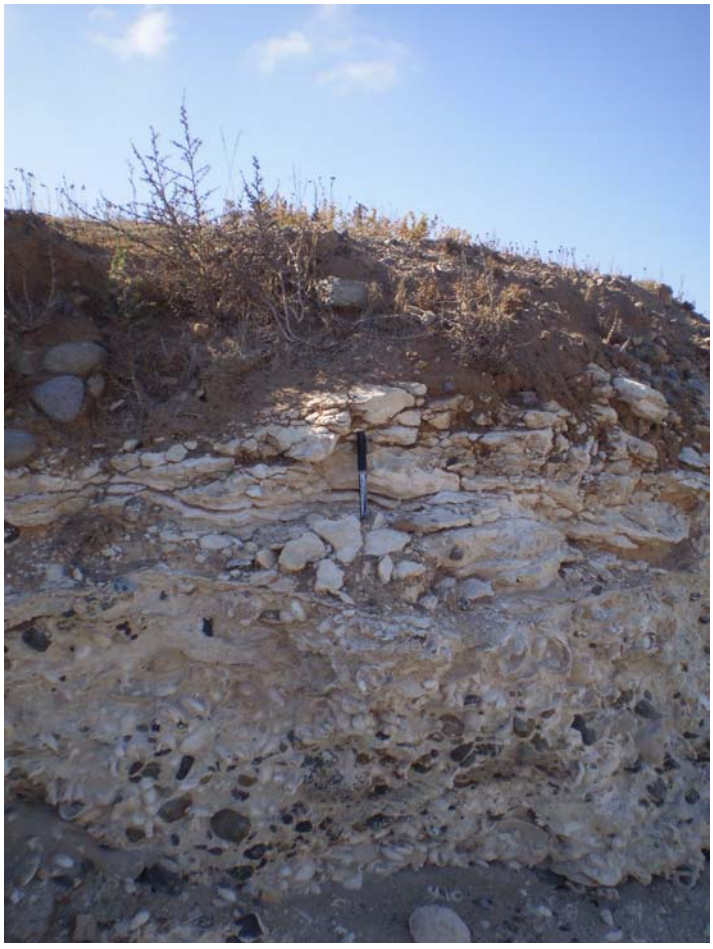
The International Conference & Field Workshops on Soil Classification

Soil: A work of art of the nature

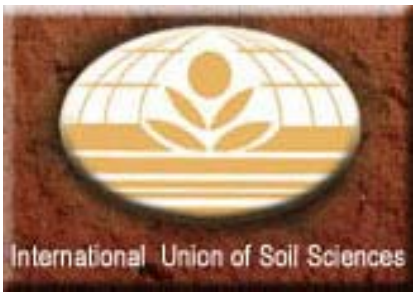
Northern Tour-Guide
Between 30º S and 33º 30´ S



9th -17th November, 2008

Santiago – Ovalle – Tongoy – Santiago

CHILE



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IMPORTANT

When visiting any area of Chile, it is recommended not to be exposed to direct sunlight since ultraviolet radiation levels are usually quite high. It is best to use sunscreen, wear hats and sunglasses with UV filters.

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GENERAL INDEX

1. INTRODUCTION

The purpose of this guide is to provide information related to geology, geomorphology, climate, hydrology and the main vegetation species of the main Valleys north to Santiago and also the characteristics of the soils at the site locations of the pre-congress tour (**Figure 1**), of the International Conference and Field Workshop on Soil Classification, Chile, 9th - 17th, November, 2008.

Additionally, specific information of each site location and soil properties are listed in tables that can be found at the end of this tour guide.

Each chapter corresponds with specific topic and has been identified by different colors in lateral bars to make easer to search the information.

2. ITINERARY AND ROUTE MAP OF THE SOILS TOUR

9 NOVEMBER, 2008: SANTIAGO - OVALLE

- Arenosol (Los Vilos)
- Lunch at Huentelauquén
- Coastal Solonetz (Huentelauquén)
- Night in Ovalle

10 NOVEMBER, 2008: OVALLE – OVALLE

- Durisol (Las Cardas)
- Vertisol (San Julián-Tabalí), wine testing
- Night in Ovalle

11 NOVEMBER, 2008: OVALLE - SANTIAGO

- Calcisol (Tongoy)
- Lunch at Tongoy Bay
- Return to Santiago
- Arrive in Santiago at around 17:00 hours

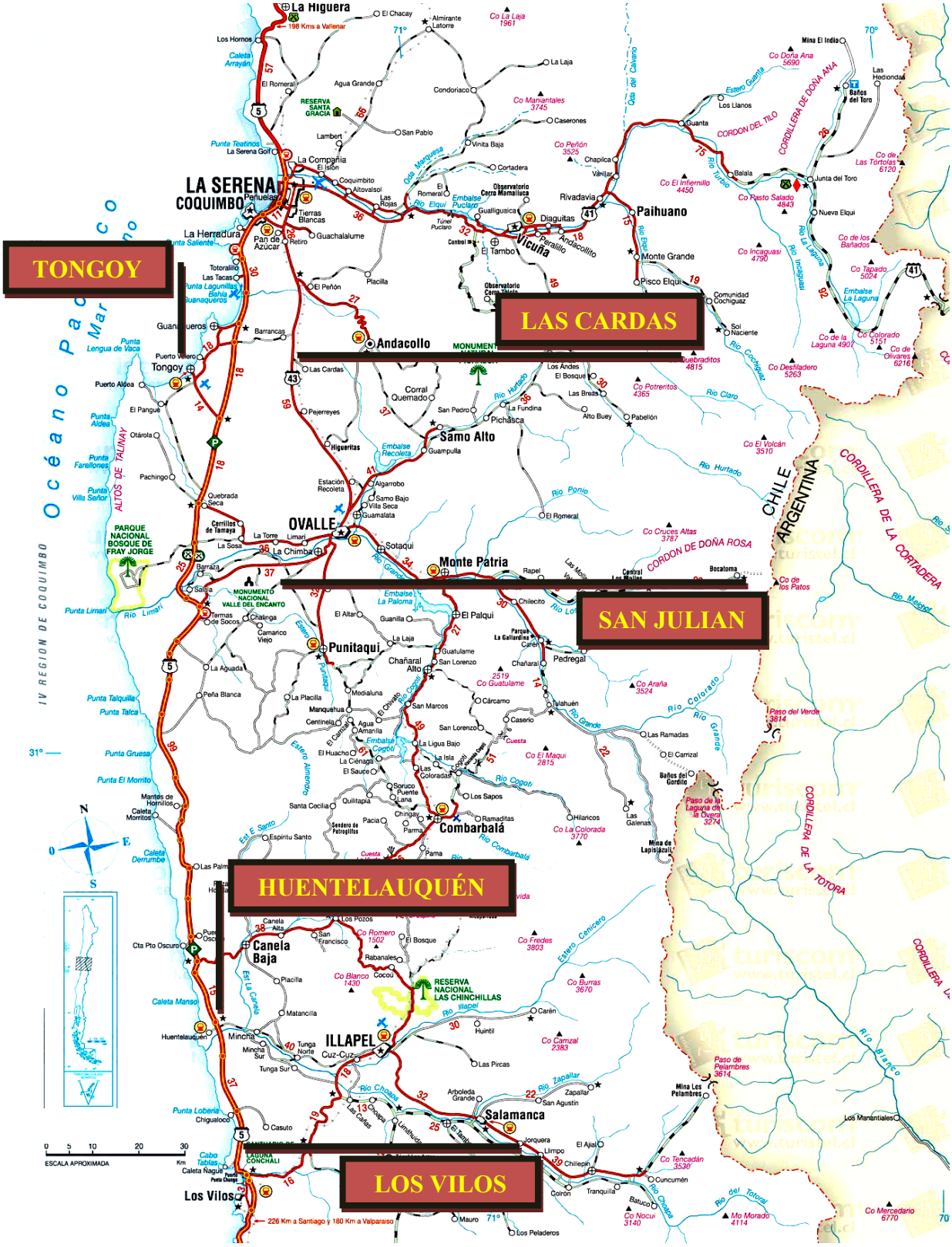


Figure 1. Road map of the soils tour area in north central part of Chile

3. GEOLOGY AND GEOMORPHOLOGY

Outcrops of the Andean Orogenic Paleozoic basement are covered by volcanic and sedimentary sequences of the Upper Triassic to Miocene. The Paleozoic outcrops and Triassic to Miocene sequences are crossed by Jurassic, Cretaceous and Tertiary plutons.

The basement corresponds to the Choapa Metamorphic Complex that includes a Devonian-Lower carboniferous sandy pelitic sequence (*Arrayan* Formation) and an Upper Carboniferous-Early Permian carbonate and sandy pelitic sequence (*Huentelauquén* Formation).

The Mesozoic is represented by an Upper Triassic transgresive littoral sequence, with turbidites (Quereo Formation) concordantly overlain by partly subaqueous, acidic volcanic deposits (Pichidangui Formation).

During the lower Cretaceous, the whole area was a volcanic domain (*Arqueros*, *Quebrada Marquesa* and *Pelambres* formations), with small marine intercalations in the *Arqueros* Formation. The upper Cretaceous is represented by a thick andesitic sequence (Salamanca Formation) deposited over lower Cretaceous rocks.

In the coastal area there are outcrops, resembling the marine littoral *Coquimbo* Formation of Miocene-Pliocene age. These deposits are related with the big rivers outlets, and their continental equivalents are recognized at various levels of the river terraces. The Quaternary is represented by beach, fluvial, glacio-fluvial and abundant mass-wasting deposits.

Mainly stratified and intrusive rocks of Mesozoic age are recognized. They occupy mostly the west-central part of the area and consist of diorite, granodiorite and tonalite. Some of the intrusives may be considered of Jurassic age, some others from the Late Cretaceous or even Early Tertiary age.

The Coastal Range, is mainly composed of phyllites and gneises, intensively folded and intruded by granites and tonalities, partly of Paleozoic age and partly, may be, of Triassic or Jurassic age. In the western part of the Coastal range, metamorphic and granitic rocks of Paleozoic or older age are exposed.

The so called *Ovalle* Group*,* includes the unit *Arqueros* formation (marine sedimentary rocks and andesitic volcanic rocks). *El Reloj Strata* is composed mainly by andesitic volcanic rocks, partly *ocoítas*, marine limestones and red sandstones. *Tamaya Strata* are andesitic volcanic rocks, with intercalations of trachytic and ryholitic volcanic rocks, red sandstones and conglomerates and limestones lenses.

Several terrace levels distributed between 40 and 480 m.a.s.l. are found in the region; most of them are affected by longitudinal and transverse faults (**Figure 2**).

Tertiary and Quaternary fossiliferous marine sedimentary rocks are also represented in the region; in parts these rocks interfinger with alluvial and terrace deposits.

The so called *Semi arid Region* of Chile extends from 30º S to 33º S. In this Region is possible to differentiate four main physiographic features: the Andean Mountains, above 4,000 m.a.s.l.; the medium mountains between 3,000 and 1,000 m.a.s.l.; the large transversal valleys, generally broad and deep along their courses, east-west direction mainly; and the littoral fringe, remarkable for its step-like marine terraces.

The coastal zones are characterized by the presence of several levels of marine terraces, crossed by sporadic gullies due to water erosion. Deflation and accumulation of sand are still active and visible in several areas (**Figure 3**). Along the coastal fringe, it is also possible to find sedimentary rock outcrops: alternating shales and sandstones of Infracambrian to Triassic age.

The morphogenetic processes are slightly active in the inner zone in agreement with the present climatic conditions, although there are evidences of more intensive processes in the past, like vertical torrential erosion in *quebradas* where water flowed in a violent way.

Towards the high Andean Cordillera it is possible to find bare-rock mountain slopes and some periglacial slope deposits.

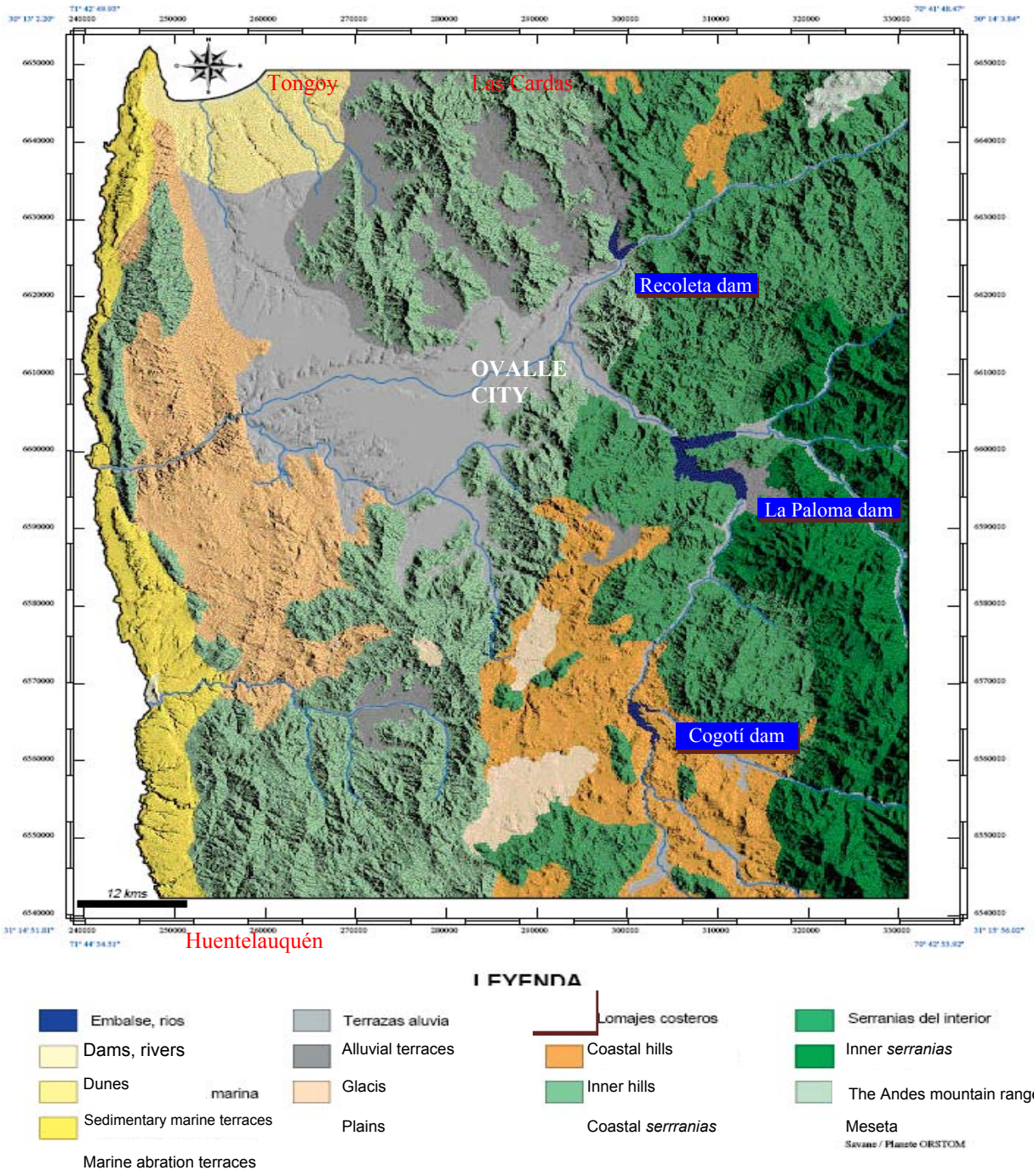
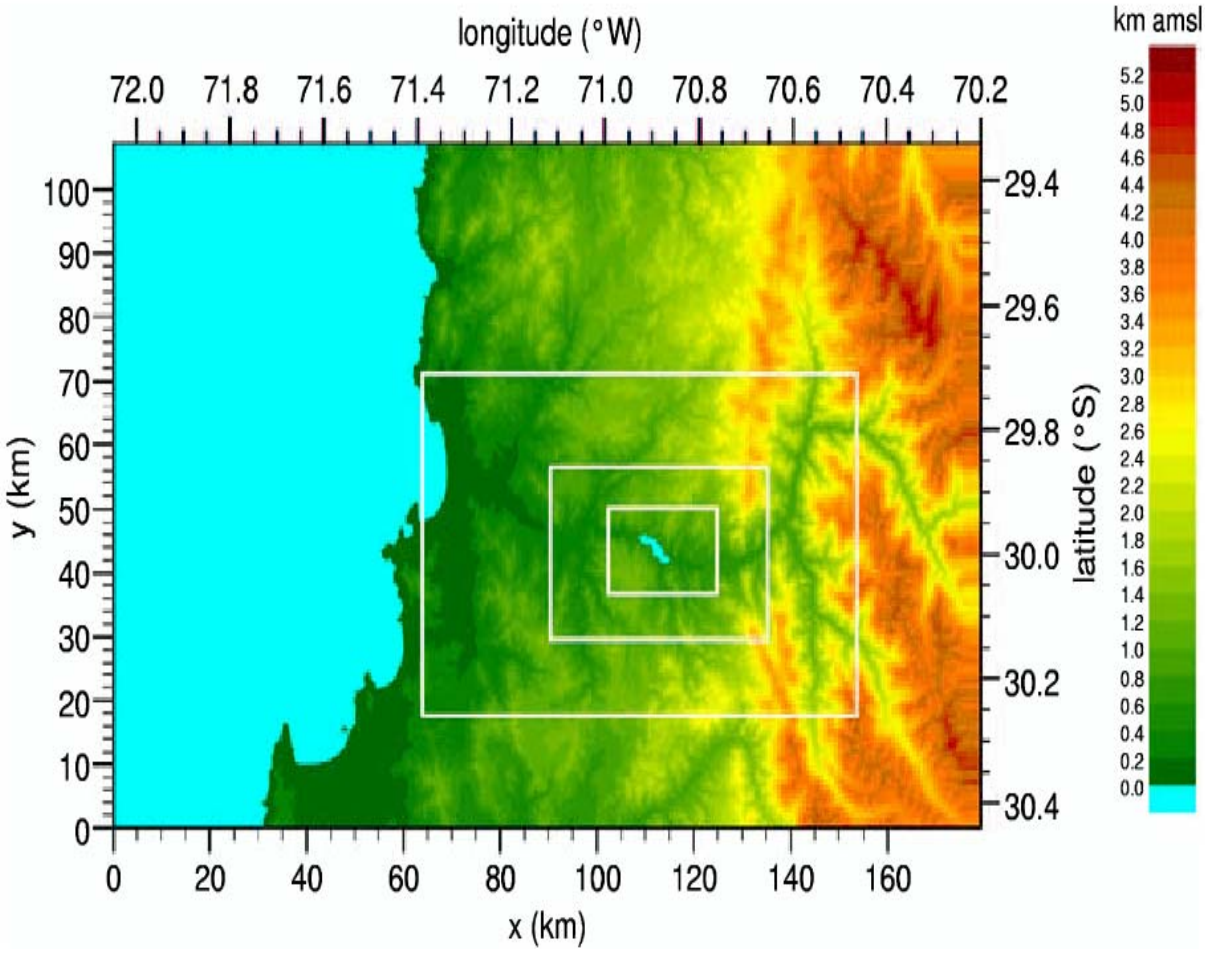
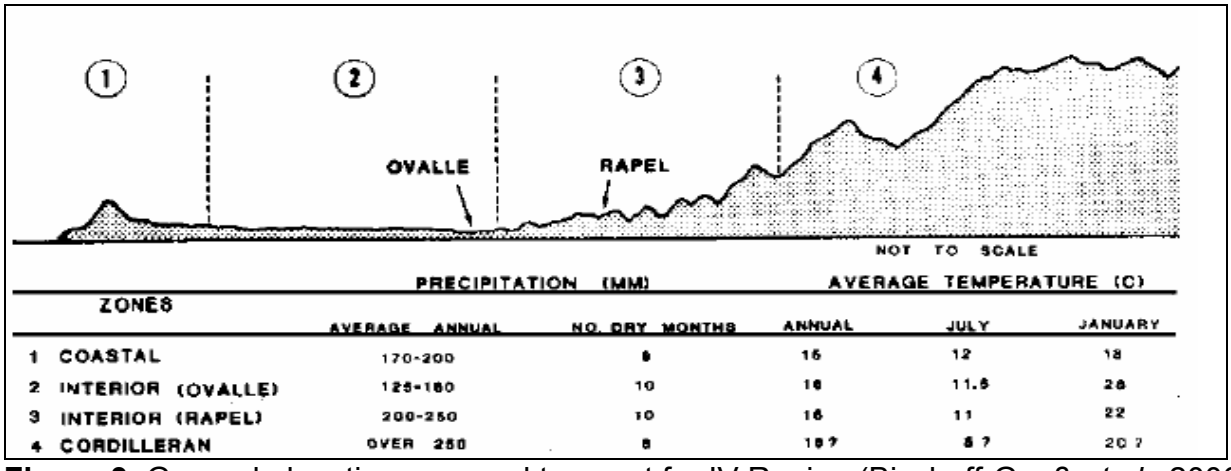


Figure 2. Transect of the geomorphology of the tour area in Regions IV of Chile (Pouget *et al*., 1996).





ZONES	PRECIPITATION (MM) AVERAGE ANNUAL	NO. DRY MONTHS	AVERAGE TEMPERATURE (C) ANNUAL	JULY	JANUARY
1 COASTAL	170-200	8	15	12	18
2 INTERIOR (OVALLE)	125-160	10	16	11.5	26
3 INTERIOR (RAPEL)	200-250	10	16	11	22
4 CORDILLERAN	OVER 250	8	10 ?	5 ?	20 ?

Figure 3. General elevation map and transect for IV Region (Bischoff-Gauß *et al.,* 2006; Bahre, 1979).

4. CLIMATE

From *Los Vilos* to *Tongoy* bays (30º S to 32º S)

The South Pacific Anticiclon is the main natural force that controls principal climatic conditions in this part of the Continent. Between May and August decreases its influence due only to occasional and short frontal situations.

The lower part of the river valleys take up the fresh and plenty of humidity marine breezes. In the middle course, normally the valleys get a north to south direction, resulting in a more dry condition due to the lacking of marine influence. In the upper part of the rivers, that means in the Andean Mountains, the rivers go down through narrow valleys where the climatic conditions are clearly those of the high altitute mountains.

The climate of the region has to be considered as semiarid. It is characterized by an irregular rainfall regime and a permanent or almost permanent water deficit. The annual rainfall rarely exceeds the 50% of potential evapotranspiration. The insolation is very high in the middle course of the rivers and in the Andean mountains, mostly due to the lack air humidity. While near the coast and in the shoreline the cloudiness decreases the amount of incident radiation.

Near the coastal line the mean summer and mean winter air temperature differ in 5ºC or less, while towards the middle valleys the difference is about 7.5ºC. The average maximum air temperature in January (summer) is about 20ºC near the coastal line, while it reaches 30ºC to the middle part of the valleys. The average minimum air temperature in the coast is 9ºC in July (winter), 5ºC in the middle valleys and -5ºC in the Andean mountains.

The Choapa River Basin shows three climatic types, going from west to east: the Coastal and cloudy Steppe, the warm steppe with winter rainfall and the high altitude cold moderate:

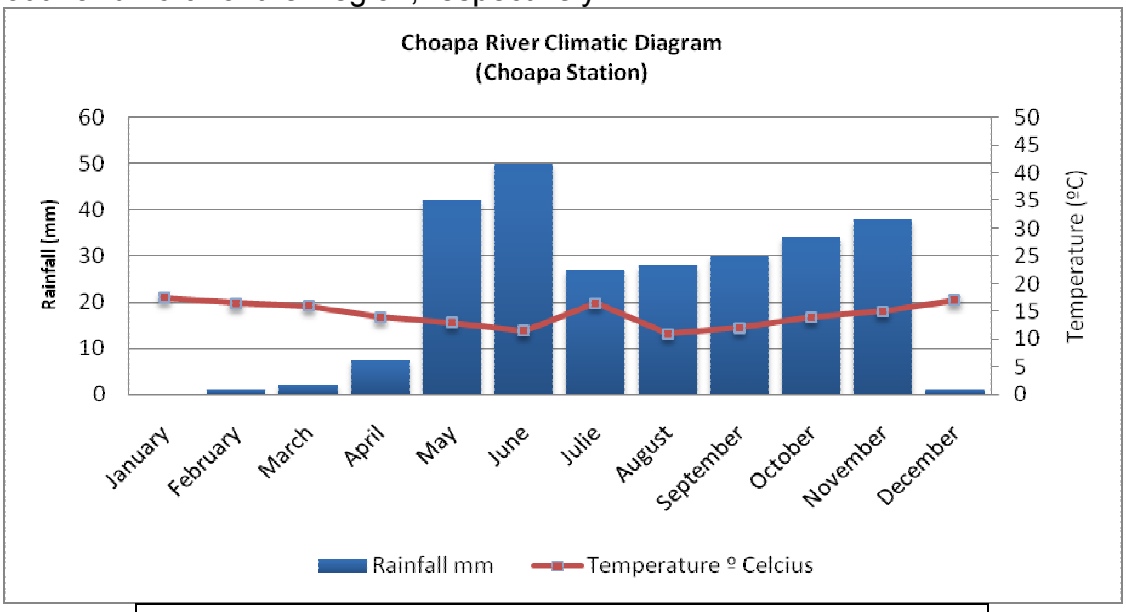
a) The Coastal and cloudy Steppe climate, is present along the coast. Its influence is estimated till 40 km to the inner lands through the river valleys. It is characterized by cloudiness, high air humidity and moderate air temperatures. The mean annual rainfall is about 130 mm, with a dry period of about 8 to 9 months.

b) The warm Steppe with winter rainfall climate, characterize the inner part of the valleys, between 500 to 1,000 m.a.s.l. The air is dry, the cloudiness decreases and the mean air temperatures are higher than those of the coastal range. The dry periods are frequent and the amount of rainfall may be less than those of the coastal areas.

c) The high altitude cold moderate climate is present in the Andean Mountains over 3,000 m.a.s.l. It is characterized by a high amount of liquid and solid precipitations, low air temperatures and many areas with snow and ice. Most of these areas are the river-heads of the majority of the rivers of the zone.

The Limarí River Basin, located in the province of Limarí in the Region, belongs to the semi-arid region and shows extreme events such as prolonged, multi-year droughts or extremely rainy seasons common feature. The area has also been described as having a Mediterranean climate because 85.7% of the average annual precipitation is concentrated in the winter months (May-August) while the summer is very dry.

Figure 4 shows the amount of annual rainfall and the mean monthly temperatures of Choapa River (at the confluence with Illapel River) and Elqui River (at La Serena city) in the south and north of the Region, respectively.



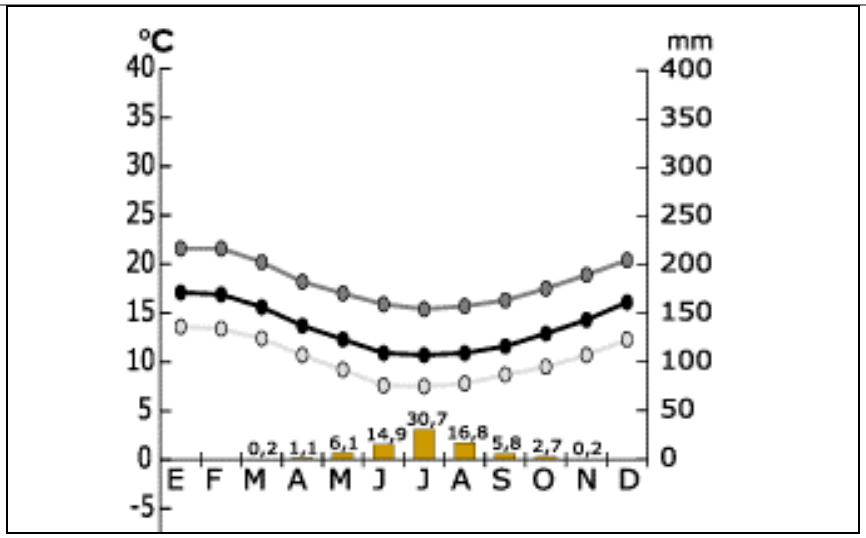


Figure 4. Ombrothermic diagram, Choapa River at the confluence with Illapel river (upper) and Elqui River at La Serena (29° 54´S; 71° 12´ W, 142 masl).

On other hand, **Figure 5** shows as a general picture, the amount of rainfall, the air temperature and the estimated runoff thought the country.

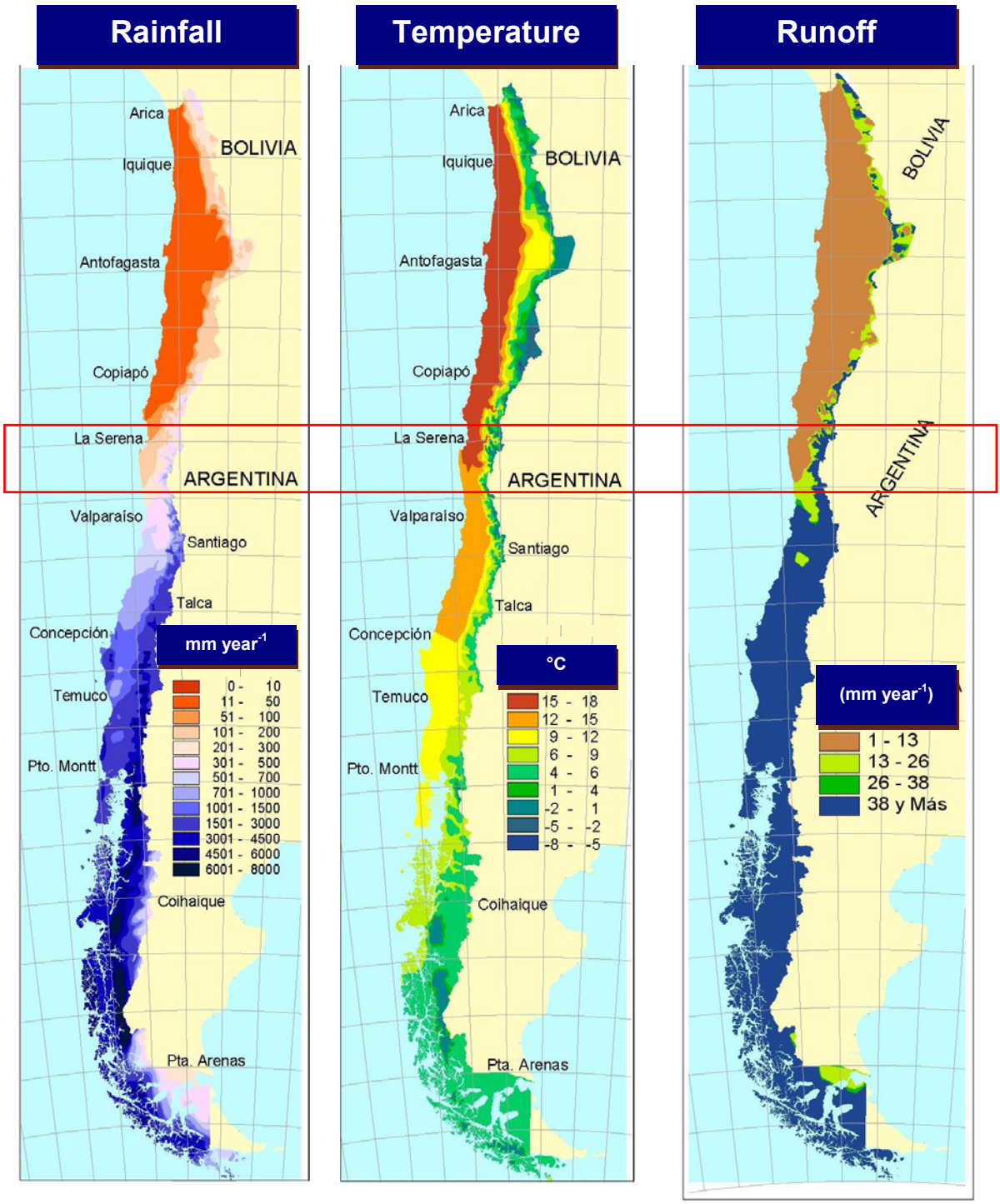


Figure 5. Mean annual precipitation, air temperature, and estimated runoff in Chile (the area within red box is the soils tour area).

5. HIDROLOGY

From "Los Vilos" to "Tongoy" Bays (30º S to 32º S)

In this Region there are three main river basins: Elqui, Limarí and Choapa from north to south. The three rivers born in the Andean Mountains, flow down the inlands, come across the Coastal Range and finally flow into the Pacific Ocean. So that they give rise to so called *Transversal Valley*" where the main towns and cities were built for obvious reasons. Principally, the Choapa and Limarí River basins will be visited (**Figure 6**).

The Choapa River Basin

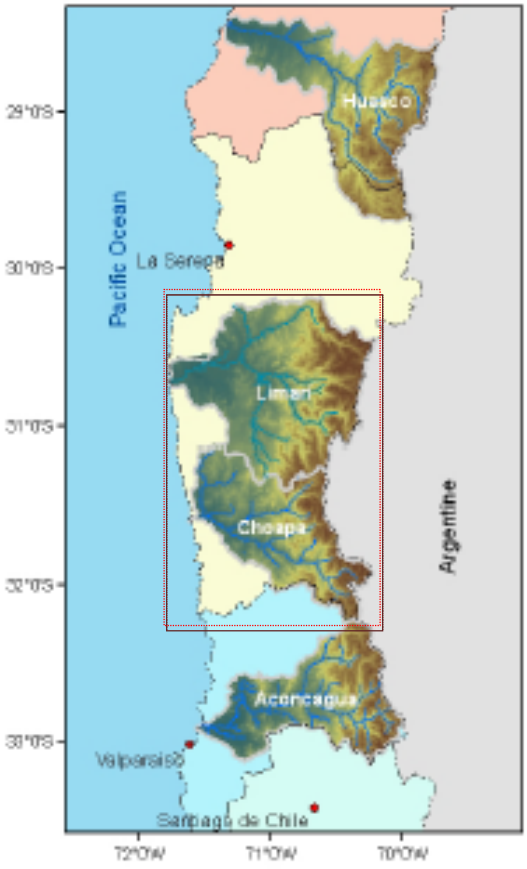
This Basin goes from 31º07' S.L. to 32º14' S.L. It borns in the Andean Mountains at 1,000 m.a.s.l., having as principal tributaries the rivers *Illapel, Cuncumen* and *Chalinga*. The rivers show intense overflows in springtime and early summer. It flows into the Ocean near the town of Huentelauquen. In the Andean environment the river-course flows through narrows and steep valleys, with frequent rock outcrops and some aluvial cones.

Several aquifers have been identified in the Choapa River Basin. One of them is located near the city of *Illapel* no more than 5 m depth. Other aquifer flows parallel to Illapel River up to discharge in the Choapa River. Another one flows E-W direction over volcanic basement up to the Coastal Range, where it is possible to find the water at 0.4 m depth. The presence of all these aquifers are associated with the low permeability rock basement, mostly ignimbrites, limestone, sandstone and other kind of volcanic rocks like tuffs and breccias attributed to the Cretaceous.

The Limarí River Basin

The Limarí River Basin goes from 30º09' S.L. to 31º22' S.L. and it is located in the central part of the Coquimbo Region. The Limarí River borns through the union of *Grande* and *Hurtado* rivers, about 3 km west to Ovalle city. Its total length is 64 km from which almost 70% consist of a broad valley, with numerous alluvial terraces and meanders. Its regime is considered as nival in the upper *Cordillera* and mostly pluvial near the Coastal Range. As in the other river basins of the Region, in the upper Cordillera the rock basements consists of very low permeability plutonic rocks, situation that give rise to the presence aquifers, generally very shallow.

Particularly the Limarí basin is characterized for the presence of three water reservoirs: the *Recoleta*, the *La Paloma*, and the *Cogotí* dams (**Figure 2**), which in total have a storage capacity of 1,000 Mm^3, becoming the largest irrigation oriented infrastructure in Chile. The system secures water for three consecutive years of droughts. Another important reservoir in the Region (Elqui River Basin) is Puclaro dam (see Figure 3).



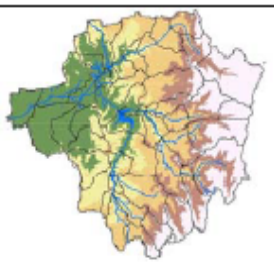
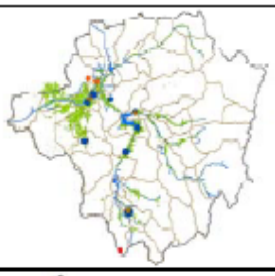
Limarí (LI)		**Area:** 11,696 km² **Average annual precipitation:** 130 mm **Average discharge,** 7.5 m³/s (mouth of Limarí), 50 m³/s (wet year)		**Irrigated area:** 65,000 ha (below the canels?) [CNR, 2005] **Industrial Activities:** *Mining:* few active, mainly copper and gold. **Population:** *Total:* 156,141 *Major cities:* Ovalle (53,395) and Combarbala (4,866)
Choapa (CII)		**Area:** 7,631 km² **Average annual precipitation:** 210 mm **Average discharge:** 9.8 m³/s (Puente Negro Station)		**Irrigated area:** 31,150 ha **Industrial Activities:** *Mining:* mainly copper, with main mine (Los Pelambres) next to the Cuncumen river, and smaller ones at the Aucó confluence *Industry: pisco* **Population:** *Total:* 64,230 *Major cities:* Illapel (21,830) and Salamanca (12,690)

Figure 6. Principal river basins of IV Region of Chile (the area within red box is the soils tour area). After Ribbe *et al*. (2008).

6. VEGETATION

From "Los Vilos" to "Tongoy" bays (30º S to 32º S)

It is considered that more than 50% of the Chilean flora is mostly endemic. In the Region of Coquimbo 1,478 species have been described, from which 53% are endemic and 140 species (9.5%) are growing only in the Region.

This endemic conditions and diversity in species in the coastal deserts could be explain through the presence of almost permanent fog or mist and the capacity of plants to use the water from that fogs, developing specialized mechanisms like surface root systems. Besides, they have developed another unic system like the quick and immediate response to the short and heavy rains that occur occasionally. It is necessary to consider also, that towards the north of this Region is found one of the driest desert of the world: ***The Atacama Desert***.

The principal vegetal formation of the Region are included in **Figure 7**.

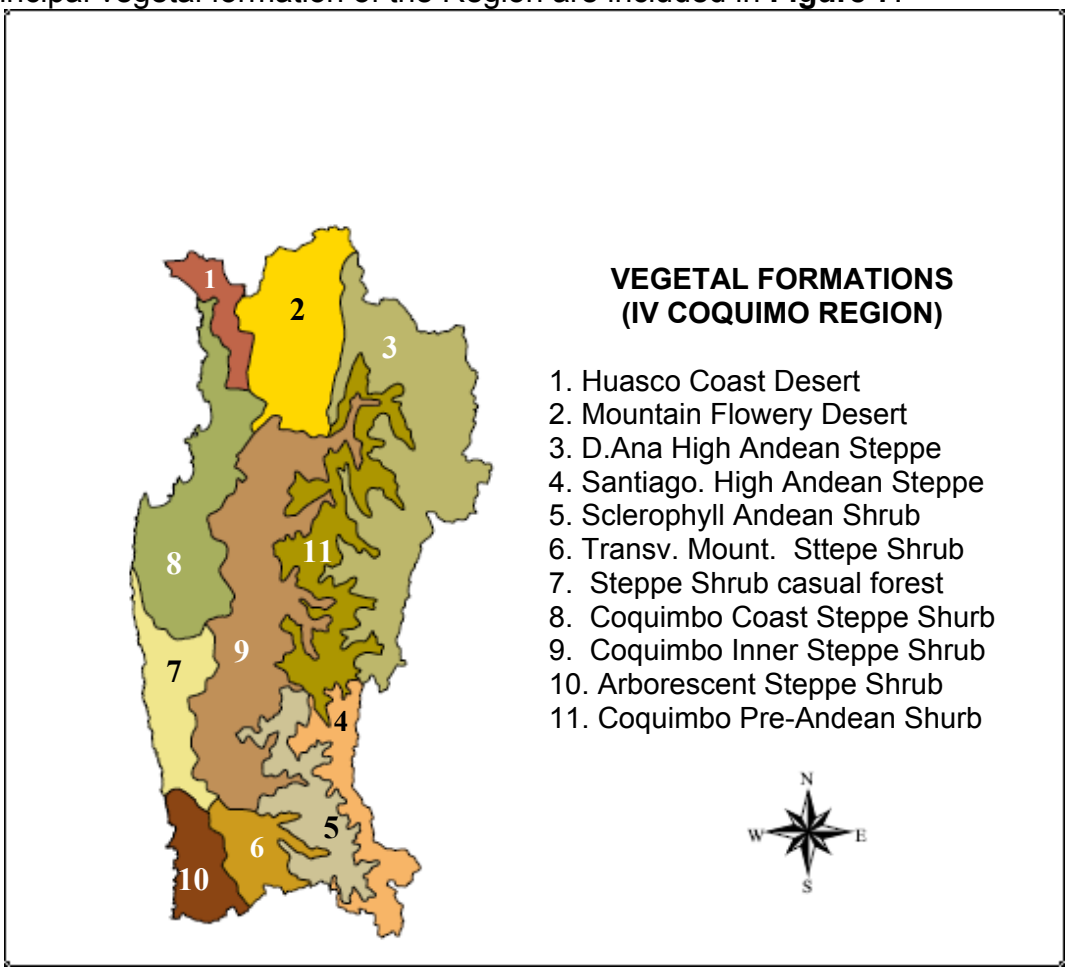


Figure 7. Main vegetation formations in the IV Region (Gajardo, 1992).

As a consequence of the climatic transition between mediterranean to desert conditions, in this Region, there is also a transition in vegetation formations. The steppe forest formation is dominant in this area being composed by short shrubs and small trees and different herbaceous species adapted to dry conditions (**Figure 8**). Shorts shrubs with hard leaf are the main species in this zone like *Adesmia microphila*. On the other hand in the southern part of this area herbaceous species, higher trees and bushes are best developed like *Lithraea caustica, Bahia ambrosoides* and *Puya chilensis,* jointly with strongly thorn trees, often succulent and summer deciduous trees as Algarrobo (*Prosopis chilensis)* and Espino (*Acacia caven*). In the inner driest conditions it is possible to find different vegetation formations likes those dominate by *Flourencia thurifera* and *Colliguaja odorifera*.

In rainy years the phenomenon known as “Flowery desert” appears, giving rise to a completely colorfull landscape, with a wide variety of plants and species.

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Figure 8. Landscape near Los Vilos, close to the soil considered is this Tourguide. Steppe arborescent heaths are dominant in the area.

Tree presence in semiarid ecosystems is generally constrained by insufficient annual rainfall. However, in semiarid Chile, rainforest patches dominated by *Aextoxicon punctatum* are unexpectedly found on coastal mountaintops (450–600 m) at 30°S, surrounded by a xerophytic vegetation matrix that receives only 147 mm of annual precipitation (**Figure 9**)

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It has been proposed that these forests persist as a result of fog-water inputs. If so, then because fog-water deposition is spatially heterogeneous and shows strong edge effects, the potential environmental gradient created by the direction of fog input should determine forest structure and tree regeneration patterns. Tree regeneration and patch structure appear to be largely controlled by fog-input direction and edge effects

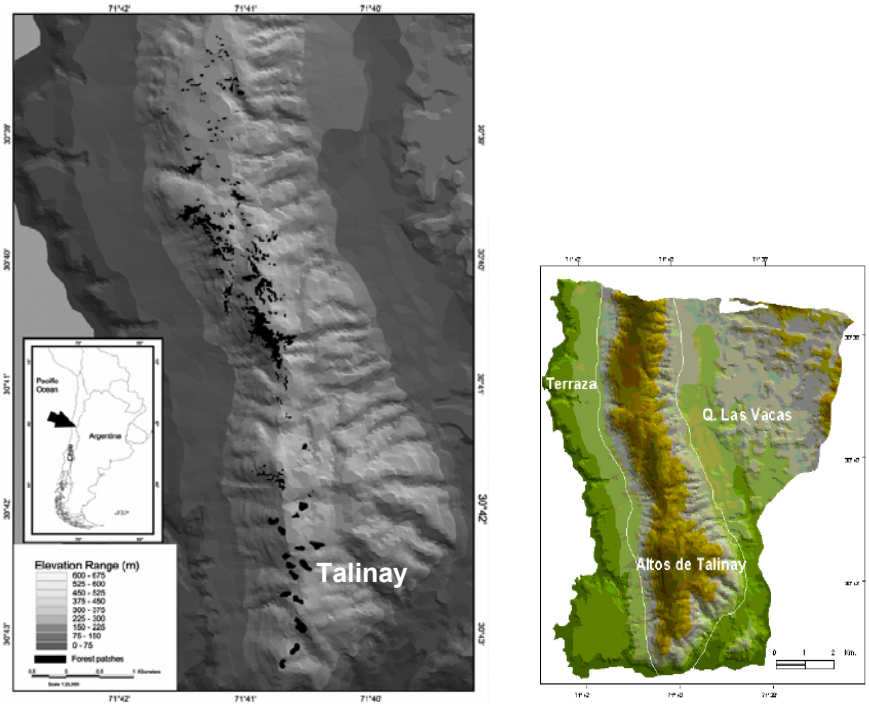

Figure 9. Rainforest patch mosaic in Fray Jorge National Park (Novoa-Jerez *et al*., 2004; del-Val, 2006).

The agricultural activity in the Choapa basin has been traditionally related with extensive crops (pastures, cereals); the recent construction of the *Corrales* reservoir (50 Mm^3) and the ongoing construction of the *El Bato* dam (25 Mm^3) will improve the inter- and intra-annual water availability. It is expected, as it has occurred in the other basins of the Region, that these hydraulic works will foster the agriculture of the Choapa Province favoring the development of high valued crops such as fruit trees.

In the Limarí basin agriculture plays an important role regarding water consumption and potential pollution. The main economic activities in the Limarí province are agriculture (31.8%) and commerce (38.5%), the latter concentrated in the main city of the province: Ovalle.

Agricultural Communities are social organizations of small farmers, joined by family bonds or friendship, living on communitarian ownership which is basically an undivided and indivisible expanse of land. These communities have their origin in land grants to individuals - generally licensed military personnel of the Spanish armies (XVI-XVII centuries). Many of these properties were subdivided by inheritance and finished up as *minifundia*, while a few remained undivided, either as *haciendas* or as *Communities*. Grazing privileges on the ranges and slopes, which often constitute by far the largest proportion of the community lands, are enjoyed by all members.

Although most of the 162 Communities identified have holdings between 500 and 10,000 ha and their total area covers almost 1 million ha (**Figure 10**), only a small proportion is classified as permanently suitable for agriculture and stock raising. Within

the *Communities*, members generally have the right to small plots that are permanently assigned to families, while larger tracts of dryland for crops are often rotated. Thus, for several decades, has been traditional that soils on a steep slope are widely used in cereal production (wheat, barley) and umbelliferae (cumin, anise) rainfed. This activity net of subsistence has contributed to the degradation of scarce land available, with an agricultural land abandonment of certain sites, *lluvias*, where the soil has lost its natural fertility or has reached levels of severe erosion. Cultivation period is followed by at least one year of fallow and after harvesting the stubbles fields are grazed by farm animals (goat overgrazing).

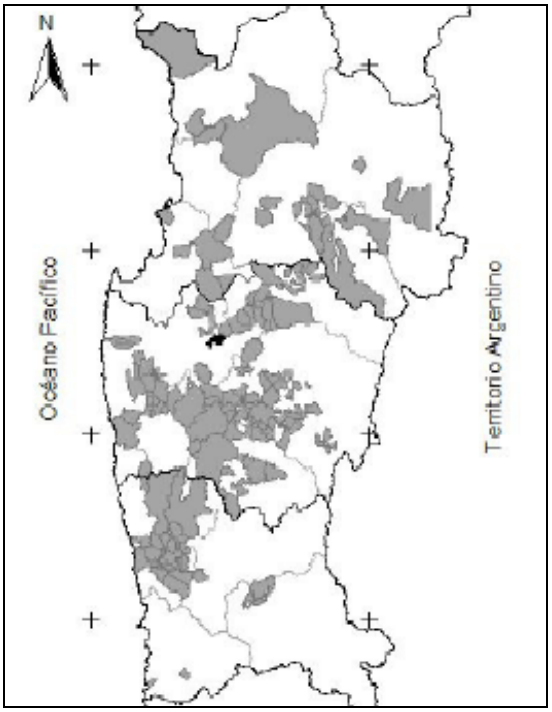

Figure 10. Distribution of *Comunidades* in the IV Region

Another productive sector coexists in IV Region with *Comunidades*: table grape and grape production (wine and pisco) as an industry with outward orientation. In terms of pisco grape varieties, from a national surface of 10,505 ha, near to 9,800 ha are located within IV Region (**Table 1**).

Table 1. Vineyards statistics in Chile (INE, 2008)

				Vineyards types											
							Red wine				White wine				*Pisco*
		Farmers		Surface (ha)			Surface (ha)								
							Commons		Fines		Commons		Fines		
		N°	Surface (ha)	Total	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated	Irrigated
Total Country		**17.396**	**1.333.368**	**128.993**	**24.684**	**104.309**	**14.367**	**9.197**	**2.978**	**60.707**	**6.098**	**2.069**	**1.241**	**21.830**	**10.505**
III R Atacama		**347**	**37.068**	**723**	**0**	**723**	**0**	**13**	**0**	**4**	**0**	**13**	**0**	**0**	**693**
IV R Coquimbo		**2.459**	**494.820**	**12.227**	**0**	**12.227**	**0**	**485**	**0**	**1.098**	**0**	**67**	**0**	**765**	**9.812**
P.	**Elqui**	**408**	**191.450**	**1.945**	**0**	**1.945**	**0**	**26**	**0**	**225**	**0**	**3**	**0**	**94**	**1.597**
P.	**Choapa**	**575**	**40.290**	**1.927**	**0**	**1.927**	**0**	**29**	**0**	**58**	**0**	**1**	**0**	**8**	**1.830**
P.	**Limarí**	**1.476**	**263.079**	**8.355**	**0**	**8.355**	**0**	**429**	**0**	**815**	**0**	**63**	**0**	**663**	**6.385**
C.	Ovalle	452	38.709	5.777	0	5.777	0	359	0	644	0	41	0	617	4.116
C.	Combarbalá	18	9.683	101	0	101	0	15	0	10	0	0	0	0	76
C.	Monte Patria	654	170.494	1.184	0	1.184	0	4	0	7	0	22	0	0	1.151
C.	**Punitaqui**	**120**	**3.216**	**946**	**0**	**946**	**0**	**50**	**0**	**145**	**0**	**0**	**0**	**45**	**707**
C.	Río Hurtado	232	40.978	347	0	347	0	1	0	10	0	0	0	1	335

R: region **P: province** **C: comune**

7. GENERAL CHARACTERISITICS OF THE SOILS

The variety of soils found in IV Region of Chile is strongly influenced by parent materials that are associated with each physiographic zone. The main characteristics of the soil at each site of the tour area are described below. Detailed descriptions and laboratory data of the soil profiles are found in the last section of this guide.

Los Vilos Soils

A huge Pleistocene sand dune covers and old marine terrace north to *Conchalí* Bay, near the outfall of Choapa River. They consist of sand accumulations that are now described as gently hilly landscape. Inside this sand formation it is possible to describe several cross bed lines indicating various aeolian Pleistocenic activities, associated with buried soils. The presence of these slightly developed soils is an indication of some pedogenic processes that occurs during the Pleistocene. In the profile shown in this place it is posible to observe two eolian phases, each one with their own pedogenic processes, separated by a pluvial period.

Huentelauquén Soils

This area it is known as the "metamorphic complex of *Choapa*", because the peneplanation has occurred over Silurian phyllites and mica-schists (**Figure 11**).

According to Paskoff (1970) the original basement rock has been reworked by the Ocean, living on top a typically sediment of marine origin. Afterwords, when the uplifted was concluded, alluvial and eolian actions modify the landscape as it is found nowadays. It should be the reason that could explain the mixture of sediments found at present in the soils.

The soils are found in a marine terrace with alluvial influence coming from the Choapa River. The subsoil shows a sequence of different layers of sediments whose origin has not been yet clarified.

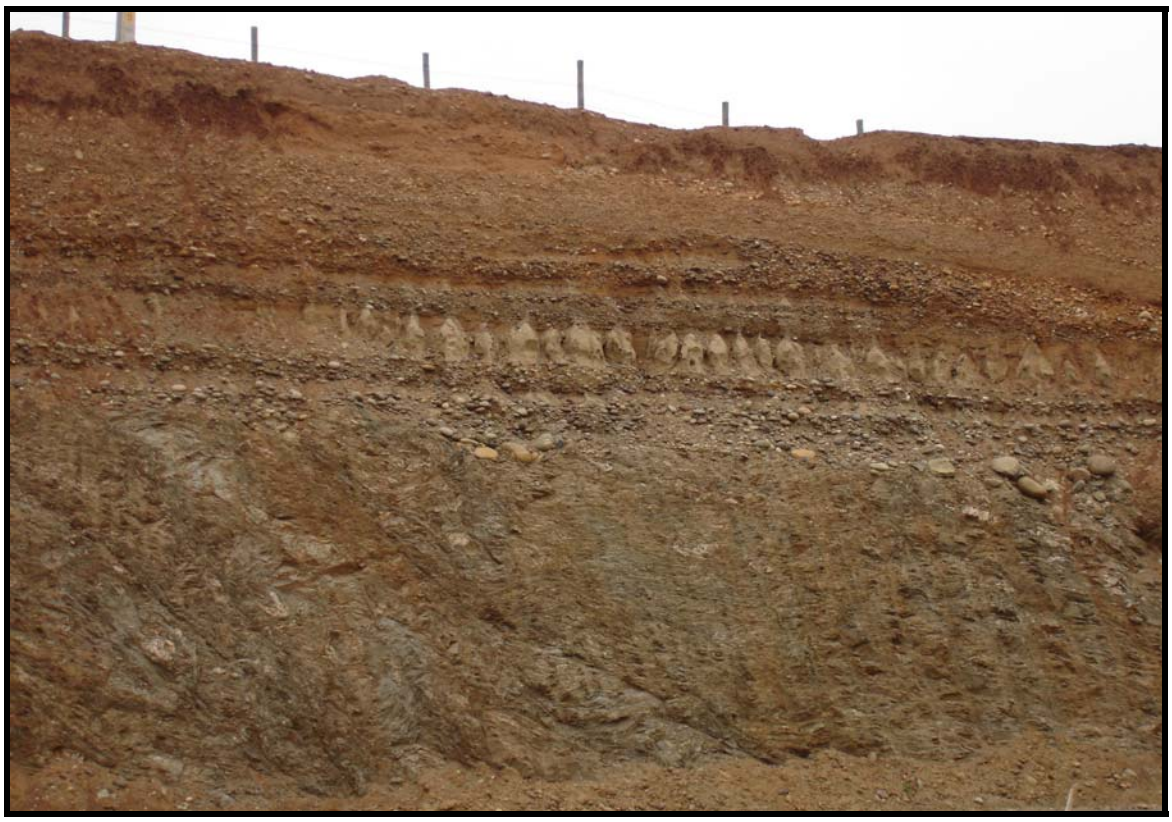

Figure 11. *Huentelauquén* road cut. From top to bottom: Soil of about 100 cm depth, diverse origin stratified deposit and Silurian Phyllites from the *Choapa* metamorphic complex

Las Cardas Soils

During the Upper Tertiary period there were several orogenic cycles, characterized by huge vertical tectonic movements. This should be the reason why it is not possible to differentiate between the three typical physiographic units that are classic in the central-south Chile: that are the Andean Cordillera, the Central Valley (graben) and the Coastal Range.

The hills to the west of *Las Cardas* belong to the granitic batolith from the Upper Cretaceous, while to the east it appears the "*Arqueros* Formation", of about 60 km long. This *Arqueros* Formation is made up of Lower Cretaceous andesitic volcanic rocks mixed with fosiliferous marine rocks. In *Las Cardas* area there is a dominance of andesites, breccias mixed with sandstones and limestone.

Las Cardas area is located in the Elqui River Basin, within the Coquimbo Province.

San Julián Soils

Near the city of Ovalle the river terraces consists in a great plateau, conforming the highest alluvial terrace of Limarí River. This hugh terraces are oriented towards the west and then to the north, excavated in both situations by deep and narrow creeks.

The present river valley is about 100 m to 150 m depth, from the upper level terrace. In the wall cliffs is possible to distinguish clearly the alluvial rounded gravels and boulders mixed with sand lenses from the river sedimentation and erosion facies.

Tongoy Soils

The highest terrace level is considered as built up by the Limari River during the Pliocene. Towards the west is intermixed with another terrace level of marine origin and similar age, so that the rounded gravel deposited by the river is mixed with different species of snails and bivalves shells. The mixture of snails, shells, sand and rounded gravel are now cemented conforming in some places a petrocalcic horizon and in another places a “petrocalcic-like” strata. It is supposed that the paleoclimates have been favourable to solubilization and leaching of carbonates constituing the cementing agent to the different particles.

The lower terrace is interrupted by a clif 40 m high near the Tongoy Bay. Under the terrace there is a more or less level surface, 1 to 2 km width consisting of compacted fossiliferous deposits. The lowest level consist of a shoreline of about 15 km long in a semicircle shape, starting to the west in the so called *Punta Lengua de Vaca* and finishing to the east in the granitic peninsula called *Guanaqueros*.

The Jurassic volcanic outcrop of *Tongoy* is now connected to the Continent by a sandy bar considered as a typical *tombolo*. The landscape is completed with several small dunes and lagoons near the outlet of the several creeks that reach the shoreline.

The system of terraces in the shoreline south to Limarí River

According to different authors the terraces are considered of marine origin and form a more or less continuous landscape from 31ºS to 32ºS.

Between *El Teniente* and *Chigualoco* bays there is only one level of terrace, very wide and almost levelled, whose origin is from the Early Quaternary. Its origin has been related with a local uplifted of the continent, up to 300 m.a.s.l. in some sectors.

South to *Chigualoco* bay it is possible to observe three levels of marine terraces. In many areas these marine terraces have been covered by Pleistocene and Holocene sands, giving rise to some pedogenic processes and consequently weakly developed soils. At present some areas consist of active sand dunes.

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9. PEDON DESCRIPTIONS AND ANALYTICAL DATA

LOS VILOS - PEDON DESCRIPTION

Print Date: 08/15/2008
Description Date: 03/11/2008
Describer: M. Casanova-W. Luzio-N. Stolpe
Site ID: S08CI007001
Site Note: Vegetation: grasses and shrubs; *Alstroemeria* sp.; *Bacharis macraei* Hook et Arn.; *Bacharis paniculata* DC.; *Chorizante* sp; *Echinopis coquimbana* (Molina) Friedrich et G. D. Rowley; *Erigeron berteroanus* DC.; *Lithraea caustica* (Molina) Hook. & Arn.; *Margyricarpus pinnatus* (Lam.) Kuntze; *Muehlenbeckia hastulata* (Smith) I. M. Johnston; *Ricinus communis* L.; *Senecio coquimbensis* Phil.; *Sphaeralcea obtusiloba* (Hook) G. Don.; *Sysirinchium* sp.
Pedon ID: S08CI007001
Pedon Note:
Lab Source ID: SSL

Lab Pedon #: 08N0456
Soil Name as Described/Sampled: Los Vilos
Soil Name as Correlated:
Classification: Mixed, active, mesic Typic Xeropsamments
Pedon Type:
Pedon Purpose: full pedon description
Taxon Kind:
Associated Soils:
Physiographic Division:
Physiographic Province:
Physiographic Section:
State Physiographic Area:
Local Physiographic Area:
Geomorphic Setting:
Upslope Shape:
Cross Slope Shape:
Particle Size Control Section: 25 to 100 cm.
Description origin: NASIS
Diagnostic Features: *ochric epipedon 0 to 38 cm*
Site ID: S08CI007001

Country: Chile
State: IV Coquimbo Region
County: Choapa Province
MLRA:
Soil Survey Area:

Map Unit:
Quad Name:
Location Description: ≈ 12 km north of Los Vilos town, on east side of Panamerican highway 5 N.
Legal Description:
Latitude: 31° 48´ 46.30" south
Longitude: 71° 30´ 0.30" west
Datum: WGS84

UTM Zone: 19
UTM Easting: 263342 m
UTM Northing: 6477586 m

Primary Earth Cover: Grass/herbaceous cover
Secondary Earth Cover: Grassland rangeland
Existing Vegetation:
Parent Material: eolian sands
Bedrock Kind:
Bedrock Depth:
Bedrock Hardness:
Bedrock Fracture Interval:
Surface Fragments:
Description database: NSSL

Pedon ID: S08CI007001

Slope (%)	Elevation (masl)	Aspect (deg)	MAAT (°C)	MSAT (°C)	MWAT (°C)	MAP (mm)	Frost-free days	Drainage Class	Slope Length (m)	Upslope Length (m)
3.0	95.0	270		20	9	266.5		excessively		

(DMC)

Depth (cm)	Profile description
0 to 11 **A1**	Dark brown (7.5YR 3/4) loamy sand, brown (7.5YR 5/4), dry; weak fine granular, and weak very fine granular structure; very friable, nonsticky, nonplastic; many fine roots and many very fine roots; many fine and many medium and many coarse and many very fine pores; clear smooth boundary. Laboratory sample # 08N02961
11 to 23 **A21**	Dark brown (7.5YR 3/4) sandy loam, yellowish brown (10YR 5/4), dry; weak medium subangular blocky structure; very friable, nonsticky, nonplastic; many fine roots and many very fine roots; many fine and many medium and many coarse and many very fine pores; diffuse smooth boundary. Laboratory sample # 08N02962.
23 to 38 **A22**	Dark brown (7.5YR 3/4) sandy loam, dark yellowish brown (10YR 4/4), dry; weak medium subangular blocky structure; loose, nonsticky, nonplastic; common fine roots and common medium roots; many medium and many coarse pores; diffuse smooth boundary. Laboratory sample # 08N02963.
38 to 54 **C1**	Dark brown (7.5YR 3/4) sand, dark yellowish brown (10YR 4/4), dry; structureless single grain; loose, nonsticky, nonplastic; many fine roots; many fine and many medium pores; diffuse smooth boundary. Laboratory sample # 08N02964
54 to 82 **C2**	Brown (7.5YR 4/4) coarse sand, dark yellowish brown (10YR 4/6), dry; structureless single grain; loose, nonsticky, nonplastic; common fine roots and common medium roots; many medium and few coarse pores; gradual smooth boundary. Laboratory sample # 08N02965.
82 to 108 **C3**	brown (7.5YR 4/4) sand, dark yellowish brown (10YR 4/6), dry; structureless single grain; loose, nonsticky, nonplastic; few fine roots and few medium roots; many fine and many medium pores; clear wavy boundary. Laboratory sample # 08N02966.
108 to 190 **2C4**	35% brown (7.5YR 4/4) and 25% dark yellowish brown (10YR 4/4) sand, 35% strong brown (7.5YR 4/6) and 25% yellowish brown (10YR 5/6), dry; structureless massive; loose, nonsticky, nonplastic; common fine roots and common medium roots; many fine and many medium pores; irregular moderately cemented dark reddish brown (2.5YR 3/4), moist, and yellowish red (5YR 4/6), dry, ironstone nodules; abrupt smooth boundary. Laboratory sample # 08N02967.
190 to 220 **3C5**	Dark red (2.5YR 3/6) sand, yellowish red (5YR 5/8), dry; structureless massive; loose, nonsticky, nonplastic; many coarse pores; many insects galleries; diffuse smooth boundary. Laboratory sample # 08N02968.
220 to 275 **4C6**	Sand; structureless massive; loose, nonsticky, nonplastic; many coarse pores. Laboratory sample # 08N02969.

*** Primary Characterization Data ***

Pedon ID: S08CI007001 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled as on Mar 11, 2008: **Los Vilos** ; Mixed, active, mesic Typic Xeropsamment

Revised to :

SSL - Project C2008CI02097 Chile

- Site ID S08CI007-001 Lat: 31° 48' 46.30" south Long: 71° 30' .30" west WGS84
- Pedon No. 08N0456
- General Methods 1B1A, 2A1, 2B

United States Department of Agriculture
Natural Resources Conservation Service
National Soil Survey Center
Soil Survey Laboratory
Lincoln, Nebraska 68508-3866

Layer	Horizon	Orig Hzn	Depth (cm)	Field Label 1	Field Label 2	Field Label 3	Field Texture	Lab Texture
08N02961	A1		0.0-11.0	S08CI007-001-1			LS	FS
08N02962	A21		11.0-23.0	S08CI007-001-2			SL	FS
08N02963	A22		23.0-38.0	S08CI007-001-3			SL	FS
08N02964	C1		38.0-54.0	S08CI007-001-4			S	FS
08N02965	C2		54.0-82.0	S08CI007-001-5			COS	FS
08N02966	C3		82.0-108.0	S08CI007-001-6			S	FS
08N02967	2C4		108.0-190.0	S08CI007-001-7			S	FS
08N02968	3C5		190.0-220.0	S08CI007-001-8			S	FS
08N02969	4C6		220.0-275.0	S08CI007-001-9			S	FS
08N02970			108.0-190.0	S08CI007-001-10	NODULES			

Pedon Calculations

Calculation Name	Result	Units of Measure
Weighted Particles, 0.1-75mm, 75 mm Base	88.914	% wt
Volume, >2mm, Weighted Average	0	% vol
Clay, total, Weighted Average	3.149	% wt
CEC Activity, CEC7/Clay, Weighted Average, CECd, Set 1	0.974	(NA)
LE, Whole Soil, Summed to 1m	0.2	cm/m

Weighted averages based on control section: 25-100 cm

Pedon ID: S08CI007001 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Los Vilos** Mixed, active, mesic Typic Xeropsamment

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0456

PSDA & Rock Fragments

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-
				(- - - - - Total - - - - - -)			(- - Clay - - -)		(- - - - Silt - - - - -)		(- - - - - - - - - - - - Sand - - - - - - - - - - - -)					(Rock Fragments (mm))				
				Clay	Silt	Sand	Fine	CO_3	Fine	Coarse	VF	F	M	C	VC	(- - - - - - - - Weight - - - - - - - -)				>2 mm
				<	.002	.05	<	<	.002	.02	.05	.10	.25	.5	1	2	5	20	.1-	wt %
	Depth			.002	-.05	-2	.0002	.002	-.02	-.05	-.10	-.25	-.50	-1	-2	-5	-20	-75	75	whole
Layer	(cm)	Horz	Prep	(- % of <2mm Mineral Soil -)												(- - - - - - - % of <75mm - - - - - -)				soil
				3A1a1a			3A1a1a		3A1a1a		3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a					
08N02961	0-11	A1	S	2.9	5.2	91.9	1.7		2.0	3.2	5.2	68.1	18.3	0.3	--	--	--	--	87	--
08N02962	11-23	A21	S	3.4	4.3	92.3	2.0		1.2	3.1	3.8	69.8	18.4	0.3	--	--	--	--	89	--
08N02963	23-38	A22	S	3.1	3.1	93.8	1.8		1.3	1.8	3.8	67.0	22.5	0.5	--	--	--	--	90	--
08N02964	38-54	C1	S	2.9	3.3	93.8	1.7		1.5	1.8	4.9	71.4	17.3	0.2	--	--	--	--	89	--
08N02965	54-82	C2	S	3.1	4.0	92.9	1.5		1.8	2.2	4.6	69.2	18.7	0.4	--	--	tr	--	88	tr
08N02966	82-108	C3	S	3.5	3.6	92.9	1.8		2.2	1.4	3.8	68.2	20.4	0.5	--	--	--	--	89	--
08N02967	108-190	2C4	S	3.1	3.3	93.6	1.7		1.7	1.6	4.5	65.9	22.4	0.8	--	--	--	--	89	--
08N02968	190-220	3C5	S	2.9	2.0	95.1	1.8		1.4	0.6	2.6	68.0	24.4	0.1	--	--	--	--	93	--
08N02969	220-275	4C6	S	2.3	1.3	96.4	1.6		0.8	0.5	3.2	79.9	13.3	--	--	--	--	--	93	--

Water Dispersible PSDA

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-
							(- Water Dispersible -)								
				(- - - - - Total - - - - - -)			(- - Clay - - -)		(- - - - Silt - - - - -)					(- - - - - - - - - - - - Sand - - - - - - - - - - - -)	
				Clay	Silt	Sand	F	CO_3	F	C	VF	F	M	C	VC
				<	.002	.05	<	<	.002	.02	.05	.10	.25	.5	1
	Depth			.002	-.05	-2	.0002	.002	-.02	-.05	-.10	-.25	-.50	-1	-2
Layer	(cm)	Horz	Prep				(- % of <2mm -)								
				3A1a6a					3A1a6a		3A1a6a	3A1a6a	3A1a6a	3A1a6a	3A1a6a
08N02961	0-11	A1	S	1.0	3.6	95.4			1.9	1.7	5.2	68.4	21.1	0.6	0.1
08N02962	11-23	A21	S	1.6	3.9	94.5			2.1	1.8	4.1	70.8	19.0	0.5	0.1
08N02963	23-38	A22	S	1.7	3.3	95.0			1.9	1.4	3.7	68.1	22.6	0.6	tr
08N02964	38-54	C1	S	2.0	2.5	95.5			1.4	1.1	3.8	72.9	18.5	0.3	tr
08N02965	54-82	C2	S	2.5	2.5	95.0			1.4	1.1	4.7	69.6	20.2	0.5	--
08N02966	82-108	C3	S	3.0	3.0	94.0			1.5	1.5	4.6	71.4	17.5	0.5	--
08N02967	108-190	2C4	S	1.9	3.2	94.9			1.9	1.3	3.9	68.2	22.0	0.8	tr
08N02968	190-220	3C5	S	2.5	1.1	96.4			0.4	0.7	2.3	66.7	27.3	0.1	--
08N02969	220-275	4C6	S	1.8	0.8	97.4			0.3	0.5	3.2	78.9	15.3	tr	--

*** Primary Characterization Data ***

Pedon ID: S08CI007001 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Los Vilos** Mixed, active, mesic Typic Xeropsamment

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0456

Bulk Density & Moisture

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-
				(Bulk Density)		Cole	(- - - - - - - - - - Water Content - - - - - - - - - - -)						WRD	Aggst		
				33	Oven	Whole	6	10	33	1500	1500 kPa	Ratio	Whole	Stabl		(- - Ratio/Clay - -)
	Depth			kPa	Dry	Soil	kPa	kPa	kPa	kPa	Moist	AD/OD	Soil	2-0.5mm	CEC7	1500 kPa
Layer	(cm)	Horz	Prep	(- - - g cm^{-3} - - -)			(- - - - - - - - - - - - pct of < 2mm - - - - - - - - - - - -)						cm^3 cm^{-3}	%		
				DbWR1	DbWR1			DbWR1	DbWR1	3C2a1a		3D1				
08N02961	0-11	A1	S	1.43	1.44	0.002		8.5	8.0	3.7		1.007	0.06		1.69	1.28
08N02962	11-23	A21	S	1.55	1.56	0.002		6.7	6.0	2.7		1.006	0.05		1.15	0.79
08N02963	23-38	A22	S	1.54	1.54	--		9.0	8.4	2.5		1.005	0.09		1.00	0.81
08N02964	38-54	C1	S	1.59	1.59	--		5.9	5.3	2.3		1.005	0.05		1.03	0.79
08N02965	54-82	C2	S	1.59	1.60	0.002		6.1	5.9	2.4		1.006	0.06		0.97	0.77
08N02966	82-108	C3	S	1.60	1.62	0.004		6.1	5.6	2.8		1.005	0.04		0.91	0.80
08N02967	108-190	2C4	S	1.57	1.58	0.002			6.2	2.7		1.007	0.05		0.94	0.87
08N02968	190-220	3C5	S	1.70	1.71	0.002			4.7	2.9		1.007	0.03		0.90	1.00
08N02969	220-275	4C6	S	1.58	1.59	0.002			3.9	2.2		1.006	0.03		1.00	0.96

Carbon & Extractions

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-
				(- - - - - Total - - - - -)			Org	C/N	(- - - Dith-Cit Ext - - -)			(- - - - - - Ammonium Oxalate Extraction - - - - - -)						(- - - Na Pyro-Phosphate - - -)			
	Depth			C	N	S	C	Ratio	Fe	Al	Mn	Al+½Fe	ODOE	Fe	Al	Si	Mn	C	Fe	Al	Mn
Layer	(cm)	Horz	Prep	(- - - - - - % of <2 mm - - - - - -)					(- % of < 2mm - - - - - - - - - - - - - - - - - - -)								mg kg^{-1}	(- - - - - - % of < 2mm - - - - - -)			
				4H2a	4H2a	4H2a			4G1	4G1	4G1		4G2a	4G2a	4G2a	4G2a	4G2a		4G3	4G3	4G3
08N02961	0-11	A1	S	1.18	0.118	0.01		10	0.5	--	--	0.16	0.05	0.19	0.07	0.01	113.8		tr	tr	--
08N02962	11-23	A21	S	0.64	0.066	0.01		10	0.6	--	--	0.14	0.04	0.17	0.06	0.01	113.8		tr	--	--
08N02963	23-38	A22	S	0.40	0.043	0.01		9	0.6	tr	--	0.14	0.04	0.16	0.06	0.01	103.4		tr	tr	--
08N02964	38-54	C1	S	0.27	0.046	0.01		6	0.6	tr	--	0.15	0.04	0.17	0.06	0.01	97.3		tr	tr	--
08N02965	54-82	C2	S	0.20	0.055	0.01		4	0.6	--	--	0.15	0.04	0.18	0.06	0.01	86.1		0.1	tr	--
08N02966	82-108	C3	S	0.14	0.029	0.01		5	0.7	--	--	0.16	0.04	0.21	0.05	0.01	59.1		0.1	tr	--
08N02967	108-190	2C4	S	0.12	0.029	0.01		4	0.8	--	--	0.25	0.04	0.39	0.05	0.02	78.4		0.1	tr	--
08N02968	190-220	3C5	S	0.04	0.027	0.01		1	1.3	--	tr	0.29	0.03	0.50	0.05	0.04	243.0		0.2	tr	--
08N02969	220-275	4C6	S	0.01	0.032	0.01		tr	0.8	--	--	0.22	0.02	0.37	0.03	0.02	29.7		0.1	--	--

*** Primary Characterization Data ***

Pedon ID: S08CI007001 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Los Vilos** Mixed, active, mesic Typic Xeropsamment

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0456

CEC & Bases

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-
				(- - - - - - NH_4OAC Extractable Bases - - - - -)												(- - - - Base - - - -)	
								Sum	Acid-	Extr	KCl	CEC8 Sum	CEC7 NH_4	ECEC Bases	Al	(- Saturation -)	
	Depth			Ca	Mg	Na	K	Bases	ity	Al	Mn	Cats	OAC	+Al	Sat	Sum	NH_4OAC
Layer	(cm)	Horz	Prep	(- - - - - - - - - - - - - - - - - cmol(+) kg^{-1} - - - - - - - - - - - - - - - - - - -)							mg kg^{-1}	(- - - - cmol(+) kg^{-1} - - -)			(- - - - - - - - % - - - - - - - -)		
				4B1a1a	4B1a1a	4B1a1a	4B1a1a		4B2b1a1				4B1a1a				
08N02961	0-11	A1	S	3.4	0.6	0.1	0.5	4.6	4.2			8.8	4.9			52	94
08N02962	11-23	A21	S	2.6	0.7	0.1	0.2	3.6	4.0			7.6	3.9			47	92
08N02963	23-38	A22	S	1.6	0.5	0.1	0.2	2.4	3.3			5.7	3.1			42	77
08N02964	38-54	C1	S	1.6	0.5	0.1	0.1	2.3	4.2			6.5	3.0			35	77
08N02965	54-82	C2	S	1.2	0.7	0.2	0.1	2.2	3.3			5.5	3.0			40	73
08N02966	82-108	C3	S	1.2	1.1	0.3	0.1	2.7	2.2			4.9	3.2			55	84
08N02967	108-190	2C4	S	1.4*	1.2	0.3	0.1	3.0	3.1			6.1	2.9			49	100
08N02968	190-220	3C5	S	1.5*	1.6	0.2	0.1	3.4	2.3			5.7	2.6			60	100
08N02969	220-275	4C6	S	1.6*	1.3	0.3	0.1	3.3	1.1			4.4	2.3			75	100

*Extractable Ca may contain Ca from calcium carbonate or gypsum. CEC7 base saturation set to 100.

Salt

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
				(- Water Extracted From Saturated Paste -)																	Pred		
																			Total	Elec	Elec	Exch	
	Depth			Ca	Mg	Na	K	CO_3	HCO_3	F	Cl	PO_4	Br	OAC	SO_4	NO_2	NO_3	H_2O	Salts	Cond	Cond	Na	SAR
Layer	(cm)	Horz	Prep	(- - - - - mmol(+) L^{-1} - - - - -)				(- mmol(-) L^{-1} -)										(- - - - % - - - -)		(- - dS m^{-1} - -)		%	
																					4F1a1a1		
08N02961	0-11	A1	S																		0.14	3	
08N02962	11-23	A21	S																		0.10	3	
08N02963	23-38	A22	S																		0.09	4	
08N02964	38-54	C1	S																		0.05	5	
08N02965	54-82	C2	S																		0.05	5	
08N02966	82-108	C3	S																		0.06	8	
08N02967	108-190	2C4	S																		0.07	9	
08N02968	190-220	3C5	S																		0.03	9	
08N02969	220-275	4C6	S																		0.03	11	

*** Primary Characterization Data ***

Pedon ID: S08CI007001 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Los Vilos** Mixed, active, mesic Typic Xeropsamment

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0456

pH & Carbonates

Layer	Depth (cm)	Horz	Prep	-1- KCl 4C1a2a3	-2- $CaCl_2$ 0.01M 1:2 4C1a2a	-3- H_2O 1:1 4C1a2a	-4- Sat Paste	-5- Oxid	-6- NaF 4C1a1a1	-7- Carbonate As $CaCO_3$ <2mm (%)	-8- Carbonate As $CaCO_3$ <20mm (%)	-9- Gypsum As $CaSO_4*2H_2O$ <2mm (%)	-10- Gypsum As $CaSO_4*2H_2O$ <20mm (%)	-11- Resist ohms cm^{-1}
08N02961	0-11	A1	S	5.2	5.6	6.2			9.1					
08N02962	11-23	A21	S	4.8	5.3	5.9			8.5					
08N02963	23-38	A22	S	4.4	4.9	5.5			8.0					
08N02964	38-54	C1	S	4.4	5.0	5.7			8.8					
08N02965	54-82	C2	S	4.2	4.9	5.7			8.5					
08N02966	82-108	C3	S	4.2	5.0	5.9			8.7					
08N02967	108-190	2C4	S	4.4	5.3	6.0			8.3					
08N02968	190-220	3C5	S	5.0	5.8	6.8			8.8					
08N02969	220-275	4C6	S	5.0	6.1	7.2			8.7					

Phosphorous

Layer	Depth (cm)	Horz	Prep	-1- Melanic Index	-2- NZ % 4D8a1	-3- Acid Oxal 4G2a	-4- Bray 1 (mg kg^{-1})	-5- Bray 2 (mg kg^{-1})	-6- Olsen (mg kg^{-1})	-7- H_2O (mg kg^{-1})	-8- Citric Acid (mg kg^{-1})	-9- Mehlich III (mg kg^{-1})	-10- KCl Extr NO_3 (mg kg^{-1})
08N02961	0-11	A1	S		7	249.7							
08N02962	11-23	A21	S		6	207.5							
08N02963	23-38	A22	S		5	180.0							
08N02964	38-54	C1	S		6	180.7							
08N02965	54-82	C2	S		3	169.1							
08N02966	82-108	C3	S		5	122.2							
08N02967	108-190	2C4	S		5	110.1							
08N02968	190-220	3C5	S		7	206.9							
08N02969	220-275	4C6	S		3	105.9							

*** Primary Characterization Data ***

Pedon ID: S08CI007001 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Los Vilos** Mixed, active, mesic Typic Xeropsamment

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0456

Sand - Silt Mineralogy (2.0-0.002 mm)

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-
						X-Ray				Thermal						Optical				EGME	Inter
													Tot Re			Grain Count				Retn	preta
	Depth		Fract													7B1a2					tion
Layer	(cm)	Horz	ion	(- - - - - - - - peak size - - - - - - - - -)					(- - - - - - - - % - - - - - - - - -)				(- % - - - - - - - - - - - - - - - - - -)							mg g^{-1}	
08N02961	0-11	A1	fs										60	QZ 43	AR 15	FE 14	FP 9	FK 8	HN 5		SMIX
														PR 3	CD 2	OP 1	FZ tr	GN tr			
08N02963	23-38	A22	fs										55	QZ 41	AR 19	FE 13	FK 10	FP 8	HN 5		SMIX
														PR 2	CD 1	GN tr	OP tr				
08N02965	54-82	C2	fs										57	QZ 40	AR 21	FE 16	FK 12	FP 6	HN 3		SMIX
														CD 1	PR 1	ZR tr					
08N02967	108-190	2C4	fs										56	QZ 40	AR 23	FE 14	FK 10	FP 6	HN 4		SMIX
														CD 2	PR 2	GN tr	OP tr				
08N02969	220-275	4C6	fs										52	QZ 39	AR 15	FE 12	FK 10	FP 10	HN 8		SMIX
														PR 5	OP 1	BT tr	CD tr	GN tr	ZR tr		

FRACTION INTERPRETATION:

fs - Fine Sand, 0.1-0.25 mm

MINERAL INTERPRETATION:

AR - Weatherable Aggregates BT - Biotite CD - Chert (Chalcedony FE - Iron Oxides (Goethite FK - Potassium Feldspar

FP - Plagioclase Feldspar FZ - Feldspathoids GN - Garnet HN - Hornblende OP - Opaques

PR - Pyroxene QZ - Quartz ZR - Zircon

INTERPRETATION (BY HORIZON):

SMIX - Mixed Sand

*** Taxonomy Characterization Data ***

Pedon ID: S08CI007001 (Chile) Print Date: Aug 20 2008 10:14AM

Sampled as on Mar 11, 2008: **Los Vilos** ; Mixed, active, mesic Typic Xeropsamment

Revised to :

SSL - Project C2008CI02097 Chile

- Site ID S08CI007-001 Lat: 31° 48' 46.30" south Long: 71° 30' .30" west WGS84
- Pedon No. 08N0456
- General Methods 1B1A, 2A1, 2B

United States Department of Agriculture
Natural Resources Conservation Service
National Soil Survey Center
Soil Survey Laboratory
Lincoln, Nebraska 68508-3866

Taxonomy Tier 1

Layer	Depth (cm)	Horz	Prep	-1- Clay <.002 (---------% of <2 mm-------) 3A1a1a	-2- Fine Clay <.0002 3A1a1a	-3- $CaCO_3$ Clay <.002	-4- 1500 kPa /Clay	-5- Clay Est (------ % ------)	-6- .1-75 mm Frac	-7- Bulk Den 33 kPa g cm^{-3} DbWR1	-8- Cole Whole Soil cm cm^{-1}	-9- Vol % of Whole	-10- Resist Min %	-11- -12- -13- -14- Glass Content csi vfs fs wt avg (-------- % --------)
08N02961	0-11	A1	S	2.9	1.7		1.28	6.3	87	1.43	0.002	--	60	
08N02962	11-23	A21	S	3.4	2.0		0.79	5.2	89	1.55	0.002	--		
08N02963	23-38	A22	S	3.1	1.8		0.81	5.3	90	1.54	--	--	55	
08N02964	38-54	C1	S	2.9	1.7		0.79	5.1	89	1.59	--	--		
08N02965	54-82	C2	S	3.1	1.5		0.77	5.5	88	1.59	0.002	--	57	
08N02966	82-108	C3	S	3.5	1.8		0.80	6.7	89	1.60	0.004	--		
08N02967	108-190	2C4	S	3.1	1.7		0.87	6.5	89	1.57	0.002	--	56	
08N02968	190-220	3C5	S	2.9	1.8		1.00	7.2	93	1.70	0.002	--		
08N02969	220-275	4C6	S	2.3	1.6		0.96	5.5	93	1.58	0.002	--	52	
08N02970	108-190		S						--			--		

Taxonomy Tier 2				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-
				pH	pH	Org	Tot	Al+½ Fe		CO_3 as	(--- Base Sat ---)		NZ	ECEC	CEC7	ECEC	Al		
	Depth			H_2O	NaF	C	C	Oxal	ODOE	$CaCO_3$	NH_4	Bases	P Ret	cmol(+)	/Clay	/Clay	Sat	E C	ESP
Layer	(cm)	Horz	Prep			(---------- % ----------								kg^{-1}			%	$dS\ m^{-1}$	%
				4C1a2a	4C1a1a1		4H2a		4G2a				4D8a1						
08N02961	0-11	A1	S	6.2	9.1		1.18	0.16	0.05		94	52	7		1.69				3
08N02962	11-23	A21	S	5.9	8.5		0.64	0.14	0.04		92	47	6		1.15				3
08N02963	23-38	A22	S	5.5	8.0		0.40	0.14	0.04		77	42	5		1.00				4
08N02964	38-54	C1	S	5.7	8.8		0.27	0.15	0.04		77	35	6		1.03				5
08N02965	54-82	C2	S	5.7	8.5		0.20	0.15	0.04		73	40	3		0.97				5
08N02966	82-108	C3	S	5.9	8.7		0.14	0.16	0.04		84	55	5		0.91				8
08N02967	108-190	2C4	S	6.0	8.3		0.12	0.25	0.04		100*	49	5		0.94				9
08N02968	190-220	3C5	S	6.8	8.8		0.04	0.29	0.03		100*	60	7		0.90				9
08N02969	220-275	4C6	S	7.2	8.7		0.01	0.22	0.02		100*	75	3		1.00				11

*Extractable Ca may contain Ca from calcium carbonate or gypsum.

Pedon Calculations

Calculation Name	Result	Units of Measure
Weighted Particles, 0.1-75mm, 75 mm Base	88.914	% wt
Volume, >2mm, Weighted Average	0	% vol
Clay, total, Weighted Average	3.149	% wt
Clay, carbonate free, Weighted Average	3.149	% wt
CEC Activity, CEC7/Clay, Weighted Average, CECd, Set 1	0.974	(NA)
LE, Whole Soil, Summed to 1m	0.2	cm/m

Weighted averages based on control section: 25-100 cm

HUENTELAUQUEN - PEDON DESCRIPTION

Print Date: 08/15/2008
Description Date: 03/13/2008
Describer: M. Casanova – W. Luzio – T. Reinsch
Site ID: S08CI007005
Site Note: In a fog bank most every day. Prevailing winds are offshore.
Pedon ID: S08CI007005
Pedon Note: Burrows created by rats or gophers (roedor).
Lab Source ID: SSL

Lab Pedon #: 08N0460
Soil Name as Described/Sampled: Huentelauquen
Soil Name as Correlated:
Classification: Fine, mixed, superactive, thermic Xeric Natrargids
Pedon Type:
Pedon Purpose: full pedon description
Taxon Kind:
Associated Soils:
Physiographic Division:
Physiographic Province:
Physiographic Section:
State Physiographic Area:
Local Physiographic Area:
Geomorphic Setting: marine terrace, alluvial plain
Upslope Shape: linear
Cross Slope Shape: linear
Particle Size Control Section: 24 to 74 cm.
Description origin: NASIS
Diagnostic Features: *ochric epipedon 0 to 24 cm.*
natric horizon 24 to 42 cm.
argillic horizon 42 to 120 cm.

Country: Chile
State: Coquimbo IV Region
County: Choapa Province
MLRA:
Soil Survey Area:

Map Unit:
Quad Name:

Location Description: 1 km east of Huentelauquén village and Panamerican highway 5 N. 6 km east of coast line. Pacific Ocean.
Legal Description:
Latitude: 31° 34´ 22.20” south
Longitude: 71° 31´ 46.50” west
Datum: WGS84

UTM Zone: 19
UTM Easting: 259930 m
UTM Northing: 6504135 m

Primary Earth Cover: Barren land
Secondary Earth Cover:
Existing Vegetation:
Parent Material: alluvium and/or marine deposits
Bedrock Kind:
Bedrock Depth:
Bedrock Hardness:
Bedrock Fracture Interval:
Surface Fragments:
Description database: NSSL

Cont. Site ID: S08CI007005 **Pedon ID:** S08CI007005

Slope (%)	Elevation (masl)	Aspect (deg)	MAAT (°C)	MSAT (°C)	MWAT (°C)	MAP (mm)	Frost-free days	Drainage Class	Slope Length (m)	Upslope Length (m)
5.0	*107.0*	*270*		20	9		-	*moderately*		

Depth (cm)	Profile description
0 to 10 **Ap**	Brown (7.5YR 4/3) loam, dark brown (7.5YR 3/3), moist; strong medium angular blocky structure; friable, very hard, slightly sticky, slightly plastic; common fine roots; many fine and many medium pores; noneffervescent, by HCl, 3 N; hard surface crust is 0-5 mm; clear smooth boundary. Laboratory sample # 08N02987.
10 to 24 **A**	Brown (7.5YR 4/3) loam, dark reddish brown (5YR 3/3), moist; strong very coarse prismatic structure; friable, very hard, moderately sticky, slightly plastic; few fine roots between peds; many fine and many medium pores; 5% very coarse worm casts; noneffervescent, by HCl, 3 N; some color in concentrations; abrupt smooth boundary. Laboratory sample # 08N02988.
24 to 42 **Btn**	Silty clay loam, dark reddish brown (5YR 3/3), moist; strong coarse columnar structure; extremely hard, very sticky, very plastic; common fine roots between peds and few fine roots and few medium roots; many fine and many very fine pores; 10% fine Fe-Mn concretions; noneffervescent, by HCl, 3 N; top of columns have lighter color - bleached; clear smooth boundary. Laboratory sample # 08N02989
42 to 73 **Bt1**	Silty clay, dark reddish brown (2.5YR 3/3), moist; strong coarse prismatic parting to strong medium prismatic structure; extremely hard, very sticky, very plastic; common fine roots between peds and common very fine roots between peds; many fine and many very fine pores; continuous clay films; 10% Fe-Mn concretions and 30% Mn masses; 3% nonflat subrounded 2 to 75 mm unspecified fragments; noneffervescent, by HCl, 3 N; clear smooth boundary. Laboratory sample # 08N02990.
73 to 97 **Bt2**	Silty clay, reddish brown (5YR 4/4), moist; moderate medium prismatic parting to strong medium angular blocky structure; extremely hard, very sticky, very plastic; common fine roots between peds; many fine and many very fine pores; continuous clay films; 15% medium Fe-Mn concretions and 15% fine Fe-Mn concretions; 50% very coarse weakly cemented pink (7.5YR 7/4), moist, carbonate masses; strong effervescence, by HCl, 3 N; Carbonates diffuse boundary following cracks; gradual smooth boundary. Laboratory sample # 08N02991.
97 to 120 **BC**	Silty clay, red (2.5YR 4/6), moist; weak medium angular blocky, and weak fine angular blocky structure; firm, very sticky, very plastic; continuous clay films; 20% fine Fe-Mn concretions; very coarse (7.5YR 7/7), moist, carbonate masses; strong effervescence, by HCl, 3 N; striated surface; gradual smooth boundary. Laboratory sample # 08N02992.
120 **2C**	Silty clay; 40% nonflat subrounded 2- to 75-millimeter andesite fragments and 40% nonflat rounded 76 to 250 mm andesite fragments.

*** Primary Characterization Data ***

Pedon ID: S08CI007005 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled as on Mar 11, 2008: **Huentelauquen** ; Fine, mixed, superactive, thermic Xeric Natrargid

Revised to :

SSL - Project C2008CI02097 Chile
- Site ID S08CI007-005 Lat: 31° 34' 22.20" south Long: 71° 31' 46.50" west WGS84
- Pedon No. 08N0460
- General Methods 1B1A, 2A1, 2B

United States Department of Agriculture
Natural Resources Conservation Service
National Soil Survey Center
Soil Survey Laboratory
Lincoln, Nebraska 68508-3866

Layer	Horizon	Orig Hzn	Depth (cm)	Field Label 1	Field Label 2	Field Label 3	Field Texture	Lab Texture
08N02987	Ap		0.0-10.0	S08CI007-005-1			L	SIL
08N02988	A		10.0-24.0	S08CI007-005-2			L	SIL
08N02989	Btn		24.0-42.0	S08CI007-005-3			SICL	L
08N02990	Bt1		42.0-73.0	S08CI007-005-4			SIC	C
08N02991	Bt2		73.0-97.0	S08CI007-005-5			SIC	C
08N02992	BC		97.0-120.0	S08CI007-005-6			SIC	C

Pedon Calculations

Calculation Name	Result	Units of Measure
Weighted Particles, 0.1-75mm, 75 mm Base	15.476	% wt
Volume, >2mm, Weighted Average	1.381	% vol
Clay, carbonate free, Weighted Average	42.189	% wt
CEC Activity, CEC7/Clay, Weighted Average, CECd, Set 1	0.487	(NA)

Weighted averages based on control section: 24-74 cm

PSDA & Rock Fragments

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-
				(- - - - - Total - - - - - -)			(- - Clay - - -)		(- - - - Silt - - - - -)		(- - - - - - - - - - - - Sand - - - - - - - - - - - -)					(Rock Fragments (mm))				
				Clay	Silt	Sand	Fine	CO_3	Fine	Coarse	VF	F	M	C	VC	(- - - - - - - - Weight - - - - - - - -)				>2 mm
				<	.002	.05	<	<	.002	.02	.05	.10	.25	.5	1	2	5	20	.1-	wt %
	Depth			.002	-.05	-2	.0002	.002	-.02	-.05	-.10	-.25	-.50	-1	-2	-5	-20	-75	75	whole
Layer	(cm)	Horz	Prep	(- % of <2mm Mineral Soil -)												(- - - - - - - % of <75mm - - - - - -)				soil
				3A1a1a			3A1a1a	3A1a1a	3A1a1a		3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a					
08N02987	0-10	Ap	S	9.7	61.1	29.2	3.0		19.6	41.5	16.2	6.7	3.7	1.7	0.9	1	tr	--	14	1
08N02988	10-24	A	S	9.4	61.5	29.1	2.7		20.8	40.7	15.9	6.8	4.3	1.5	0.6	2	tr	--	15	2
08N02989	24-42	Btn	S	25.7	48.7	25.6	16.5		17.4	31.3	13.3	6.0	3.8	1.5	1.0	1	tr	--	13	1
08N02990	42-73	Bt1	S	51.2	26.9	21.9	32.9		11.4	15.5	7.7	7.9	3.6	1.7	1.0	2	1	--	17	3
08N02991	73-97	Bt2	S	61.2	18.0	20.8	26.4	2.2	11.4	6.6	5.9	6.9	4.4	2.4	1.2	1	1	--	17	2
08N02992	97-120	BC	S	66.8	18.2	15.0	32.0	4.7	15.4	2.8	3.8	4.9	3.1	2.0	1.2	1	2	2	16	5

*** Primary Characterization Data ***

Pedon ID: S08CI007005 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Huentelauquen** Fine, mixed, superactive, thermic Xeric Natrargid

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0460

PSDA & Rock Fragments

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-
				(- - - - - Total - - - - - -)			(- - Clay - - -)		(- - - - Silt - - - - -)		(- - - - - - - - - - - - Sand - - - - - - - - - - - -)					(Rock Fragments (mm))				
				Clay	Silt	Sand	Fine	CO_3	Fine	Coarse	VF	F	M	C	VC	(- - - - - - - - Weight - - - - - - - -)				>2 mm
				<	.002	.05	<	<	.002	.02	.05	.10	.25	.5	1	2	5	20	.1-	wt %
	Depth			.002	-.05	-2	.0002	.002	-.02	-.05	-.10	-.25	-.50	-1	-2	-5	-20	-75	75	whole
Layer	(cm)	Horz	Prep	(- % of <2mm Mineral Soil -)												(- - - - - - - % of <75mm - - - - - -)				soil
								3A1a6a												
08N02991	73-97	Bt2	S					2.2												
08N02992	97-120	BC	S					5.2												

Water Dispersible PSDA

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-
				(- Water Dispersible -)											
				(- - - - - Total - - - - - -)			(- - Clay - - -)		(- - - - Silt - - - - -)		(- - - - - - - - - - - - Sand - - - - - - - - - - - -)				
				Clay	Silt	Sand	F	CO_3	F	C	VF	F	M	C	VC
				<	.002	.05	<	<	.002	.02	.05	.10	.25	.5	1
	Depth			.002	-.05	-2	.0002	.002	-.02	-.05	-.10	-.25	-.50	-1	-2
Layer	(cm)	Horz	Prep	(- % of <2mm -)											
				3A1a6a				3A1a6a	3A1a6a		3A1a6a	3A1a6a	3A1a6a	3A1a6a	3A1a6a
08N02987	0-10	Ap	S	5.1	61.9	33.0			22.1	39.8	18.8	6.8	4.4	2.0	1.0
08N02988	10-24	A	S	4.9	64.7	30.4			22.7	42.0	16.3	7.0	4.2	2.3	0.6
08N02989	24-42	Btn	S	23.3	50.5	26.2			18.9	31.6	12.8	6.8	4.1	2.0	0.5
08N02990	42-73	Bt1	S	45.6	31.6	22.8			16.9	14.7	8.0	7.2	4.1	1.4	2.1
08N02991	73-97	Bt2	S	50.5	25.4	24.1		2.2	17.8	7.6	7.7	8.2	4.5	2.8	0.9
08N02992	97-120	BC	S	55.7	25.7	18.6		5.2	20.9	4.8	4.8	7.3	3.4	2.1	1.0

*** Primary Characterization Data ***

Pedon ID: S08CI007005 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Huentelauquen** Fine, mixed, superactive, thermic Xeric Natrargid

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0460

Bulk Density & Moisture

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-
				(Bulk Density)		Cole	(- - - - - - - - - - Water Content - - - - - - - - - -)						WRD	Aggst		
				33	Oven	Whole	6	10	33	1500	1500 kPa	Ratio	Whole	Stabl	(- - Ratio/Clay - -)	
	Depth			kPa	Dry	Soil	kPa	kPa	kPa	kPa	Moist	AD/OD	Soil	2-0.5mm	CEC7	1500 kPa
Layer	(cm)	Horz	Prep	(- - - g cm^{-3} - - -)			(- - - - - - - - - - - - pct of < 2mm - - - - - - - - - - - -)						cm^3 cm^{-3}	%		
				DbWR1	DbWR1				DbWR1	3C2a1a		3D1				
08N02987	0-10	Ap	S	1.48	1.49	0.002			16.9	3.9		1.009	0.19		0.66	0.40
08N02988	10-24	A	S	1.47	1.48	0.002			14.7	4.0		1.010	0.16		0.64	0.43
08N02989	24-42	Btn	S	1.79	2.04	0.044			17.0	9.9		1.025	0.13		0.51	0.39
08N02990	42-73	Bt1	S	1.57	1.88	0.061			24.1	19.0		1.048	0.08		0.47	0.37
08N02991	73-97	Bt2	S	1.34	1.83	0.108			33.7	25.4		1.061	0.11		0.48	0.42
08N02992	97-120	BC	S							24.4		1.060			0.41	0.37

Carbon & Extractions

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-
				(- - - - - Total - - - - -)			Org	C/N	(- - - Dith-Cit Ext - - -)			(- - - - - - Ammonium Oxalate Extraction - - - - - -)						(- - - Na Pyro-Phosphate - - -)			
	Depth			C	N	S	C	Ratio	Fe	Al	Mn	Al+½Fe	ODOE	Fe	Al	Si	Mn	C	Fe	Al	Mn
Layer	(cm)	Horz	Prep	(- - - - - - % of <2 mm - - - - - -)					(- % of < 2mm -)								mg kg^{-1}	(- - - - - - % of < 2mm - - - - - -)			
				4H2a	4H2a	4H2a			4G1	4G1	4G1		4G2a	4G2a	4G2a	4G2a	4G2a		4G3	4G3	4G3
08N02987	0-10	Ap	S	0.62	0.080	0.03		8	1.7	tr	tr	0.20	0.05	0.30	0.06	0.03	404.9		0.1	tr	--
08N02988	10-24	A	S	0.41	0.044	0.02		9	1.7	tr	tr	0.21	0.05	0.32	0.05	0.03	390.1		0.1	tr	--
08N02989	24-42	Btn	S	0.28	0.074	0.02		4	2.0	tr	0.1	0.22	0.04	0.29	0.07	0.07	743.1		0.4	0.4	--
08N02990	42-73	Bt1	S	0.18	0.073	0.03		1	2.0	0.1	0.1	0.20	0.03	0.21	0.10	0.09	789.9		tr	--	--
08N02991	73-97	Bt2	S	1.17	0.056	0.04		4	2.3	0.1	tr	0.20	0.02	0.16	0.13	0.11	383.1		0.1	tr	--
08N02992	97-120	BC	S	1.70	0.048	0.05		1	2.4	0.1	tr	0.17	0.02	0.13	0.11	0.09	325.0		tr	tr	--

*** Primary Characterization Data ***

Pedon ID: S08CI007005 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Huentelauquen** Fine, mixed, superactive, thermic Xeric Natrargid

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0460

CEC & Bases

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-
				(- - - - - - NH_4OAC Extractable Bases - - - - -)								CEC8	CEC7	ECEC		(- - - - Base - - - -)	
								Sum	Acid-	Extr	KCl	Sum	NH_4	Bases	Al	(- Saturation -)	
	Depth			Ca	Mg	Na	K	Bases	ity	Al	Mn	Cats	OAC	+Al	Sat	Sum	NH_4OAC
Layer	(cm)	Horz	Prep	(- - - - - - - - - - - - - - - - - cmol(+) kg^{-1} - - - - - - - - - - - - - - - - - - -)							mg kg^{-1}	(- - - - cmol(+) kg^{-1} - - -)			(- - - - - - - - % - - - - - - - -)		
				4B1a1a	4B1a1a	4B1a1a	4B1a1a		4B2b1a1				4B1a1a				
08N02987	0-10	Ap	S	2.3	0.8	1.9	1.1	6.1	5.9			12.0	6.4			51	95
08N02988	10-24	A	S	2.5	1.1	1.8	0.5	5.9	5.5			11.4	6.0			52	98
08N02989	24-42	Btn	S	4.8*	4.8	6.1	0.6	16.3	3.9			20.2	13.0			81	100
08N02990	42-73	Bt1	S	8.3*	13.0	15.5	1.0	37.8	3.2				24.3				100
08N02991	73-97	Bt2	S	46.3*	14.0	16.7	0.7	77.7					29.1				100
08N02992	97-120	BC	S	47.6*	13.7	14.8	0.9	77.0					27.4				100

*Extractable Ca may contain Ca from calcium carbonate or gypsum. CEC7 base saturation set to 100.

Salt

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
				(- Water Extracted From Saturated Paste -)																	Pred		
																			Total	Elec	Elec	Exch	
	Depth			Ca	Mg	Na	K	CO_3	HCO_3	F	Cl	PO_4	Br	OAC	SO_4	NO_2	NO_3	H_2O	Salts	Cond	Cond	Na	SAR
Layer	(cm)	Horz	Prep	(- - - - - mmol(+) L^{-1} - - - - -)				(- mmol(-) L^{-1} -)											(- - - - % - - - -)	(- - dS m^{-1} - - -)		%	
				4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2		4F2	4F1a1a1		
08N02987	0-10	Ap	S	0.7	0.7	16.5	0.5	--	0.1	--	14.0	--	--	--	2.7	0.8	0.8	36.6	tr	2.00	0.46	19	20
08N02988	10-24	A	S	0.3	0.4	10.0	0.1	--	tr	--	9.3	0.2	--	--	1.0	--	0.7	32.0	tr	1.31	0.24	24	17
08N02989	24-42	Btn	S	1.0	1.8	27.0	0.1	--	0.7	0.3	22.5	0.7	--	--	2.8	--	1.4	45.9	0.1	3.05	0.87	38	23
08N02990	42-73	Bt1	S	4.5	6.9	73.1	0.3	--	1.3	0.3	73.5	1.1	--	--	11.0	--	2.3	68.2	0.5	8.74	3.42	43	31
08N02991	73-97	Bt2	S	1.8	3.5	51.0	0.2	--	2.1	0.2	40.2	--	--	--	10.6	--	0.8	92.1	0.4	5.40	2.88	41	31
08N02992	97-120	BC	S	1.0	1.8	43.2	--	--	2.2	0.3	29.2	--	--	--	10.9	--	1.3	95.4	0.3	4.48	2.61	39	36

Pedon ID: S08CI007005 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Huentelauquen** Fine, mixed, superactive, thermic Xeric Natrargid

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0460

pH & Carbonates

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-
				(- - - pH					- - -)	(- - Carbonate - -)		(- - Gypsum - - -)		
					$CaCl_2$					As $CaCO_3$		As $CaSO_4$*$2H_2O$		Resist
	Depth				0.01M	H_2O	Sat			<2mm	<20mm	<2mm	<20mm	ohms
Layer	(cm)	Horz	Prep	KCl	1:2	1:1	Paste	Oxid	NaF	(- - - %			- - -)	cm^{-1}
				4C1a2a3	4C1a2a	4C1a2a	4F2		4C1a1a1	4E1a1a1a1		4E2a1a1a1		
08N02987	0-10	Ap	S	4.7	6.2	6.5	6.2		8.2					
08N02988	10-24	A	S	4.7	5.4	6.2	5.9		8.3					
08N02989	24-42	Btn	S	5.5	6.6	7.0	6.8		8.9			--		
08N02990	42-73	Bt1	S	7.1	7.9	7.9	7.8		9.6	1		--		
08N02991	73-97	Bt2	S	7.5	8.3	8.5	8.3		10.0	8		--		
08N02992	97-120	BC	S	7.6	8.5	8.6	8.5		10.0	14		--		

Phosphorous

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-
					(- - - Phosphorous							- - -)	KCl
				Melanic	NZ	Acid	Bray	Bray	Olsen	H_2O	Citric	Mehlich	Extr
	Depth			Index		Oxal	1	2			Acid	III	NO_3
Layer	(cm)	Horz	Prep		%	(- - - mg kg^{-1}							- - -)
					4D8a1	4G2a							
08N02987	0-10	Ap	S		12	80.0							
08N02988	10-24	A	S		10	78.6							
08N02989	24-42	Btn	S		15	--							
08N02990	42-73	Bt1	S		19	--							
08N02991	73-97	Bt2	S		56	116.7							
08N02992	97-120	BC	S		47	125.0							

*** Primary Characterization Data ***

Pedon ID: S08CI007005 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Huentelauquen** Fine, mixed, superactive, thermic Xeric Natrargid

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0460

Sand - Silt Mineralogy (2.0-0.002 mm)

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-
				X-Ray					Thermal				Tot Re	Optical						EGME	Inter
														Grain Count						Retn	preta
	Depth		Fract											7B1a2							tion
Layer	(cm)	Horz	ion	(- - - - - - - - peak size - - - - - - - - -)					(- - - - - - - - % - - - - - - - - - -)				(- % - - - - - - - - - - - - - - - - - - -)							mg g^{-1}	
08N02989	24-42	Btn	csi										69	QZ 61	FK 7	AR 5	FE 4	PR 4	BT 3		SMIX
														FP 3	OP 3	GC 2	GS 2	HN 2	MS 2		
														CD 1	GA 1	BY tr	CL tr	GN tr	LA tr		
														PO tr	TM tr	ZE tr	ZR tr				
08N02991	73-97	Bt2	fs										45	AR 42	QZ 33	FE 10	FK 9	PR 2	BT 1		SMIX
														CD 1	HN 1	OP 1	FP tr	GS tr			

FRACTION INTERPRETATION:

csi - Coarse Silt, 0.02-0.05 mm fs - Fine Sand, 0.1-0.25 mm

MINERAL INTERPRETATION:

AR - Weatherable Aggregates	BT - Biotite	BY - Beryl	CD - Chert (Chalcedony	CL - Chlorite
FE - Iron Oxides (Goethite	FK - Potassium Feldspar	FP - Plagioclase Feldspar	GA - Glass Aggregates	GC - Glass Coated Grain
GN - Garnet	GS - Glass	HN - Hornblende	LA - Lamprobolite	MS - Muscovite
OP - Opaques	PO - Plant Opal	PR - Pyroxene	QZ - Quartz	TM - Tourmaline
ZE - Zeolite	ZR - Zircon			

INTERPRETATION (BY HORIZON):

SMIX - Mixed Sand

*** Taxonomy Characterization Data ***

Pedon ID: S08CI007005 (Chile) Print Date: Aug 20 2008 10:14AM

Sampled as on Mar 11, 2008: **Huentelauquen** ; Fine, mixed, superactive, thermic Xeric Natrargid
Revised to :

SSL - Project C2008CI02097 Chile
- Site ID S08CI007-005 Lat: 31° 34' 22.20" south Long: 71° 31' 46.50" west WGS84
- Pedon No. 08N0460
- General Methods 1B1A, 2A1, 2B

United States Department of Agriculture, NRCS
National Soil Survey Center
Soil Survey Laboratory
Lincoln, Nebraska 68508-3866

Taxonomy Tier 1

Layer	Depth (cm)	Horz	Prep	-1- Clay <.002 (% of <2 mm) 3A1a1a	-2- Fine Clay <.0002 3A1a1a	-3- $CaCO_3$ Clay <.002 3A1a1a	-4- 1500 kPa /Clay	-5- Clay Est (%)	-6- .1-75 mm Frac (%)	-7- Bulk Den 33 kPa g cm^{-3} DbWR1	-8- Cole Whole Soil cm cm^{-1}	-9- Vol % of Whole	-10- Resist Min %	-11- Glass Content csi	-12- vfs	-13- fs	-14- wt avg
08N02987	0-10	Ap	S	9.7	3.0		0.40		14	1.48	0.002	1					
08N02988	10-24	A	S	9.4	2.7		0.43		15	1.47	0.002	2					
08N02989	24-42	Btn	S	25.7	16.5		0.39		13	1.79	0.044	1	69	5			
08N02990	42-73	Bt1	S	51.2	32.9		0.37		17	1.57	0.061	2					
08N02991	73-97	Bt2	S	61.2	26.4	2.2	0.42		17	1.34	0.108	1	45			0	
08N02992	97-120	BC	S	66.8	32.0	4.7	0.37		16			2					

Taxonomy Tier 2

Layer	Depth (cm)	Horz	Prep	-1- pH H_2O 4C1a2a	-2- pH NaF 4C1a1a1	-3- Org C (%)	-4- Tot C (%) 4H2a	-5- Al+½ Fe Oxal (%)	-6- ODOE (%) 4G2a	-7- CO_3 as $CaCO_3$ (%) 4E1a1a1a1	-8- (--- Base Sat ---) NH_4 (%)	-9- Bases (%)	-10- NZ P Ret (%) 4D8a1	-11- ECEC cmol(+) kg^{-1}	-12- CEC7 /Clay	-13- ECEC /Clay	-14- Al Sat %	-15- E C dS m^{-1} 4F2	-16- ESP %
08N02987	0-10	Ap	S	6.5	8.2		0.62	0.20	0.05		95	51	12		0.66			2.00	19
08N02988	10-24	A	S	6.2	8.3		0.41	0.21	0.05		98	52	10		0.64			1.31	24
08N02989	24-42	Btn	S	7.0	8.9		0.28	0.22	0.04		100*	81	15		0.51			3.05	38
08N02990	42-73	Bt1	S	7.9	9.6		0.18	0.20	0.03	1	100*		19		0.47			8.74	43
08N02991	73-97	Bt2	S	8.5	10.0		1.17	0.20	0.02	8	100*		56		0.48			5.40	41
08N02992	97-120	BC	S	8.6	10.0		1.70	0.17	0.02	14	100*		47		0.41			4.48	39

*Extractable Ca may contain Ca from calcium carbonate or gypsum.

Pedon Calculations

Calculation Name	Result	Units of Measure
Weighted Particles, 0.1-75mm, 75 mm Base	15.476	% wt
Volume, >2mm, Weighted Average	1.381	% vol
Clay, total, Weighted Average	42.232	% wt
Clay, carbonate free, Weighted Average	42.189	% wt
CEC Activity, CEC7/Clay, Weighted Average, CECd, Set 1	0.487	(NA)

Weighted averages based on control section: 24-74 cm

*** Primary Characterization Data ***

Pedon ID: S08CI007002 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled as on Mar 11, 2008: **San Julian** ; Fine, smectitic, thermic Typic Haplotorrert

Revised to :

SSL - Project C2008CI02097 Chile
- Site ID S08CI007-002 Lat: 30° 40' 28.00" south Long: 71° 22' 57.00" west WGS84
- Pedon No. 08N0457
- General Methods 1B1A, 2A1, 2B

United States Department of Agriculture
Natural Resources Conservation Service
National Soil Survey Center
Soil Survey Laboratory
Lincoln, Nebraska 68508-3866

Layer	Horizon	Orig Hzn	Depth (cm)	Field Label 1	Field Label 2	Field Label 3	Field Texture	Lab Texture
08N02971	Ap		0.0-13.0	S08CI007-002-1			CL	C
08N02972	BA		13.0-43.0	S08CI007-002-2			C	C
08N02973	Bss1		43.0-63.0	S08CI007-002-3			C	C
08N02974	Bss2		63.0-110.0	S08CI007-002-4			C	C
08N02975	2C		110.0-125.0	S08CI007-002-5			GR-C	SCL
08N03045				S08CI007-002-5A	2-20 nodules			

Pedon Calculations

Calculation Name	Result	Units of Measure
Weighted Particles, 0.1-75mm, 75 mm Base	19.617	% wt
Volume, >2mm, Weighted Average	2.728	% vol
Clay, total, Weighted Average	60.723	% wt
CEC Activity, CEC7/Clay, Weighted Average, CECd, Set 1	0.622	(NA)

Weighted averages based on control section: 25-100 cm

PSDA & Rock Fragments

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-
				(- - - - - Total - - - - - -)			(- - Clay - - -)		(- - - - Silt - - - - -)		(- - - - - - - - - - - - Sand - - - - - - - - - - - -)					(Rock Fragments (mm))				
				Clay	Silt	Sand	Fine	CO_3	Fine	Coarse	VF	F	M	C	VC	(- - - - - - - - Weight - - - - - - - -)				>2 mm
				<	.002	.05	<	<	.002	.02	.05	.10	.25	.5	1	2	5	20	.1-	wt %
	Depth			.002	-.05	-2	.0002	.002	-.02	-.05	-.10	-.25	-.50	-1	-2	-5	-20	-75	75	whole
Layer	(cm)	Horz	Prep	(- % of <2mm Mineral Soil -)												(- - - - - - - % of <75mm - - - - - -)				soil
				3A1a1a			3A1a1a		3A1a1a		3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a					
08N02971	0-13	Ap	S	52.7	26.5	20.8	28.3		21.4	5.1	3.4	7.5	6.1	2.6	1.2	4	4	--	24	8
08N02972	13-43	BA	S	61.1	21.7	17.2	40.1		17.5	4.2	2.6	5.8	5.6	2.0	1.2	5	3	--	21	8
08N02973	43-63	Bss1	S	61.3	17.4	21.3	27.5		15.8	1.6	2.4	6.1	7.0	3.3	2.5	7	3	--	27	10
08N02974	63-110	Bss2	S	60.2	25.1	14.7	23.6		20.7	4.4	2.6	4.9	4.2	1.9	1.1	2	1	--	15	3
08N02975	110-125	2C	S	29.2	25.4	45.4	5.9		18.8	6.6	6.2	9.3	10.8	10.7	8.4	15	20	tr	60	40

LAS CARDAS - PEDON DESCRIPTION

Print Date: 08/15/2008
Description Date: 03/11/2008
Describer: M. Casanova- W. Luzio
Site ID: S08CI007003
Site Note: Vegetation: *Acacia caven* Mol; *Adesmia microphilla* Hook. & Arn; *Erodium moschatum* (L.) L'Her; *Flourensia thurifera* (Mol.) DC.; *Gutierrezia resinosa* (Hook. Et Arn) Blacke; *Lithraea caustica* (Molina) Hook. & Arn.; *Medicago polymorpha* L.
Pedon ID: S08CI007003
Pedon Note:
Lab Source ID: SSL

Lab Pedon #: 08N0458
Soil Name as Described/Sampled: Las Cardas
Soil Name as Correlated:
Classification: Coarse-loamy over sandy or sandy-skeletal, mixed, active, thermic Typic Haplodurids
Pedon Type:
Pedon Purpose: full pedon description
Taxon Kind:
Associated Soils:
Physiographic Division: Undesignated

Physiographic Province:

Physiographic Section:
State Physiographic Area:

Local Physiographic Area:
Geomorphic Setting: on footslope of alluvial cone
Upslope Shape: linear
Cross Slope Shape:
Particle Size Control Section: 25 to 80 cm.

Description origin: NASIS
Diagnostic Features: *ochric epipedon 0 to 7 cm. cambic horizon 7 to 31 cm. duripan 80 cm.*

Country: Chile
State: IV Coquimbo Region
County: Elqui Province
MLRA:
Soil Survey Area:

Map Unit:
Quad Name:
Location Description: Las Cardas Experiment Station (University of Chile-CEZA). Approximately 7 km north of Las Cardas village, on highway 43 (Ovalle-Coquimbo).
Legal Description:
Latitude: 30° 14´ 0.20" south
Longitude: 71° 15´ 32.80" west
Datum: WGS84

UTM Zone: 19
UTM Easting: 282598 m
UTM Northing: 6653195 m

Primary Earth Cover: Grass/herbaceous cover
Secondary Earth Cover: Grassland rangeland
Existing Vegetation:
Parent Material: alluvium derived from granite and andesite
Bedrock Kind:
Bedrock Depth:
Bedrock Hardness:
Bedrock Fracture Interval:
Surface Fragments: 2.5% andesite fragments and 2.5% basalt fragments
Description database: NSSL

Cont. Site ID: S08CI007003 **Pedon ID: S08CI007003**

Slope (%)	Elevation (masl)	Aspect (deg)	MAAT (°C)	MSAT (°C)	MWAT (°C)	MAP (mm)	Frost-free days	Drainage Class	Slope Length (m)	Upslope Length (m)
2.0	242.0	180	14.8	18.9	11.2	127.4		well		

Di Castri y Hajek (1976)

Depth (cm)	Profile description
0 to 7 **A**	Brown (7.5YR 5/4) sandy loam, dark reddish brown (5YR 3/2), moist; structureless single grain; loose, slightly sticky, slightly plastic; few fine roots and few medium roots; many fine and many medium pores; 21% fine worm casts; 6% nonflat angular 2 to 20 mm unspecified fragments; noneffervescent, by HCl, unspecified; abrupt smooth boundary. Laboratory sample # 08N02976.
7 to 31 **Bw**	Brown (7.5YR 5/4) sandy loam, dark reddish brown (5YR 3/2), moist; weak medium angular blocky structure; hard, slightly sticky, slightly plastic; few fine roots; many fine and many coarse pores; 3% fine worm casts; 3% nonflat angular 2 to 30 mm unspecified fragments; noneffervescent, by HCl, unspecified; clear smooth boundary. Laboratory sample # 08N02977.
31 to 49 **BC**	Brown (7.5YR 4/4) sandy loam, dark reddish brown (5YR 3/2), moist; structureless massive; hard, slightly sticky, slightly plastic; few fine roots; many fine and many coarse pores; 3% fine worm casts; 23% nonflat 30 to 60 mm unspecified fragments; noneffervescent, by HCl, unspecified; gradual smooth boundary. Laboratory sample # 08N02978.
49 to 80 **C**	Dark brown (7.5YR 3/3) loamy sand, dark reddish brown (5YR 3/3), moist; structureless massive; very hard, nonsticky, nonplastic; few fine roots between peds and few fine roots in cracks; many medium and many coarse pores; 35% nonflat rounded 75 to 250 mm andesite fragments and 45% nonflat angular 20 to 140 mm unspecified fragments; noneffervescent, by HCl, unspecified; abrupt smooth boundary. Laboratory sample # 08N02979.
80 to 123 **Cqm**	Light brown (7.5YR 6/4), brown (7.5YR 4/4), moist; structureless massive; noneffervescent, by HCl, unspecified; Duripan with fine few cracks. Laboratory sample # 08N02980.

*** Primary Characterization Data ***

Pedon ID: S08CI007003 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled as on Mar 11, 2008: **Las Cardas** ; Coarse-loamy over sandy or sandy-skeletal, mixed, active, thermic Typic Haplodurid

Revised to :

SSL - Project C2008CI02097 Chile

- Site ID S08CI007-003 Lat: 30° 14' .20" south Long: 71° 15' 32.80" west WGS84
- Pedon No. 08N0458
- General Methods 1B1A, 2A1, 2B

United States Department of Agriculture, NRCS
National Soil Survey Center
Soil Survey Laboratory
Lincoln, Nebraska 68508-3866

Layer	Horizon	Orig Hzn	Depth (cm)	Field Label 1	Field Label 2	Field Label 3	Field Texture	Lab Texture
08N02976	A		0.0-7.0	S08CI007-003-1			SL	SL
08N02977	B		7.0-31.0	S08CI007-003-2			SL	SL
08N02978	BC		31.0-49.0	S08CI007-003-3			SL	SL
08N02979	C		49.0-80.0	S08CI007-003-4			LS	COSL
08N02980	Cqm		80.0-123.0	S08CI007-003-5			CEM-MAT	

Pedon Calculations

Calculation Name	Result	Units of Measure
Weighted Particles, 0.1-75mm, 75 mm Base	74.756	% wt
Volume, >2mm, Weighted Average	36.391	% vol
Clay, total, Weighted Average	10.376	% wt
CEC Activity, CEC7/Clay, Weighted Average, CECd, Set 1	0.724	(NA)

Weighted averages based on control section: 25-80 cm

PSDA & Rock Fragments

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-
				(- - - - - Total - - - - - -)			(- - Clay - - -)		(- - - - Silt - - - - -)		(- - - - - - - - - - - - Sand - - - - - - - - - - - -)					(Rock Fragments (mm))				
				Clay	Silt	Sand	Fine	CO_3	Fine	Coarse	VF	F	M	C	VC	(- - - - - - - - Weight - - - - - - - -)				>2 mm
				<	.002	.05	<	<	.002	.02	.05	.10	.25	.5	1	2	5	20	.1-	wt %
	Depth			.002	-.05	-2	.0002	.002	-.02	-.05	-.10	-.25	-.50	-1	-2	-5	-20	-75	75	whole
Layer	(cm)	Horz	Prep	(- % of <2mm Mineral Soil -)												(- - - - - - - % of <75mm - - - - - -)				soil
				3A1a1a			3A1a1a		3A1a1a		3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a					
08N02976	0-7	A	S	7.3	25.8	66.9	2.2		12.6	13.2	12.6	19.6	18.9	11.0	4.8	5	8	3	62	16
08N02977	7-31	B	S	9.1	22.8	68.1	2.9		11.3	11.5	12.5	21.1	18.2	11.3	5.0	5	6	--	60	11
08N02978	31-49	BC	S	11.3	20.2	68.5	4.8		9.8	10.4	10.8	21.4	18.8	11.6	5.9	8	12	--	66	20
08N02979	49-80	C	S	10.1	13.1	76.8	5.8		6.7	6.4	8.6	20.1	22.6	15.7	9.8	12	33	tr	83	69
08N02980	80-123	Cqm	GP	3.5	10.2	86.3	1.2		4.9	5.3	9.7	18.9	22.3	22.2	13.2					
08N02980	80-123	Cqm	S													--	--	--	--	--

*** Primary Characterization Data ***

Pedon ID: S08CI007003 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Las Cardas** Coarse-loamy over sandy or sandy-skeletal, mixed, active, thermic Typic Haplodurid

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0458

Water Dispersible PSDA

Layer	Depth (cm)	Horz	Prep	Clay < .002	Silt .002 -.05	Sand .05 -2	F < .0002	CO_3 < .002	F .002 -.02	C .02 -.05	VF .05 -.10	F .10 -.25	M .25 -.50	C .5 -1	VC 1 -2
				(- - - - - Total - - - - - -)			(- - Clay - - -)		(- - - - Silt - - - - -)		(- - - - - - - - - - - - Sand - - - - - - - - - - - -)				
				(- % of <2mm -)											
				3A1a6a					3A1a6a		3A1a6a	3A1a6a	3A1a6a	3A1a6a	3A1a6a
08N02976	0-7	A	S	4.5	25.1	70.4			13.7	11.4	12.4	20.7	18.8	12.3	6.2
08N02977	7-31	B	S	7.0	24.2	68.8			13.0	11.2	11.8	21.9	18.6	10.6	5.9
08N02978	31-49	BC	S	8.3	20.5	71.2			11.3	9.2	11.8	20.9	19.1	12.2	7.2
08N02979	49-80	C	S	7.7	11.2	81.1			7.3	3.9	7.0	16.6	23.0	18.6	15.9

Bulk Density & Moisture

Layer	Depth (cm)	Horz	Prep	(Bulk Density) 33 kPa	Oven Dry	Cole Whole Soil	(- - - - - - - - - - - Water Content - - - - - - - - - - -) 6 kPa	10 kPa	33 kPa	1500 kPa	1500 kPa Moist	Ratio AD/OD	WRD Whole Soil	Aggst Stabl 2-0.5mm	(- - Ratio/Clay - -) CEC7	1500 kPa
				(- - - g cm^{-3} - - -)			(- - - - - - - - - - - - pct of < 2mm - - - - - - - - - - - -)						cm^3 cm^{-3}	%		
				DbWR1	DbWR1			DbWR1	DbWR1	3C2a1a		3D1				
08N02976	0-7	A	S							5.5		1.011			1.03	0.75
08N02977	7-31	B	S	1.59	1.60	0.002		15.3	12.1	5.1		1.013	0.10		0.71	0.56
08N02978	31-49	BC	S	1.67	1.69	0.003		12.5	10.5	5.8		1.019	0.07		0.65	0.51
08N02979	49-80	C	S							5.8		1.020			0.77	0.57
08N02980	80-123	Cqm	S	1.96	2.02	0.010			11.1							
08N02980	80-123	Cqm	GP							9.2		1.043				

Water Content

Layer	Depth (cm)	Horz	Prep	(- - Atterberg - -) (- - - Limits - - -) LL	PI	(- - - - - Bulk Density - - - - -) Field	Recon 33 kPa	Recon Oven Dry	(- Water Content -) Field	Recon 33 kPa	(- - - - - - - - - - - - - - Sieved Samples - - - - - - - - - - - - - -) 6 kPa	10 kPa	33 kPa	100 kPa	200 kPa	500 kPa
				pct <0.4mm		(- - - - - - - - g cm^{-3} - - - - - - - -)			(- % of < 2mm -)							
						3B6			3B6							
08N02976	0-7	A	CDB			1.29			1.10							

*** Primary Characterization Data ***

Pedon ID: S08CI007003 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Las Cardas** Coarse-loamy over sandy or sandy-skeletal, mixed, active, thermic Typic Haplodurid

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0458

Carbon & Extractions

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-
				(- - - - - Total - - - - -)			Org	C/N	(- - - Dith-Cit Ext - - -)			(- - - - - - Ammonium Oxalate Extraction - - - - - -)						(- - - Na Pyro-Phosphate - - -)			
	Depth			C	N	S	C	Ratio	Fe	Al	Mn	Al+½Fe	ODOE	Fe	Al	Si	Mn	C	Fe	Al	Mn
Layer	(cm)	Horz	Prep	(- - - - - - % of <2 mm - - - - - -)					(- % of < 2mm - - - - - - - - - - - - - - - - - -)								mg kg^{-1}	(- - - - - - % of < 2mm - - - - - -)			
				4H2a	4H2a	4H2a			4G1	4G1	4G1		4G2a	4G2a	4G2a	4G2a	4G2a		4G3	4G3	4G3
08N02976	0-7	A	S	1.33	0.151	0.08		9	2.0	tr	0.2	0.22	0.04	0.30	0.07	0.02	1968.1		tr	--	0.03
08N02977	7-31	B	S	0.16	0.018	0.04		9	2.1	tr	0.2	0.24	0.03	0.33	0.07	0.02	2542.9		tr	--	--
08N02978	31-49	BC	S	0.09	0.030	0.02		3	2.0	tr	0.2	0.21	0.02	0.30	0.06	0.02	2380.3		tr	--	--
08N02979	49-80	C	S	0.08	0.032	0.02		3	1.9	tr	0.2	0.19	0.02	0.27	0.06	0.02	1885.8		0.1	--	--
08N02980	80-123	Cqm	GP	0.03	0.013	0.02			1.3	tr	0.2	0.10	0.01	0.06	0.07	0.03	1688.2		tr	--	--

CEC & Bases

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-
				(- - - - - - NH_4OAC Extractable Bases - - - - -)								CEC8	CEC7	ECEC		(- - - - Base - - - -)	
								Sum	Acid-	Extr	KCl	Sum	NH_4	Bases	Al	(- Saturation -)	
	Depth			Ca	Mg	Na	K	Bases	ity	Al	Mn	Cats	OAC	+Al	Sat	Sum	NH_4OAC
Layer	(cm)	Horz	Prep	(- - - - - - - - - - - - - - - - - - cmol(+) kg^{-1} - - - - - - - - - - - - - - - - - - -)							mg kg^{-1}	(- - - - cmol(+) kg^{-1} - - -)			(- - - - - - - - % - - - - - - - -)		
				4B1a1a	4B1a1a	4B1a1a	4B1a1a		4B2b1a1				4B1a1a				
08N02976	0-7	A	S	6.6*	1.9	0.1	1.4	10.0	4.3			14.3	7.5			70	100
08N02977	7-31	B	S	5.1*	3.0	0.1	0.6	8.8	5.2			14.0	6.5			63	100
08N02978	31-49	BC	S	7.5*	5.7	0.2	0.5	13.9	4.8			18.7	7.3			74	100
08N02979	49-80	C	S	6.4*	7.4	0.1	0.3	14.2	3.7			17.9	7.8			79	100
08N02980	80-123	Cqm	GP	9.5*	15.4	1.0	0.4	26.3	4.2			30.5	20.9			86	100

*Extractable Ca may contain Ca from calcium carbonate or gypsum. CEC7 base saturation set to 100.

Salt

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
				(- Water Extracted From Saturated Paste -)																	Pred		
																			Total	Elec	Elec	Exch	
	Depth			Ca	Mg	Na	K	CO_3	HCO_3	F	Cl	PO_4	Br	OAC	SO_4	NO_2	NO_3	H_2O	Salts	Cond	Cond	Na	SAR
Layer	(cm)	Horz	Prep	(- - - - - mmol(+) L^{-1} - - - - -)				(- mmol(-) L^{-1} -)										(- - - - % - - - -)		(- - dS m^{-1} - -)		%	
				4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2		4F2	4F1a1a1		
08N02976	0-7	A	S	4.3	2.4	1.3	1.8	--	3.7	--	1.5	0.2	--	--	1.0	2.3	tr	38.8	tr	0.96	0.31	1	1
08N02977	7-31	B	S																		0.12	2	
08N02978	31-49	BC	S																		0.08	2	
08N02979	49-80	C	S																		0.06	1	
08N02980	80-123	Cqm	GP																		0.08		

*** Primary Characterization Data ***

Pedon ID: S08CI007003 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : Las Cardas Coarse-loamy over sandy or sandy-skeletal, mixed, active, thermic Typic Haplodurid

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0458

pH & Carbonates

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-
				(- - - - - - - - - - - - - - - - - - pH - - - - - - - - - - - - - - - - -)						(- - Carbonate - -)		(- - Gypsum - - -)		
					$CaCl_2$					As $CaCO_3$		As $CaSO_4*2H_2O$		Resist
	Depth				0.01M	H_2O	Sat			<2mm	<20mm	<2mm	<20mm	ohms
Layer	(cm)	Horz	Prep	KCl	1:2	1:1	Paste	Oxid	NaF	(- - - - - - - - - - - - % - - - - - - - - - - -)				cm^{-1}
				4C1a2a3	4C1a2a	4C1a2a	4F2		4C1a1a1					
08N02976	0-7	A	S	5.9	6.4	6.7	6.6		8.8					
08N02977	7-31	B	S	4.9	6.0	6.5			8.6					
08N02978	31-49	BC	S	4.7	6.1	6.8			8.5					
08N02979	49-80	C	S	4.6	6.1	6.9			8.5					
08N02980	80-123	Cqm	GP	5.0	6.6	7.2			8.7					

Phosphorous

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-
					(- - - - - - - - - - - - - - - - - - - Phosphorous - - - - - - - - - - - - - - - - - -)								KCl
				Melanic	NZ	Acid	Bray	Bray	Olsen	H_2O	Citric	Mehlich	Extr
	Depth			Index		Oxal	1	2			Acid	III	NO_3
Layer	(cm)	Horz	Prep		%	(- -mg kg^{-1} - - - - - - - - - - - - - - - - - -)							
					4D8a1	4G2a							
08N02976	0-7	A	S		5	275.6							
08N02977	7-31	B	S		6	187.9							
08N02978	31-49	BC	S		6	174.0							
08N02979	49-80	C	S		7	172.4							
08N02980	80-123	Cqm	GP		10	30.2							

*** Primary Characterization Data ***

Pedon ID: S08CI007003 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Las Cardas** Coarse-loamy over sandy or sandy-skeletal, mixed, active, thermic Typic Haplodurid

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0458

Sand - Silt Mineralogy (2.0-0.002 mm)

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-
				X-Ray					Thermal				Optical							EGME	Inter
													Tot Re	Grain Count						Retn	preta
	Depth		Fract										7B1a2								tion
Layer	(cm)	Horz	ion	(- - - - - - - - peak size - - - - - - - - -)					(- - - - - - - - % - - - - - - - - - -)				(- % - - - - - - - - - - - - - - - - - -)							mg g^{-1}	
08N02976	0-7	A	fs										43	AR 43	FE 25	QZ 17	FK 12	OP 1	PR 1		SMIX
														BT tr							
08N02978	31-49	BC	fs										41	AR 43	QZ 20	FE 18	FK 13	OP 3	PR 3		SMIX
														BT tr	FP tr						

FRACTION INTERPRETATION:

fs - Fine Sand, 0.1-0.25 mm

MINERAL INTERPRETATION:

AR - Weatherable Aggregates BT - Biotite FE - Iron Oxides (Goethite FK - Potassium Feldspar FP - Plagioclase Feldspar

OP - Opaques PR - Pyroxene QZ - Quartz

INTERPRETATION (BY HORIZON):

SMIX - Mixed Sand

*** Taxonomy Characterization Data ***

Pedon ID: S08CI007003 (Chile) Print Date: Aug 20 2008 10:14AM

Sampled as on Mar 11, 2008: **Las Cardas** ; Coarse-loamy over sandy or sandy-skeletal, mixed, active, thermic Typic Haplodurid
Revised to :

SSL - Project C2008CI02097 Chile
- Site ID S08CI007-003 Lat: 30° 14' .20" south Long: 71° 15' 32.80" west WGS84
- Pedon No. 08N0458
- General Methods 1B1A, 2A1, 2B

United States Department of Agriculture, NRCS.
National Soil Survey Center
Soil Survey Laboratory
Lincoln, Nebraska 68508-3866

Taxonomy Tier 1

Layer	Depth (cm)	Horz	Prep	Clay <.002 (% of <2 mm) 3A1a1a	Fine Clay <.0002 (% of <2 mm) 3A1a1a	$CaCO_3$ Clay <.002 (% of <2 mm)	1500 kPa /Clay (% of <2 mm)	Clay Est (% of <2 mm)	.1-75 mm Frac (% of <2 mm)	Bulk Den 33 kPa g cm^{-3} DbWR1	Cole Whole Soil cm cm^{-1}	Vol % of Whole	Resist Min %	Glass Content csi	Glass Content vfs (% of <2 mm)	Glass Content fs (% of <2 mm)	Glass Content wt avg (% of <2 mm)
08N02976	0-7	A	S	7.3	2.2		0.75	10.4	62			9	43				
08N02977	7-31	B	S	9.1	2.9		0.56		60	1.59	0.002	7					
08N02978	31-49	BC	S	11.3	4.8		0.51		66	1.67	0.003	13	41				
08N02979	49-80	C	S	10.1	5.8		0.57		83			55					
08N02980	80-123	Cqm	GP	3.5	1.2					1.96							
08N02980	80-123	Cqm	S						--		0.010	--					

Taxonomy Tier 2

Layer	Depth (cm)	Horz	Prep	pH H_2O 4C1a2a	pH NaF 4C1a1a1	Org C (% of <2 mm)	Tot C (% of <2 mm) 4H2a	Al+½ Fe Oxal (% of <2 mm)	ODOE (% of <2 mm) 4G2a	CO_3 as $CaCO_3$ (% of <2 mm)	(--- Base Sat ---) NH_4 (% of <2 mm)	(--- Base Sat ---) Bases (% of <2 mm)	NZ P Ret (% of <2 mm) 4D8a1	ECEC cmol(+) kg^{-1} (% of <2 mm)	CEC7 /Clay (% of <2 mm)	ECEC /Clay (% of <2 mm)	Al Sat (% of <2 mm)	E C $dS\ m^{-1}$ 4F2	ESP (% of <2 mm)
08N02976	0-7	A	S	6.7	8.8		1.33	0.22	0.04		100*	70	5		1.03			0.96	1
08N02977	7-31	B	S	6.5	8.6		0.16	0.24	0.03		100*	63	6		0.71				2
08N02978	31-49	BC	S	6.8	8.5		0.09	0.21	0.02		100*	74	6		0.65				2
08N02979	49-80	C	S	6.9	8.5		0.08	0.19	0.02		100*	79	7		0.77				1
08N02980	80-123	Cqm	GP	7.2	8.7		0.03	0.10	0.01				10						
08N02980	80-123	Cqm	S									86							

*Extractable Ca may contain Ca from calcium carbonate or gypsum.

Pedon Calculations

Calculation Name	Result	Units of Measure
Weighted Particles, 0.1-75mm, 75 mm Base	74.756	% wt
Volume, >2mm, Weighted Average	36.391	% vol
Clay, total, Weighted Average	10.376	% wt
Clay, carbonate free, Weighted Average	10.376	% wt
CEC Activity, CEC7/Clay, Weighted Average, CECd, Set 1	0.724	(NA)

Weighted averages based on control section: 25-80 cm

SAN JULIAN - PEDON DESCRIPTION

Print Date: 08/15/2008
Description Date: 03/11/2008
Describer: M. Casanova-W. Luzio- N. Stolpe
Site ID: S08CI007002
Site Note: Alluvial terraces, Limarí river; Microfeature: Level; subsoil cracks
Pedon ID: S08CI007002
Pedon Note:
Lab Source ID: SSL

Lab Pedon #: 08N0457
Soil Name as Described/Sampled: San Julian
Soil Name as Correlated:
Classification: Fine, smectitic, thermic Typic Haplotorrerts
Pedon Type:
Pedon Purpose: full pedon description
Taxon Kind:
Associated Soils:
Physiographic Division:
Physiographic Province:
Physiographic Section:
State Physiographic Area:
Local Physiographic Area:
Geomorphic Setting: alluvial plain
Upslope Shape:
Cross Slope Shape:
Particle Size Control Section: 25 to 100 cm.
Description origin: NASIS
Diagnostic Features: *mollic epipedon 0 to 43 cm slickensides 43 to 110 cm.*

Country: Chile
State: IV Region
County: Limarí Province
MLRA:
Soil Survey Area:

Map Unit:
Quad Name:
Location Description: Tabalí Vineyard. Approximately 24 km west of Ovalle, at east of road 45 (Ovalle city-Socos town).
Legal Description:
Latitude: 30° 40´ 28” south
Longitude: 71° 22´ 57” west
Datum: WGS84

UTM Zone: 19
UTM Easting: 271763 m
UTM Northing: 6603958 m

Primary Earth Cover: Crop cover
Secondary Earth Cover:
Existing Vegetation:
Parent Material: alluvium
Bedrock Kind:
Bedrock Depth:
Bedrock Hardness:
Bedrock Fracture Interval:
Surface Fragments:
Description database: NSSL

Cont. Site ID: S08CI007002 **Pedon ID:** S08CI007002

Slope (%)	Elevation (masl)	Aspect (deg)	MAAT (°C)	MSAT (°C)	MWAT (°C)	MAP (mm)	Frost-free days	Drainage Class	Slope Length (m)	Upslope Length (m)
< 1	241.0		15.2	23,5	9,2	134		poorly		

Di Castry y Hajek (1976)

Depth (cm)	Profile description
0 to 13 **Ap**	Dark reddish brown (5YR 3/2) clay loam, brown (7.5YR 4/3), dry; strong fine subangular blocky, and strong medium subangular blocky structure; hard, moderately sticky, moderately plastic; many fine roots and many medium roots; many fine and many very fine pores; 20% nonflat subrounded 110 to 112 mm unspecified fragments; clear smooth boundary. Laboratory sample # 08N02971.
13 to 43 **B1**	Dark reddish brown (2.5YR 3/3) clay, dark reddish brown (5YR 3/3), dry; strong coarse subangular blocky structure; very hard, very sticky, very plastic; common fine roots between peds; many fine and many very fine pores; nonflat angular 2- to 5-mm unspecified fragments and 10% nonflat subrounded 70 to 100 mm unspecified fragments; gradual smooth boundary. Laboratory sample # 08N02972.
43 to 63 **Bss1**	Dark reddish brown (2.5YR 3/3) clay, dark reddish brown (5YR 3/3), dry; strong coarse subangular blocky structure; extremely hard, very sticky, very plastic; few fine roots between peds; many fine and many very fine pores; clay films and 75% slickensides (pedogenic) on all faces of peds; 21% carbonate nodules and 21% carbonate root casts; 5% 30 to 70 mm unspecified fragments; clear smooth boundary. Laboratory sample # 08N02973.
63 to 110 **Bss2**	Dark reddish brown (2.5YR 3/4) clay, reddish brown (5YR 4/3), dry; strong coarse prismatic structure; extremely hard, very sticky, very plastic; many fine and many very fine pores; 70% slickensides (pedogenic) on all faces of peds; 21% carbonate nodules and 21% carbonate root casts; nonflat angular 2 to 10 mm unspecified fragments; abrupt smooth boundary. Laboratory sample # 08N02974.
110 to 125 **2C**	Dark reddish brown (2.5YR 3/3) gravelly clay; structureless massive; firm, hard; 5% very coarse gypsum masses; 5% nonflat subrounded 76 to 250 mm unspecified fragments and 40% nonflat angular 2 to 75mm unspecified fragments; various colors when moist. Laboratory sample # 08N02975.

*** Primary Characterization Data ***

Pedon ID: S08CI007002 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **San Julian** Fine, smectitic, thermic Typic Haplotorrert

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0457

Water Dispersible PSDA

Layer	Depth (cm)	Horz	Prep	Clay < .002	Silt .002 -.05	Sand .05 -2	F < .0002	CO_3 < .002	F .002 -.02	C .02 -.05	VF .05 -.10	F .10 -.25	M .25 -.50	C .5 -1	VC 1 -2
				(Total)			(Clay)		(Silt)		(Sand)				
				(% of <2mm)											
				3A1a6a					3A1a6a		3A1a6a	3A1a6a	3A1a6a	3A1a6a	3A1a6a
08N02971	0-13	Ap	S	36.3	39.9	23.8			31.9	8.0	5.6	8.1	5.7	2.6	1.8
08N02972	13-43	BA	S	50.3	31.3	18.4			27.9	3.4	3.1	5.6	5.3	2.3	2.1
08N02973	43-63	Bss1	S	55.9	22.1	22.0			20.8	1.3	2.6	5.8	6.9	3.3	3.4
08N02974	63-110	Bss2	S	57.9	27.1	15.0			25.2	1.9	2.5	4.6	4.2	2.1	1.6
08N02975	110-125	2C	S	6.5	48.6	44.9			46.1	2.5	6.0	9.0	11.6	9.6	8.7

Bulk Density & Moisture

Layer	Depth (cm)	Horz	Prep	(Bulk Density) 33 kPa	(Bulk Density) Oven Dry	Cole Whole Soil	(Water Content) 6 kPa	(Water Content) 10 kPa	(Water Content) 33 kPa	(Water Content) 1500 kPa	(Water Content) 1500 kPa Moist	Ratio AD/OD	WRD Whole Soil	Aggst Stabl 2-0.5mm	(Ratio/Clay) CEC7	(Ratio/Clay) 1500 kPa
				(g cm^{-3})			(pct of < 2mm)						cm^3 cm^{-3}	%		
				DbWR1	DbWR1				DbWR1	3C2a1a		3D1				
08N02971	0-13	Ap	S							18.5		1.061			0.62	0.35
08N02972	13-43	BA	S	1.15	1.71	0.135			38.6	24.8		1.074	0.15		0.62	0.41
08N02973	43-63	Bss1	S	1.13	1.93	0.183			45.2	26.2		1.077	0.21		0.61	0.43
08N02974	63-110	Bss2	S	1.15	1.96	0.191			44.6	24.8		1.074	0.22		0.63	0.41
08N02975	110-125	2C	S							12.3		1.053			0.72	0.42

Water Content

Layer	Depth (cm)	Horz	Prep	(Atterberg Limits) LL	(Atterberg Limits) PI	(Bulk Density) Field	(Bulk Density) Recon 33 kPa	(Bulk Density) Recon Oven Dry	(Water Content) Field	(Water Content) Recon 33 kPa	(Water Content Sieved Samples) 6 kPa	(Water Content Sieved Samples) 10 kPa	(Water Content Sieved Samples) 33 kPa	(Water Content Sieved Samples) 100 kPa	(Water Content Sieved Samples) 200 kPa	(Water Content Sieved Samples) 500 kPa
				pct <0.4mm		(g cm^{-3})			(% of < 2mm)							
						3B6			3B6							
08N02971	0-13	Ap	CDB			1.17			6.81							

*** Primary Characterization Data ***

Pedon ID: S08CI007002 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **San Julian** Fine, smectitic, thermic Typic Haplotorrert

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0457

Carbon & Extractions

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-
				(- - - - - Total - - - - -)			Org	C/N	(- - - Dith-Cit Ext - - -)			(- - - - - - Ammonium Oxalate Extraction - - - - - -)						(- - - Na Pyro-Phosphate - - -)			
	Depth			C	N	S	C	Ratio	Fe	Al	Mn	Al+½Fe	ODOE	Fe	Al	Si	Mn	C	Fe	Al	Mn
Layer	(cm)	Horz	Prep	(- - - - - % of <2 mm - - - - - -)					(- % of < 2mm - - - - - - - - - - - - - - - - - -)								mg kg^{-1}	(- - - - - % of < 2mm - - - - -)			
				4H2a	4H2a	4H2a			4G1	4G1	4G1		4G2a	4G2a	4G2a	4G2a	4G2a		4G3	4G3	4G3
08N02971	0-13	Ap	S	0.85	0.111	0.03		7	0.7	0.1	0.1	0.21	0.01	0.10	0.16	0.10	743.2		tr	--	--
08N02972	13-43	BA	S	0.70	0.084	0.02		7	0.8	0.1	0.1	0.25	0.01	0.11	0.19	0.12	712.3		tr	--	--
08N02973	43-63	Bss1	S	0.36	0.057	0.02		4	0.7	0.1	tr	0.24	0.01	0.10	0.19	0.12	656.0		tr	--	--
08N02974	63-110	Bss2	S	0.16	0.043	0.03		1	0.7	0.1	0.1	0.22	0.01	0.09	0.18	0.11	762.8		tr	--	--
08N02975	110-125	2C	S	0.26	0.028	1.04		6	1.0	--	tr	0.10	0.01	0.07	0.07	0.05	345.1		tr	--	--

CEC & Bases

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-
				(- - - - - - NH_4OAC Extractable Bases - - - - -)								CEC8	CEC7	ECEC		(- - - - Base - - - -)	
								Sum	Acid-	Extr	KCl	Sum	NH_4	Bases	Al	(- Saturation -)	
	Depth			Ca	Mg	Na	K	Bases	ity	Al	Mn	Cats	OAC	+Al	Sat	Sum	NH_4OAC
Layer	(cm)	Horz	Prep	(- - - - - - - - - - - - - - - - - cmol(+) kg^{-1} - - - - - - - - - - - - - - - - - -)							mg kg^{-1}	(- - - - cmol(+) kg^{-1} - - -)			(- - - - - - - - % - - - - - - - -)		
				4B1a1a	4B1a1a	4B1a1a	4B1a1a		4B2b1a1				4B1a1a				
08N02971	0-13	Ap	S	20.8*	11.4	3.3	2.6	38.1	4.7				32.7				100
08N02972	13-43	BA	S	19.3*	13.9	7.1	2.2	42.5	5.2				37.9				100
08N02973	43-63	Bss1	S	22.1*	15.1	12.3	1.5	51.0	1.3				37.2				100
08N02974	63-110	Bss2	S	17.8*	12.8	18.6	1.6	50.8	1.0				37.9				100
08N02975	110-125	2C	S	104.8*	6.9	13.0	0.6	125.3	--				21.0				100

*Extractable Ca may contain Ca from calcium carbonate or gypsum. CEC7 base saturation set to 100.

Salt

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
				(- Water Extracted From Saturated Paste -)																	Pred		
																			Total	Elec	Elec	Exch	
	Depth			Ca	Mg	Na	K	CO_3	HCO_3	F	Cl	PO_4	Br	OAC	SO_4	NO_2	NO_3	H_2O	Salts	Cond	Cond	Na	SAR
Layer	(cm)	Horz	Prep	(- - - - - mmol(+) L^{-1} - - - - -)				(- mmol(-) L^{-1} -)										(- - - - % - - - -)		(- - dS m^{-1} - -)		%	
				4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2		4F2	4F1a1a1		
08N02971	0-13	Ap	S	5.0	3.4	11.8	0.3	--	4.1	tr	4.5	--	--	--	10.7	--	--	67.3	0.1	1.74	0.72	8	6
08N02972	13-43	BA	S	0.7	0.6	10.9	tr	--	3.2	tr	7.4	--	--	--	2.1	tr	tr	92.6	0.1	1.15	0.66	16	14
08N02973	43-63	Bss1	S	0.6	0.5	18.0	tr	--	3.0	0.1	13.6	--	--	--	2.1	--	--	105.4	0.1	1.86	1.17	28	24
08N02974	63-110	Bss2	S	1.0	1.1	39.7	tr	--	2.0	--	27.6	--	--	--	11.0	--	0.2	105.3	0.3	3.97	2.40	38	38
08N02975	110-125	2C	S	26.4	15.4	99.6	0.4	--	0.6	--	52.4	--	--	--	85.1	--	--	51.4	0.4	10.70	5.49	38	22

*** Primary Characterization Data ***

Pedon ID: S08CI007002 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **San Julian** Fine, smectitic, thermic Typic Haplotorrert

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0457

pH & Carbonates

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-
				(- - - pH					- - -)	(- - Carbonate - -)		(- - Gypsum - - -)		
					$CaCl_2$					As $CaCO_3$		As $CaSO_4$*$2H_2O$		Resist
	Depth				0.01M	H_2O	Sat			<2mm	<20mm	<2mm	<20mm	ohms
Layer	(cm)	Horz	Prep	KCl	1:2	1:1	Paste	Oxid	NaF	(- - -	- - -	% - - -	- - -)	cm^{-1}
				4C1a2a3	4C1a2a	4C1a2a	4F2		4C1a1a1	4E1a1a1a1		4E2a1a1a1		
08N02971	0-13	Ap	S	6.2	7.1	7.5	7.3		9.6	1	1	--		
08N02972	13-43	BA	S	6.5	7.5	8.0	7.6		9.9	1	1	--		
08N02973	43-63	Bss1	S	7.0	8.1	8.6	8.2		10.1	1	1	--		
08N02974	63-110	Bss2	S	7.1	8.3	8.4	8.2		10.1	1	1	--		
08N02975	110-125	2C	S	7.2	8.0	8.0	7.8		9.7	1	1	5		

Phosphorous

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-
					(- - -	- - -	- - -	Phosphorous	- - -	- - -	- - -	- - -)	KCl
				Melanic	NZ	Acid	Bray	Bray	Olsen	H_2O	Citric	Mehlich	Extr
	Depth			Index		Oxal	1	2			Acid	III	NO_3
Layer	(cm)	Horz	Prep		%	(- - -	- - -	- - -	-mg kg^{-1}	- - -	- - -	- - -	- - -)
					4D8a1	4G2a							
08N02971	0-13	Ap	S		18	28.4							
08N02972	13-43	BA	S		18	8.6							
08N02973	43-63	Bss1	S		20	31.0							
08N02974	63-110	Bss2	S		16	110.0							
08N02975	110-125	2C	S		7	226.2							

*** Primary Characterization Data ***

Pedon ID: S08CI007002 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **San Julian** Fine, smectitic, thermic Typic Haplotorrert

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0457

Sand - Silt Mineralogy (2.0-0.002 mm)

Layer	Depth (cm)	Horz	Fraction	-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-
				X-Ray					Thermal				Tot Re	Optical Grain Count 7B1a2						EGME Retn	Interpretation
				(- - - - - - - - peak size - - - - - - - - -)					(- - - - - - - - % - - - - - - - - - -)				(- % - - - - - - - - - - - - - - - - - -)							mg g^{-1}	
08N02971	0-13	Ap	fs										76	QZ 66	FK 10	AR 8	FE 7	FP 2	OP 2		SMIX
														PR 2	BT 1	CD 1	HN 1	GN tr	ZR tr		
08N02973	43-63	Bss1	fs										76	QZ 64	FK 12	FE 10	AR 8	FP 2	OP 2		SMIX
														PR 1	BT tr	CD tr	GN tr	HN tr	ZR tr		
08N02974	63-110	Bss2	fs										74	QZ 62	FK 12	AR 10	FE 9	CD 2	FP 2		SMIX
														PR 2	OP 1	BT tr	HN tr	VM tr			

FRACTION INTERPRETATION:

fs - Fine Sand, 0.1-0.25 mm

MINERAL INTERPRETATION:

AR - Weatherable Aggregates BT - Biotite CD - Chert (Chalcedony FE - Iron Oxides (Goethite FK - Potassium Feldspar

FP - Plagioclase Feldspar GN - Garnet HN - Hornblende OP - Opaques PR - Pyroxene

QZ - Quartz VM - Vermiculite-Mica ZR - Zircon

INTERPRETATION (BY HORIZON):

SMIX - Mixed Sand

*** Taxonomy Characterization Data ***

Pedon ID: S08CI007002 (Chile) Print Date: Aug 20 2008 10:14AM

Sampled as on Mar 11, 2008: **San Julian** ; Fine, smectitic, thermic Typic Haplotorrert
Revised to :

SSL - Project C2008CI02097 Chile
- Site ID S08CI007-002 Lat: 30° 40' 28.00" south Long: 71° 22' 57.00" west WGS84
- Pedon No. 08N0457
- General Methods 1B1A, 2A1, 2B

United States Department of Agriculture, NRCS.
National Soil Survey Center
Soil Survey Laboratory,
Lincoln, Nebraska 68508-3866

Taxonomy Tier 1

Layer	Depth (cm)	Horz	Prep	-1- Clay <.002 (% of <2 mm) 3A1a1a	-2- Fine Clay <.0002 (% of <2 mm) 3A1a1a	-3- $CaCO_3$ Clay <.002 (% of <2 mm)	-4- 1500 kPa /Clay	-5- Clay Est (% of <2 mm)	-6- .1-75 mm Frac (% of <2 mm)	-7- Bulk Den 33 kPa g cm^{-3} DbWR1	-8- Cole Whole Soil cm cm^{-1}	-9- Vol % of Whole	-10- Resist Min %	-11- Glass Content csi (% of <2 mm)	-12- Glass Content vfs (% of <2 mm)	-13- Glass Content fs (% of <2 mm)	-14- Glass Content wt avg (% of <2 mm)
08N02971	0-13	Ap	S	52.7	28.3		0.35		24			5	76				
08N02972	13-43	BA	S	61.1	40.1		0.41		21	1.15	0.135	4					
08N02973	43-63	Bss1	S	61.3	27.5		0.43		27	1.13	0.183	4	76				
08N02974	63-110	Bss2	S	60.2	23.6		0.41		15	1.15	0.191	1	74				
08N02975	110-125	2C	S	29.2	5.9		0.42		60			23					

Taxonomy Tier 2

Layer	Depth (cm)	Horz	Prep	-1- pH H_2O 4C1a2a	-2- pH NaF 4C1a1a1	-3- Org C (% of <2 mm)	-4- Tot C (% of <2 mm) 4H2a	-5- Al+½ Fe Oxal (% of <2 mm)	-6- ODOE (% of <2 mm) 4G2a	-7- CO_3 as $CaCO_3$ (% of <2 mm) 4E1a1a1a1	-8- (--- Base Sat ---) NH_4 (% of <2 mm)	-9- Bases (% of <2 mm)	-10- NZ P Ret (% of <2 mm) 4D8a1	-11- ECEC cmol(+) kg^{-1} (% of <2 mm)	-12- CEC7 /Clay (% of <2 mm)	-13- ECEC /Clay (% of <2 mm)	-14- Al Sat (% of <2 mm)	-15- E C dS m^{-1} (% of <2 mm) 4F2	-16- ESP (% of <2 mm)
08N02971	0-13	Ap	S	7.5	9.6		0.85	0.21	0.01	1	100*		18		0.62			1.74	8
08N02972	13-43	BA	S	8.0	9.9		0.70	0.25	0.01	1	100*		18		0.62			1.15	16
08N02973	43-63	Bss1	S	8.6	10.1		0.36	0.24	0.01	1	100*		20		0.61			1.86	28
08N02974	63-110	Bss2	S	8.4	10.1		0.16	0.22	0.01	1	100*		16		0.63			3.97	38
08N02975	110-125	2C	S	8.0	9.7		0.26	0.10	0.01	1	100*		7		0.72			10.70	38

*Extractable Ca may contain Ca from calcium carbonate or gypsum.

Pedon Calculations

Calculation Name	Result	Units of Measure
Weighted Particles, 0.1-75mm, 75 mm Base	19.617	% wt
Volume, >2mm, Weighted Average	2.728	% vol
Clay, total, Weighted Average	60.723	% wt
Clay, carbonate free, Weighted Average	60.723	% wt
CEC Activity, CEC7/Clay, Weighted Average, CECd, Set 1	0.622	(NA)

Weighted averages based on control section: 25-100 cm

TONGOY - PEDON DESCRIPTION

Print Date: 08/15/2008
Description Date: 03/12/2008
Describer: M. Casanova- W. Luzio- T. Reinsch
Site ID: S08CI007004
Site Note: Vegetation: *Atriplex repanda* Phil.; *Baccharis linearis* (R. et p.) Pers.; *Ephedra gracillis* Phil. ex Stapf; *Gutierrezia resinosa* (Hook. Et Arn.) Blacke; *Haplopappus cerberoanus* (J. Remy) Reiche; *Heliotropium stenophyllum* Hook et. Arn; *Ricinus communis* L.; *Pleocarphus revolutus* D. Don; *Salsola kali* L.
Pedon ID: S08CI007004
Pedon Note: Shells: *Argopecten purpuratus* (Lamark, 1819); *Balanus sp*.; *Concholepas concholepas* (Brugiere, 1789); *Mesodesma donacium* (Lamarck, 1818); *Oliva peruviana* Lamarck, 1811; *Priene scabrum* (King, 1832); *Turritella cingulata* Sowerby 1825; *Tagelus dombeii* (Lamarck, 1818)
Lab Source ID: SSL

Lab Pedon #: 08N0459
Soil Name as Described/Sampled: Tongoy
Soil Name as Correlated:
Classification: Fine-loamy, mixed, active, thermic Xeric Petrocalcids
Pedon Type:
Pedon Purpose: full pedon description
Taxon Kind:
Associated Soils:
Physiographic Division:
Physiographic Province:

Physiographic Section:
State Physiographic Area:
Local Physiographic Area:
Geomorphic Setting: hillslope
Upslope Shape: convex
Cross Slope Shape: convex
Particle Size Control Section: 25 to 56 cm.

Description origin: NASIS
Diagnostic Features: *ochric epipedon 0 to 8 cm.*
cambic horizon 7 to 28 cm.
petrocalcic horizon 56 cm.

Country: Chile
State: Coquimbo IV Region
County: Coquimbo Province
MLRA:
Soil Survey Area:

Map Unit:
Quad Name:

Location Description: Approximately 2 km south of intersection of route D440 and road to Tongoy on route D440.
Legal Description:
Latitude: 30° 16´ 32.60" south
Longitude: 71° 28´ 53.50" west
Datum: WGS84

UTM Zone: 19
UTM Easting: 261291 m
UTM Northing: 6648054 m

Primary Earth Cover: Shrub cover
Secondary Earth Cover: Shrubby rangeland
Existing Vegetation: blue-green saltbush
Parent Material: marine terrace alluvium
Bedrock Kind:
Bedrock Depth:
Bedrock Hardness:
Bedrock Fracture Interval:
Surface Fragments: 5% rounded igneous rock fragments
Description database: NSSL

Cont. Site ID: S08CI007004 **Pedon ID:** S08CI007004

Slope (%)	Elevation (masl)	Aspect (deg)	MAAT (°C)	MSAT (°C)	MWAT (°C)	MAP (mm)	Frost-free days	Drainage Class	Slope Length (m)	Upslope Length (m)
8.0	50?	270		20,6	9,2			well		

Depth (cm)	Profile description
0 to 8 **A**	Yellowish brown (10YR 5/4) sandy loam, brown (10YR 4/3), moist; structureless single grain; slightly hard, nonsticky, nonplastic; common fine roots throughout and common very fine roots throughout; many fine tubular and many medium tubular and many coarse tubular and many very fine tubular pores; 21% worm casts; 5% nonflat rounded 2 to 30 mm unspecified fragments; violent effervescence, by HCl, unspecified; 1 mm crust; clear smooth boundary. Laboratory sample # 08N02981
8 to 28 **Bw**	Brown (10YR 4/3) sandy loam, dark brown (7.5YR 3/3), moist; moderate medium subangular blocky structure; slightly hard, nonsticky, nonplastic; common fine roots throughout and very few medium roots throughout and common very fine roots throughout; many fine and many coarse pores; 3% worm casts in cracks; 5% nonflat rounded 2 to 30 mm unspecified fragments; noneffervescent, by HCl, unspecified (effervescence was strong near lower horizon boundary); clear smooth boundary. Laboratory sample # 08N02982.
28 to 39 **2C**	Reddish brown (5YR 4/4) sandy clay loam, reddish brown (5YR 4/4), moist; structureless massive; very hard, slightly sticky, moderately plastic; common fine roots and common very fine roots; many fine and common medium pores; 2% nonflat subrounded 76 to 250 mm unspecified fragments and 55% nonflat subrounded 2 to 75 mm unspecified fragments; noneffervescent, by HCl, unspecified; stoneline at the lower horizon boundary; abrupt wavy boundary. Laboratory sample # 08N02983.
39 to 56 **3Bb**	Brown (7.5YR 4/4) clay loam, brown (7.5YR 4/4), moist; strong medium prismatic structure; extremely hard, very sticky, very plastic; common fine roots and common very fine roots; many fine and many very fine pores; 5% coarse irregular carbonate masses; 20% nonflat 20 to 50 mm unspecified fragments; strong effervescence, by HCl, unspecified (effervescence was violent near lower horizon boundary); abrupt wavy boundary. Laboratory sample # 08N02984.
56 to 85 **4Ckm**	Very pale brown (10YR 8/2), very pale brown (10YR 7/3), moist; very hard; carbonate coats on rock fragments; 5% nonflat rounded 20 to 50 mm unspecified fragments; violent effervescence, by HCl, unspecified; some parts of exposure have continuous petrocalcic, other parts fractured; 1% weathered shells; 2 to 20 mm thick fractured laminar cap, interlayered not parallel; abrupt wavy boundary. Laboratory sample # 08N02985.
85 to 117 5Ckm	Very pale brown (10YR 8/2), very pale brown (10YR 7/3), moist; rigid; 5% nonflat rounded 20 to 50 mm unspecified fragments; violent effervescence, by HCl, unspecified; continuous cemented layers; 75% unweathered shells; did not break with foot pressure; clear wavy boundary. Laboratory sample # 08N02986.
117 to 197 **6C**	Very pale brown (10YR 8/2), very pale brown (10YR 7/3), moist; common fine roots and common very fine roots. Contains interlayered successive depositional layers - ground shells, shells, rounded gravels.

*** Primary Characterization Data ***

Pedon ID: S08CI007004 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled as on Mar 11, 2008: **Tongoy** ; Fine-loamy, mixed, active, thermic Xeric Petrocalcid

Revised to :

SSL - Project C2008CI02097 Chile
- Site ID S08CI007-004 Lat: 30° 16' 32.60" south Long: 71° 28' 53.50" west WGS84
- Pedon No. 08N0459
- General Methods 1B1A, 2A1, 2B

United States Department of Agriculture
Natural Resources Conservation Service
National Soil Survey Center
Soil Survey Laboratory
Lincoln, Nebraska 68508-3866

Layer	Horizon	Orig Hzn	Depth (cm)	Field Label 1	Field Label 2	Field Label 3	Field Texture	Lab Texture
08N02981	A		0.0-8.0	S08CI007-004-1			SL	LFS
08N02982	B		8.0-28.0	S08CI007-004-2			SL	LFS
08N02983	2C		28.0-39.0	S08CI007-004-3			SCL	SCL
08N02984	3Bb		39.0-56.0	S08CI007-004-4			CL	SC
08N02985	4Ckm		56.0-85.0	S08CI007-004-5			CEM-MAT	
08N02986	5Cm		85.0-117.0	S08CI007-004-6			CEM-MAT	

Pedon Calculations

Calculation Name	Result	Units of Measure
Weighted Particles, 0.1-75mm, 75 mm Base	58.88	% wt
Volume, >2mm, Weighted Average	7.815	% vol
Clay, total, Weighted Average	28.647	% wt
Clay, carbonate free, Weighted Average	28.234	% wt
CEC Activity, CEC7/Clay, Weighted Average, CECd, Set 1	0.719	(NA)

Weighted averages based on control section: 25-56 cm

PSDA & Rock Fragments

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-
				(- - - - - Total - - - - - -)			(- - Clay - - -)		(- - - - Silt - - - - -)		(- - - - - - - - - - - - Sand - - - - - - - - - - - -)					(Rock Fragments (mm))				
				Clay	Silt	Sand	Fine	CO_3	Fine	Coarse	VF	F	M	C	VC	(- - - - - - - - Weight - - - - - - - -)				>2 mm
				<	.002	.05	<	<	.002	.02	.05	.10	.25	.5	1	2	5	20	.1-	wt %
	Depth			.002	-.05	-2	.0002	.002	-.02	-.05	-.10	-.25	-.50	-1	-2	-5	-20	-75	75	whole
Layer	(cm)	Horz	Prep	(- % of <2mm Mineral Soil -)												(- - - - - - - % of <75mm - - - - - -)				soil
				3A1a1a			3A1a1a	3A1a1a	3A1a1a		3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a					
08N02981	0-8	A	S	6.1	12.7	81.2	3.1		4.1	8.6	18.9	47.4	10.3	3.4	1.2	2	8	3	67	13
08N02982	8-28	B	S	6.6	11.1	82.3	3.8		4.1	7.0	13.7	52.5	10.7	4.3	1.1	2	3	1	70	6
08N02983	28-39	2C	S	23.2	7.9	68.9	18.3		3.7	4.2	11.0	33.0	9.1	7.4	8.4	18	--	--	65	20
08N02984	39-56	3Bb	S	36.1	6.3	57.6	22.4	0.8	3.4	2.9	10.9	28.6	8.1	4.2	5.8	5	5	1	53	11
08N02985	56-85	4Ckm	GP	10.8	12.8	76.4	3.5	8.0	8.2	4.6	8.0	16.3	14.5	18.3	19.3					
08N02985	56-85	4Ckm	S													--	--	--	--	--
08N02986	85-117	5Cm	GP	5.3	14.8	79.9	1.1	4.1	9.6	5.2	9.8	25.1	13.4	15.6	16.0					
08N02986	85-117	5Cm	S													--	--	--	--	--

*** Primary Characterization Data ***

Pedon ID: S08CI007004 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Tongoy** Fine-loamy, mixed, active, thermic Xeric Petrocalcid

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0459

Water Dispersible PSDA

Layer	Depth (cm)	Horz	Prep	Clay < .002	Silt .002 -.05	Sand .05 -2	F Clay < .0002	CO_3 Clay < .002	F Silt .002 -.02	C Silt .02 -.05	VF Sand .05 -.10	F Sand .10 -.25	M Sand .25 -.50	C Sand .5 -1	VC Sand 1 -2
				(- - - - - Total - - - - - -)			(- - Clay - - -)		(- - - - Silt - - - - -)		(- - - - - - - - - - - - Sand - - - - - - - - - - - -)				
				(- % of <2mm -)											
				3A1a6a					3A1a6a		3A1a6a	3A1a6a	3A1a6a	3A1a6a	3A1a6a
08N02981	0-8	A	S	3.1	14.5	82.4			6.2	8.3	18.2	48.1	10.9	3.8	1.4
08N02982	8-28	B	S	4.2	13.0	82.8			6.3	6.7	12.5	53.5	10.7	4.0	2.1
08N02983	28-39	2C	S	17.3	14.3	68.4			10.2	4.1	11.4	33.1	8.6	6.7	8.6
08N02984	39-56	3Bb	S	29.7	12.8	57.5			10.6	2.2	10.6	28.7	7.8	4.8	5.6

Bulk Density & Moisture

Layer	Depth (cm)	Horz	Prep	(Bulk Density) 33 kPa	Oven Dry	Cole Whole Soil	(- - - - - - - - - - - Water Content - - - - - - - - - - -) 6 kPa	10 kPa	33 kPa	1500 kPa	1500 kPa Moist	Ratio AD/OD	WRD Whole Soil	Aggst Stabl 2-0.5mm	(- - Ratio/Clay - -) CEC7	1500 kPa
				(- - - g cm^{-3} - - -)			(- - - - - - - - - - - - pct of < 2mm - - - - - - - - - - - -)						cm^3 cm^{-3}	%		
				DbWR1	DbWR1				DbWR1	3C2a1a		3D1				
08N02981	0-8	A	S							2.9		1.006			0.79	0.48
08N02982	8-28	B	S	1.67	1.68	0.002			5.2	2.9		1.008	0.04		0.80	0.44
08N02983	28-39	2C	S							9.8		1.030			0.67	0.42
08N02984	39-56	3Bb	S	1.53	1.86	0.062			23.0	15.7		1.048	0.10		0.73	0.43
08N02985	56-85	4Ckm	GP							12.8		1.021				
08N02986	85-117	5Cm	GP							4.4		1.010				

Water Content

Layer	Depth (cm)	Horz	Prep	(- - Atterberg - -) (- - - Limits - - -) LL	PI	(- - - - - Bulk Density - - - - -) Field	Recon 33 kPa	Recon Oven Dry	(- Water Content -) Field	Recon 33 kPa	(- - - - - - - - - - - - - - Sieved Samples - - - - - - - - - - - - - -) 6 kPa	10 kPa	33 kPa	100 kPa	200 kPa	500 kPa
				pct <0.4mm		(- - - - - - - - g cm^{-3} - - - - - - -)			(- % of < 2mm -)						
						3B6			3B6						
08N02981	0-8	A	CDB			1.08			2.24						

*** Primary Characterization Data ***

Pedon ID: S08CI007004 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Tongoy** Fine-loamy, mixed, active, thermic Xeric Petrocalcid

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0459

Carbon & Extractions

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-
				(- - - - - Total - - - - -)			Org	C/N	(- - - Dith-Cit Ext - - -)			(- - - - - - Ammonium Oxalate Extraction - - - - - -)						(- - - Na Pyro-Phosphate - - -)			
	Depth			C	N	S	C	Ratio	Fe	Al	Mn	Al+½Fe	ODOE	Fe	Al	Si	Mn	C	Fe	Al	Mn
Layer	(cm)	Horz	Prep	(- - - - - - % of <2 mm - - - - - -)					(- % of < 2mm - - - - - - - - - - - - - - - - - -)								mg kg^{-1}	(- - - - - - % of < 2mm - - - - -)			
				4H2a	4H2a	4H2a			4G1	4G1	4G1		4G2a	4G2a	4G2a	4G2a	4G2a		4G3	4G3	4G3
08N02981	0-8	A	S	0.60	0.067	0.01		6	0.5	--	--	0.08	0.02	0.07	0.04	0.02	102.8		--	--	--
08N02982	8-28	B	S	0.33	0.023	0.01		13	0.6	--	--	0.06	0.03	0.06	0.03	0.01	104.8		tr	--	--
08N02983	28-39	2C	S	0.35	0.045	0.01		6	0.7	--	--	0.09	0.02	0.07	0.06	0.03	124.3		0.1	tr	--
08N02984	39-56	3Bb	S	0.48	0.050	0.03		6	0.7	tr	--	0.11	0.03	0.06	0.08	0.05	87.7		--	--	--
08N02985	56-85	4Ckm	GP	8.56	0.059	0.07			--	--	--	0.01	0.01	tr	tr	0.01	5.9		--	--	--
08N02986	85-117	5Cm	GP	6.87	0.009	0.08			tr	--	--	0.02	tr	0.02	0.01	0.01	8.2		--	--	--

CEC & Bases

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-
				(- - - - - - NH_4OAC Extractable Bases - - - - -)								CEC8	CEC7	ECEC		(- - - - Base - - - -)	
								Sum	Acid-	Extr	KCl	Sum	NH_4	Bases	Al	(- Saturation -)	
	Depth			Ca	Mg	Na	K	Bases	ity	Al	Mn	Cats	OAC	+Al	Sat	Sum	NH_4OAC
Layer	(cm)	Horz	Prep	(- - - - - - - - - - - - - - - - - - cmol(+) kg^{-1} - - - - - - - - - - - - - - - - - - -)							mg kg^{-1}	(- - - - cmol(+) kg^{-1} - - -)			(- - - - - - - - % - - - - - - - -)		
				4B1a1a	4B1a1a	4B1a1a	4B1a1a		4B2b1a1				4B1a1a				
08N02981	0-8	A	S	20.2*	1.1	0.1	0.6	22.0	1.1				4.8				100
08N02982	8-28	B	S	7.8*	1.0	0.4	0.3	9.5	0.1				5.3				100
08N02983	28-39	2C	S	18.4*	3.7	1.2	0.4	23.7	2.2				15.6				100
08N02984	39-56	3Bb	S	35.8*	10.3	12.9	0.6	59.6					26.5				100
08N02985	56-85	4Ckm	GP	48.9*	3.4	15.5	0.2	68.0					3.4				100
08N02986	85-117	5Cm	GP	45.9*	3.1	39.3	0.1	88.4					4.0				100

*Extractable Ca may contain Ca from calcium carbonate or gypsum. CEC7 base saturation set to 100.

*** Primary Characterization Data ***

Pedon ID: S08CI007004 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Tongoy** Fine-loamy, mixed, active, thermic Xeric Petrocalcid

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0459

Salt

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
				(- Water Extracted From Saturated Paste -)																	Pred		
																			Total	Elec	Elec	Exch	
	Depth			Ca	Mg	Na	K	CO_3	HCO_3	F	Cl	PO_4	Br	OAC	SO_4	NO_2	NO_3	H_2O	Salts	Cond	Cond	Na	SAR
Layer	(cm)	Horz	Prep	(- - - - - mmol(+) L^{-1} - - - - -)				(- mmol(-) L^{-1} -)										(- - - - % - - - -)		(- - dS m^{-1} - -)		%	
				4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2	4F2		4F2	4F1a1a1		
08N02981	0-8	A	S	4.6	1.1	2.9	0.7	--	4.4	tr	3.4	0.2	--	--	0.6	--	--	29.8	tr	0.95	0.24	1	2
08N02982	8-28	B	S	3.8	1.2	5.8	0.2	--	2.3	--	9.3	0.1	--	--	0.5	0.1	tr	29.1	tr	1.10	0.28	4	4
08N02983	28-39	2C	S	3.0	1.0	6.4	--	--	3.7	--	5.2	0.1	tr	--	1.2	0.7	0.2	44.6	tr	1.03	0.37	6	5
08N02984	39-56	3Bb	S	20.4	15.3	85.7	0.2	--	1.7	--	107.0	--	--	--	10.9	--	--	58.8	0.5	10.78	3.94	30	20
08N02985	56-85	4Ckm	GP	31.2	23.8	213.0	0.6	--	1.0	--	245.8	--	--	--	21.7	--	--	43.0		22.90	7.65		
08N02986	85-117	5Cm	GP	60.9	39.0	773.2	1.1	--	1.0	--	874.3	--	--	--	63.6	--	4.9	30.5		65.00	15.04		

pH & Carbonates

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-
				(- - - - - - - - - - - - - - - - - - pH - - - - - - - - - - - - - - - - - -)						(- - Carbonate - -)		(- - Gypsum - - -)		
					$CaCl_2$							As $CaCO_3$		As $CaSO_4$*$2H_2O$		Resist
	Depth				0.01M	H_2O	Sat					<2mm	<20mm	<2mm	<20mm	ohms
Layer	(cm)	Horz	Prep	KCl	1:2	1:1	Paste	Oxid	NaF			(- - - - - - - - - - - - % - - - - - - - - - - - -)				cm^{-1}
				4C1a2a3	4C1a2a	4C1a2a	4F2		4C1a1a1	4E1a1a1a1				4E2a1a1a1		
08N02981	0-8	A	S	7.5	7.7	8.2	8.0		10.0	2						
08N02982	8-28	B	S	7.2	7.5	8.0	7.7		9.5	tr						
08N02983	28-39	2C	S	6.6	7.3	7.8	7.4		9.8	1						
08N02984	39-56	3Bb	S	7.2	8.0	8.0	7.7		10.1	2				--		
08N02985	56-85	4Ckm	GP	8.1	8.3	8.0	7.9		11.0	68				--		
08N02986	85-117	5Cm	GP	8.2	8.4	8.4	8.0		10.8	56				--		

*** Primary Characterization Data ***

Pedon ID: S08CI007004 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Tongoy** Fine-loamy, mixed, active, thermic Xeric Petrocalcid

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0459

Phosphorous

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-
					(- Phosphorous							- - - - - - - - - - - - - - - - - -)	KCl
				Melanic	NZ	Acid	Bray	Bray	Olsen	H_2O	Citric	Mehlich	Extr
	Depth			Index		Oxal	1	2			Acid	III	NO_3
Layer	(cm)	Horz	Prep		%	(- mg kg^{-1}							- - - - - - - - - - - - - - - - - -)
					4D8a1	4G2a							
08N02981	0-8	A	S		8	104.8							
08N02982	8-28	B	S		6	65.1							
08N02983	28-39	2C	S		10	73.3							
08N02984	39-56	3Bb	S		13	76.2							
08N02985	56-85	4Ckm	GP		92	74.3							
08N02986	85-117	5Cm	GP		90	63.3							

*** Primary Characterization Data ***

Pedon ID: S08CI007004 (Chile) Print Date: Aug 20 2008 9:52AM

Sampled As : **Tongoy** Fine-loamy, mixed, active, thermic Xeric Petrocalcid

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 08N0459

Sand - Silt Mineralogy (2.0-0.002 mm)

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-
						X-Ray				Thermal						Optical				EGME	Inter
													Tot Re			Grain Count				Retn	preta
	Depth		Fract													7B1a2					tion
Layer	(cm)	Horz	ion	(- - - - - - - - peak size - - - - - - - - -)					(- - - - - - - - % - - - - - - - - - -)				(- % - - - - - - - - - - - - - - - - - -)							mg g^{-1}	
08N02983	28-39	2C	fs										59	QZ 55	FK 17	AR 13	FP 5	PR 3	CD 2		SMIX
														HN 2	FE 1	OP 1	MS tr				
08N02984	39-56	3Bb	fs										56	QZ 53	FK 24	AR 10	FP 7	PR 4	CD 1		SMIX
														FE 1	OP 1	BT tr	GN tr				

FRACTION INTERPRETATION:

fs - Fine Sand, 0.1-0.25 mm

MINERAL INTERPRETATION:

AR - Weatherable Aggregates BT - Biotite CD - Chert (Chalcedony FE - Iron Oxides (Goethite FK - Potassium Feldspar

FP - Plagioclase Feldspar GN - Garnet HN - Hornblende MS - Muscovite OP - Opaques

PR - Pyroxene QZ - Quartz

INTERPRETATION (BY HORIZON):

SMIX - Mixed Sand

*** Taxonomy Characterization Data ***

Pedon ID: S08CI007004 (Chile) Print Date: Aug 20 2008 10:14AM

Sampled as on Mar 11, 2008: **Tongoy** ; Fine-loamy, mixed, active, thermic Xeric Petrocalcid

Revised to :

SSL - Project C2008CI02097 Chile

- Site ID S08CI007-004 Lat: 30° 16' 32.60" south Long: 71° 28' 53.50" west WGS84
- Pedon No. 08N0459
- General Methods 1B1A, 2A1, 2B

United States Department of Agriculture, NRCS
National Soil Survey Center
Soil Survey Laboratory
Lincoln, Nebraska 68508-3866

Taxonomy Tier 1

Layer	Depth (cm)	Horz	Prep	-1- Clay <.002 (--------% of <2 mm-------) 3A1a1a	-2- Fine Clay <.0002 3A1a1a	-3- $CaCO_3$ Clay <.002 3A1a1a	-4- 1500 kPa /Clay	-5- Clay Est (------- % -------)	-6- .1-75 mm Frac	-7- Bulk Den 33 kPa g cm^{-3} DbWR1	-8- Cole Whole Soil cm cm^{-1}	-9- Vol % of Whole	-10- Resist Min %	-11- csi	-12- Glass Content vfs	-13- fs	-14- wt avg (-------- % --------)
08N02981	0-8	A	S	6.1	3.1		0.48		67			8					
08N02982	8-28	B	S	6.6	3.8		0.44		70	1.67	0.002	4					
08N02983	28-39	2C	S	23.2	18.3		0.42		65			11	59				
08N02984	39-56	3Bb	S	36.1	22.4	0.8	0.43		53	1.53	0.062	7	56				
08N02985	56-85	4Ckm	GP	10.8	3.5	8.0											
08N02985	56-85	4Ckm	S						--			--					
08N02986	85-117	5Cm	GP	5.3	1.1	4.1											
08N02986	85-117	5Cm	S						--			--					

Taxonomy Tier 2

Layer	Depth (cm)	Horz	Prep	-1- pH H_2O 4C1a2a	-2- pH NaF 4C1a1a1	-3- Org C (----------%	-4- Tot C 4H2a	-5- Al+½ Fe Oxal	-6- ODOE 4G2a	-7- CO_3 as $CaCO_3$ 4E1a1a1a1	-8- (--- Base Sat --- NH_4	-9- Bases	-10- NZ P Ret 4D8a1)	-11- ECEC cmol(+) kg^{-1}	-12- CEC7 /Clay	-13- ECEC /Clay	-14- Al Sat %	-15- E C dS m^{-1} 4F2	-16- ESP %
08N02981	0-8	A	S	8.2	10.0		0.60	0.08	0.02	2	100*		8		0.79			0.95	1
08N02982	8-28	B	S	8.0	9.5		0.33	0.06	0.03	tr	100*		6		0.80			1.10	4
08N02983	28-39	2C	S	7.8	9.8		0.35	0.09	0.02	1	100*		10		0.67			1.03	6
08N02984	39-56	3Bb	S	8.0	10.1		0.48	0.11	0.03	2	100*		13		0.73			10.78	30
08N02985	56-85	4Ckm	GP	8.0	11.0		8.56	0.01	0.01	68			92					22.90	
08N02986	85-117	5Cm	GP	8.4	10.8		6.87	0.02	tr	56			90					65.00	

*Extractable Ca may contain Ca from calcium carbonate or gypsum.

Pedon Calculations

Calculation Name	Result	Units of Measure
Weighted Particles, 0.1-75mm, 75 mm Base	58.88	% wt
Volume, >2mm, Weighted Average	7.815	% vol
Clay, total, Weighted Average	28.647	% wt
Clay, carbonate free, Weighted Average	28.234	% wt
CEC Activity, CEC7/Clay, Weighted Average, CECd, Set 1	0.719	(NA)

Weighted averages based on control section: 25-56 cm