	none	Igneous rocks (Oretaceous-Tertiary : Plutonic rocks and hypabyssal rocks)
αJm	brown	coarse	sub-dendritic, rectangular	medium	high		massive	none	none	Igneous rocks (Middle Jurassic : Granodiorite, diorite, granite, tonalite and dacite)
αP	gray	coarse	sub-dendritic, rectangular	medium	medium-high		massive	partly	none	Igneous rocks (Paleozoic : Plutonic rocks and hypabyssal rocks)
A	light gray	fine	none	low	low		none	none	none	Alteration Zone (Hydrothermal alteration zone)

Laguna Blanca

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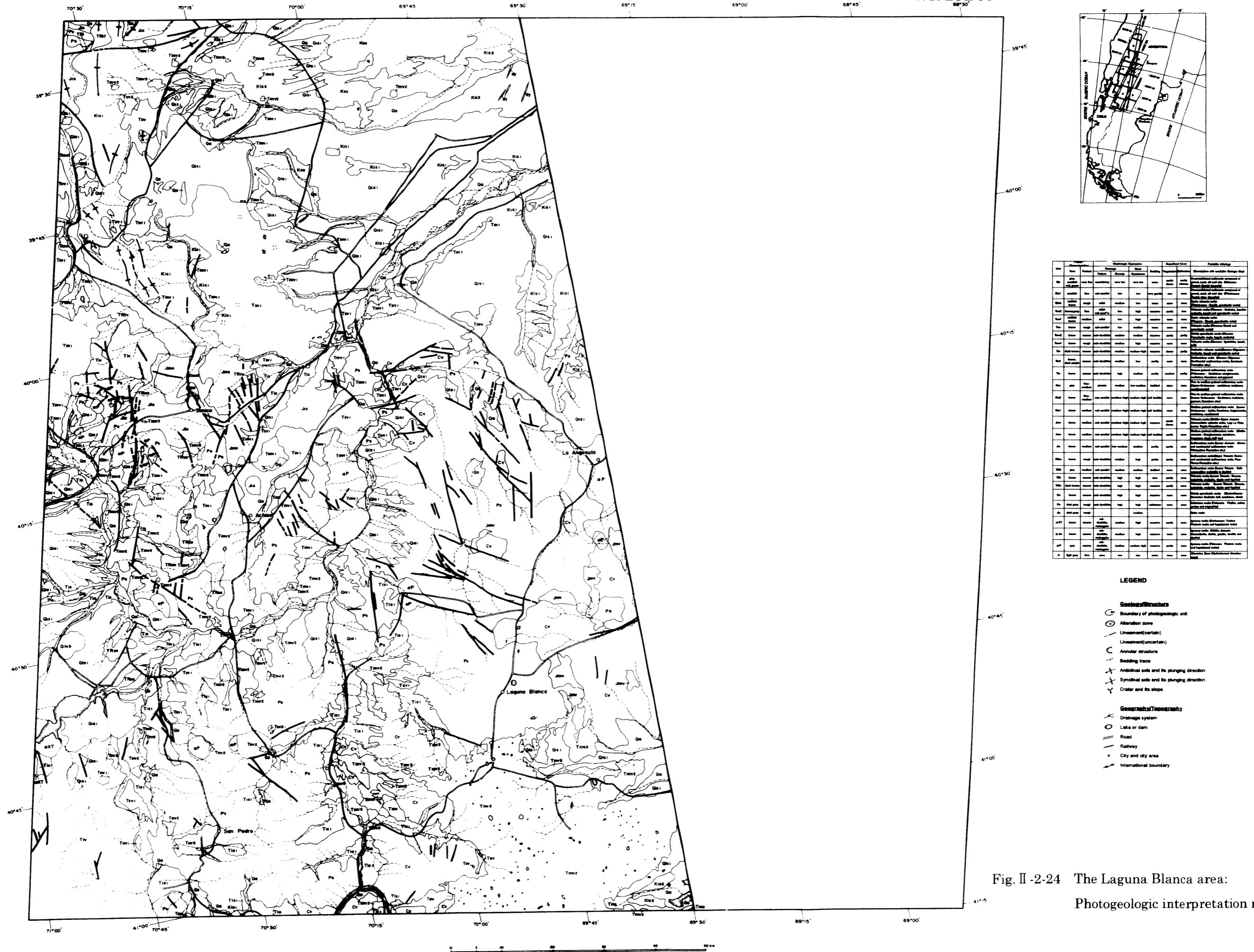


Fig. II -2-24 The Laguna Blanca area:
Photogeologic interpretation map

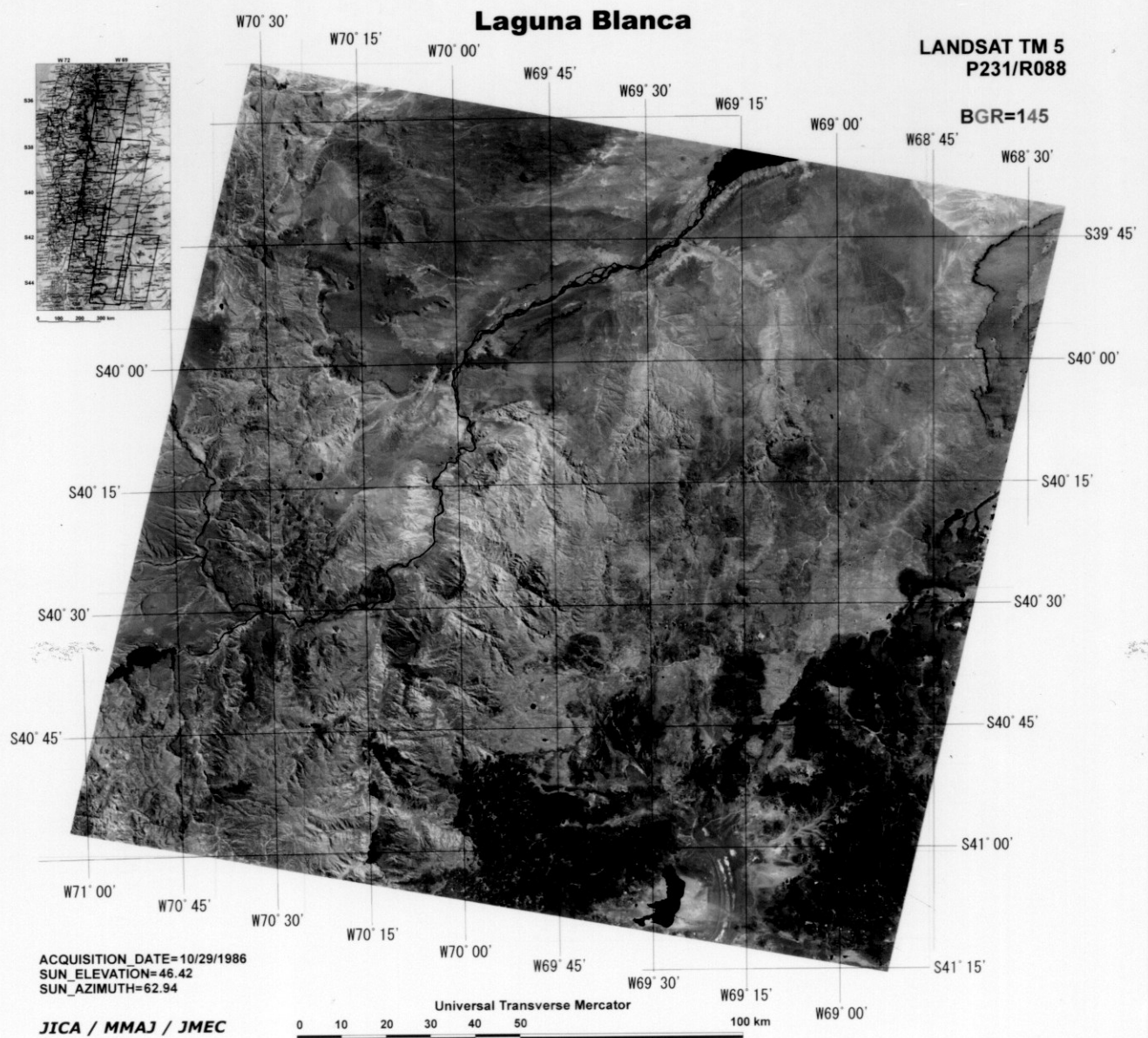


Fig. II -2-25 The Laguna Blanca area: Landsat TM false color image

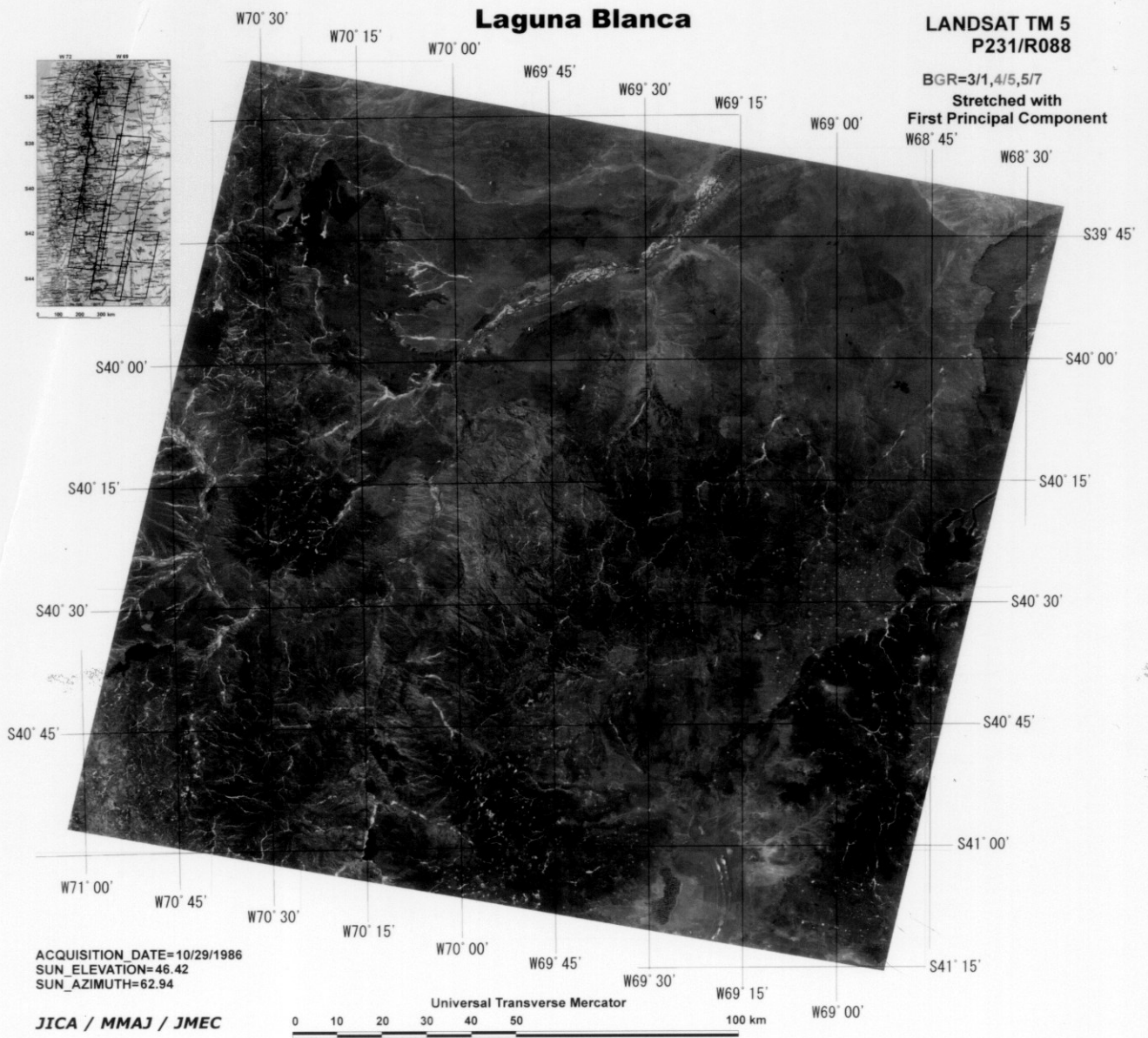


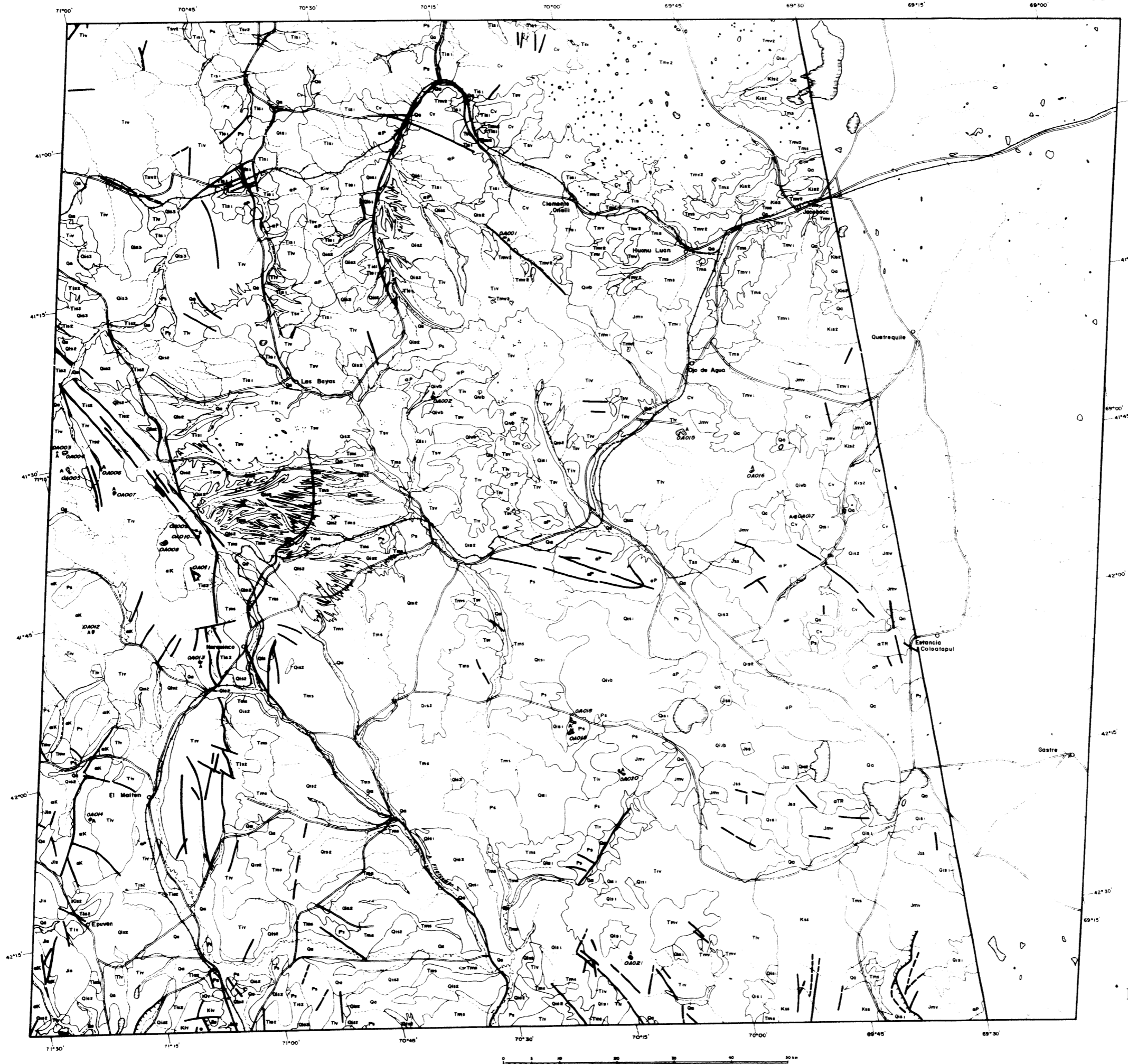
Fig. II -2-26 The Laguna Blanca area: Landsat TM ratio image

Table II -2-10 Characteristics of photogeologic units of the Ojo de Agua area

Unit	Photo-Characteristics		Morphologic Expression					Superficial Cover		Probable Lithology (Correlation with available Geologic Map)
	Tone	Texture	Drainage		Rock Resistance	Section	Bedding	Vegetation	Cultivation	
			Pattern	Density						
Qa	gray, purplish red, green	very fine	meandering	very low	very low		none	partly dense	partly intense	Unconsolidated sediments composed of gravel, sand, silt and clay (Holocene : Recent alluvial deposits)
Qis3	brown	fine	sub-parallel	low	low		none	partly	partly	Glacial deposits (Pleistocene : Gracial deposits)
Qis2	light gray	medium	sub-parallel	low	low		none	none	none	Glacial deposits (Pleistocene : Gracial deposits)
Qis1	purplish	fine	sub-parallel	low	low		very gentle	rare	none	Unconsolidated sediments composed of gravel, sand, silt and clay (Pleistocene : Fluvial, talus deposits)
Qivb	reddish brown	rough	radial	medium	low		none	none	none	Basic volcanic rocks (Pleistocene : Basalt, pyroclastic rocks)
Tsv	brown	rough	sub-parallel	low	medium		none	none	none	Volcanic rocks (Pliocene: Basalt and pyroclastic rocks)
Tms	grayish purple	coarse-fine	sub-dendritic	low	low		rare	none	partly	Sedimentary rocks (Miocene : Continental sedimentary rocks, Collon Cura, Pedregoso Formations etc.)
Tmv2	brown	coarse	sub-dendritic	medium	medium-high		massive	partly	none	Mainly pyroclastic rocks (Miocene : Pyroclastic rocks, basalt, andesite)
Tmv1	gray	coarse	sub-dendritic	low	low		massive	none	none	Mainly pyroclastic rocks (Miocene : Tuff, ignimbrite, basalt)
Tmv	brown	coarse	sub-dendritic	medium	medium-high		massive	partly	rare	Mainly pyroclastic rocks (Miocene : Basaltic rocks, El Mirador Formation)
Tiv	dark brown	coarse	sub-dendritic	medium	medium-high		massive	dense	partly	Andesitic volcanic rocks (Eocene-Oligocene : Andesite, basalt and pyroclastic rocks)
Tis2	brown, dark purple	coarse	sub-dendritic	high	medium		partly	medium	rare	Sedimentary rocks (Oligocene : Marine and continental sedimentary rocks, Nirihua Formation etc.)
Tis1	brown, dark purple	coarse	sub-dendritic	medium	low		partly	none	none	Sedimentary rocks (Eocene-Oligocene : Continental sedimentary rocks, Sarmiento Formation etc.)
Kss	gray	fine-medium	pinnate	medium	low-medium		bedded	none	none	Fine to medium grained sedimentary rocks (Upper Cretaceous : Sandstone, mudstone, conglomerate)
Kis2	brown	fine-medium	sub-parallel	medium-high	medium-high		well bedded	none	none	Fine to medium grained sedimentary rocks (Lower Cretaceous : Sandstone, mudstone, gypsum, limestone etc.)
Kiv	brown	medium	sub-parallel	medium-high	medium-high		well bedded	none	none	Volcanic rocks (Upper Cretaceous: Intermediate volcanic rocks (Devisadero Formation etc.)
Jss	brown	fine-medium	sub-parallel	medium-high	medium-high		well bedded	none	none	Medium grained sedimentary rocks (Upper Jurassic : Conglomerate, sandstone, shale, limestone, gypsum etc.)
Jmv	brown	medium	sub-parallel	medium-high	medium-high		massive	partly dense	none	Volcanic rocks (Middle-Upper Jurassic: Intermediate volcanic rocks, Lago La Plata, Lonco Trapia Formation

Table II -2-10 Characteristics of photogeologic units of the Ojo de Agua area

Unit	Photo-Characteristics		Morphologic Expression				Superficial Cover		Probable Lithology (Correlation with available Geologic Map)
	Tone	Texture	Drainage		Section	Bedding	Vegetation	Cultivation	
			Pattern	Density					
Jis	brown	medium	sub-parallel	low-medium	medium	partly	partly	none	Sedimentary rocks (Lower Jurassic: Marine and continental sedimentary rocks, Piltriquitron Formation)
Cv	brown	coarse	sub-dendritic	high	high	massive	none	none	Mainly pyroclastic rocks (Carboniferous-Devonian: Andestic tuff, sandstone, shale)
Ps	dark gray	rough	sub-dendritic	high	high	schistose	none	none	Schistose rocks (Paleozoic :Phyllite, schist, gneiss and migmatite)
αK	brown	coarse	sub-dendritic, rectangular	medium	high	massive	partly	none	Igneous rocks (Cretaceous-Tertiary : Plutonic rocks and hypabyssal rocks)
αTR	brown	coarse	sub-dendritic	low	medium	massive	none	none	Igneous rocks (Triassic: Granitic rocks)
αP	gray	coarse	sub-dendritic, rectangular	medium	medium-high	massive	partly	none	Igneous rocks (Paleozoic : Plutonic rocks and hypabyssal rocks)
A	light gray	fine	none	low	low	none	none	none	Alteration Zone (Hydrothermal alteration zone)



Symbol	Description
(Symbol)	Boundary of photogeologic unit
(Symbol)	Abandonment zone
(Symbol)	Lineament (certain)
(Symbol)	Lineament (uncertain)
(Symbol)	Annular structure
(Symbol)	Bedding trace
(Symbol)	Anticlinal axis and its plunging direction
(Symbol)	Synclinal axis and its plunging direction
(Symbol)	Crater and its slope
(Symbol)	Drainage system
(Symbol)	Lake or dam
(Symbol)	Road
(Symbol)	Railway
(Symbol)	City and city area
(Symbol)	International boundary

LEGEND

Geology/Structure

- (Symbol) Boundary of photogeologic unit
- (Symbol) Abandonment zone
- (Symbol) Lineament (certain)
- (Symbol) Lineament (uncertain)
- (Symbol) Annular structure
- (Symbol) Bedding trace
- (Symbol) Anticlinal axis and its plunging direction
- (Symbol) Synclinal axis and its plunging direction
- (Symbol) Crater and its slope

Geography/Topography

- (Symbol) Drainage system
- (Symbol) Lake or dam
- (Symbol) Road
- (Symbol) Railway
- (Symbol) City and city area
- (Symbol) International boundary

Fig. II -2-27 The Ojo de Agua area:
Photogeologic interpretation map

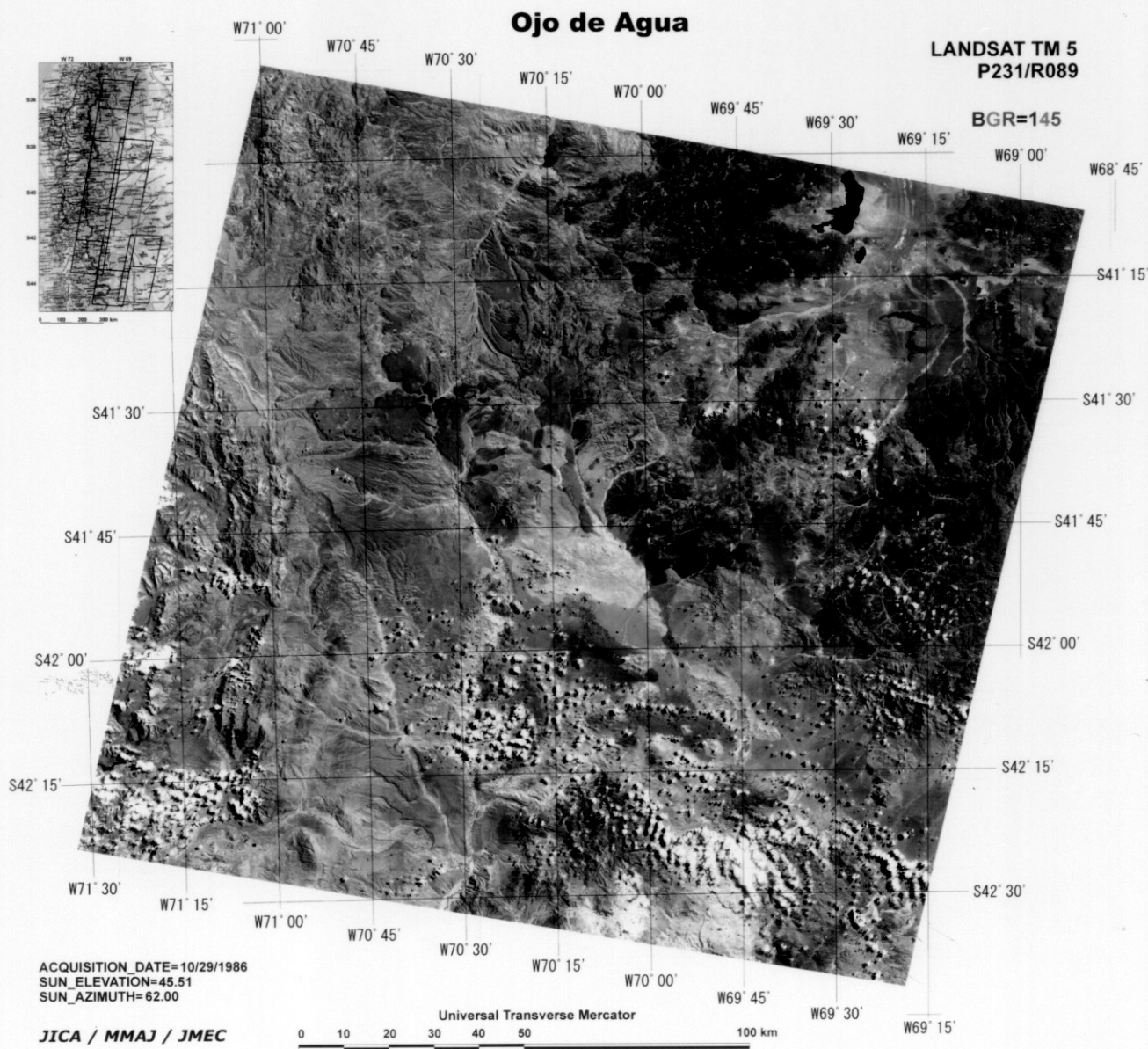


Fig. II -2-28 The Ojo de Agua area: Landsat TM false color image

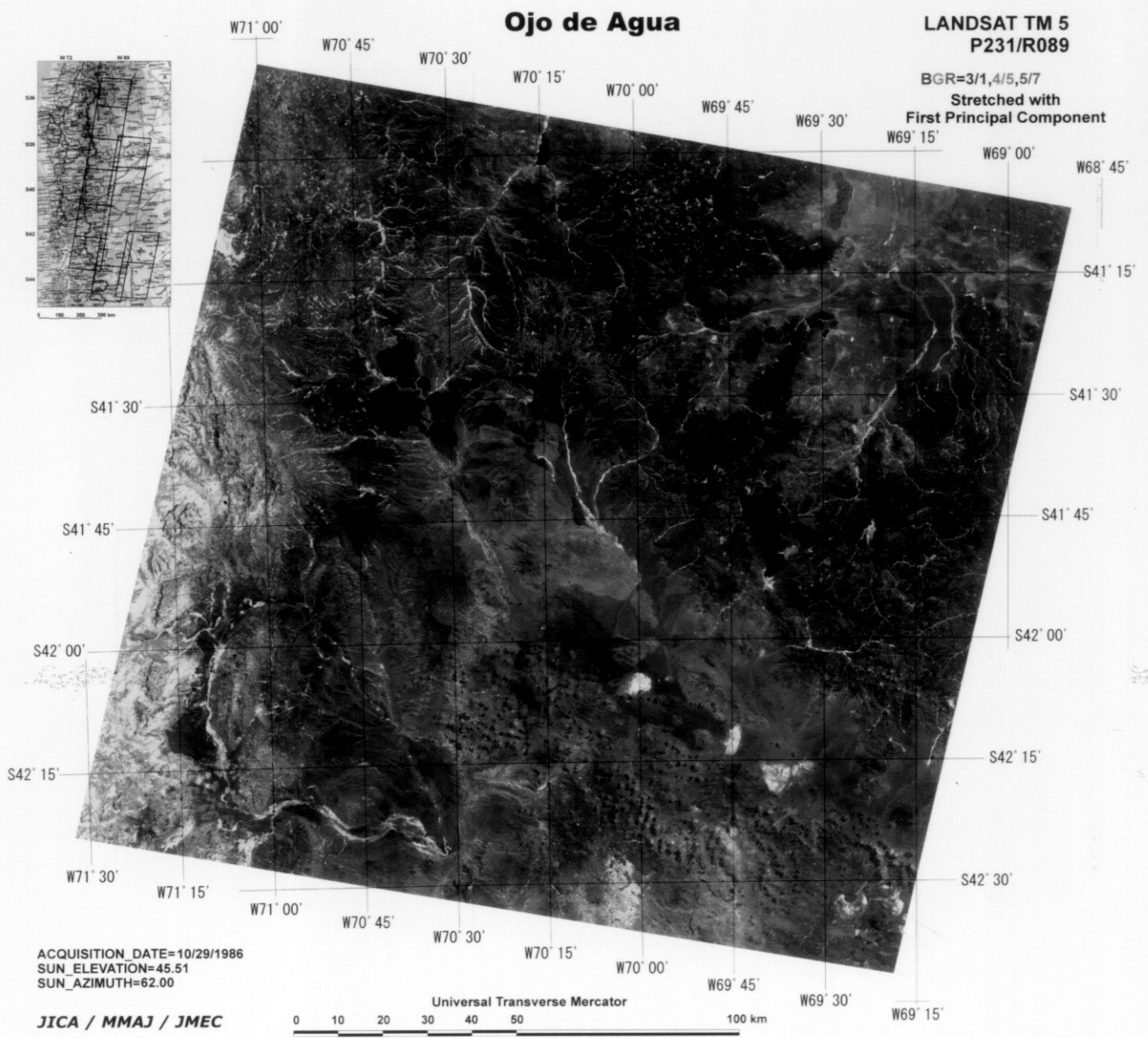


Fig. II -2-29 The Ojo de Agua area: Landsat TM ratio image