ARMY OF CHILE
MILITARY GEOGRAPHIC INSTITUTE OF CHILE

REPORT ON CARTOGRAPHY IN THE REPUBLIC OF CHILE 2015 - 2019

PRESENTED BY THE CHILEAN NATIONAL COMMITTEE OF THE INTERNATIONAL CARTOGRAPHIC ASSOCIATION

AT THE SEVENTEENTH GENERAL ASSEMBLY OF THE INTERNATIONAL CARTOGRAPHIC ASSOCIATION

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PREPARED BY:

MILITARY GEOGRAPHIC INSTITUTE OF CHILE

HEADQUARTERS OF THE CHILEAN NATIONAL COMMITTEE OF THE INTERNATIONAL CARTOGRAPHIC ASSOCIATION

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1.1. Introduction

1.1.1 The ICA National Committee of Chile

The Military Geographic Institute of Chile (IGM) sustains the National Committee of the ICA in Chile because it is the official authority representing the Chilean State in matters involving geography, mapping, surveying and the representation of Chilean territory in official cartography. The IGM represents the State in international organizations related to geography and geo-spatial information[1], including the ICA. This representation is assigned specifically to the Director of the IGM, who leads the ICA National Committee. The IGM acts as secretariat for this National Committee, coordinating ICA-related activities in Chile, which can involve other local organizations.

1.1.2 National Reports from Chile to the ICA

This report complements previous reports from this National Committee covering earlier periods. Images of cartographic products are not included because most of the institutions named in this report provide these at their own websites and geoportals, for which the URL addresses are stated. While valid at this date, no guarantee can be given that the contact details given in the report will remain valid throughout the period 2019 – 2023. This report will be submitted to the Executive Committee and to the 17th General Assembly of the ICA.

1.1.3. Contact Details for ICA National Committee in Chile

Director of IGM & National Committee President	direccion@igm.cl
IGM Geographic Division	dgeo@igm.cl
IGM National & International Relations Section (contact for this report)	rrii@igm.cl

Telephone: (56) – 2 – 24109314. Other contact details are those given for the IGM in 3.1.

1.2. Chilean ICA National Committee during 2015 - 2019

1.2.1 Outline of National Committee Activities

During the current period, the Chilean National Committee has continued to support the ICA through the annual fee payments, attendance at ICC conferences and correspondence.

1.2.2. Presidents of the ICA National Committee in Chile

The Chilean National Committee of the ICA has been led by successive Directors of the IGM; in this period these have been:

- December 2014 to December 2015: Colonel Rony Jara Lecanda
- December 2015 to December 2017: Colonel José Riquelme Muñoz
- December 2017 to date: Colonel Eduardo Cayul Aristondo

1.2.3 Chilean Commission Chair

In the year 2015 the Chilean National Committee supported the nomination of the incumbent chair of the Commission for Maps and Graphics for the Blind and Visually Handicapped to continue for another period. At the 16th General Assembly this nomination was successfully adopted, and Prof. Alejandra Coll has continued since then as chair of this Commission. Of necessity, a lot of the organization work has been performed by the Chair and some close contributors based in Chile, but the Vice-Chair is Brazilian and efforts have been made to contact and reach potential contributors and participants in other ICA member countries. Alejandra Coll is due to stand down from this post at the 17th General Assembly.

1.2.4 Children's Map Competitions in Chile

IIn the year 2015 a national competition was announced in Chile, related to the Barbara Petchenik Children's Map Competition of that year. Due to a combination of factors outside the control of the N.C., the number of competition entries was insufficient for a viable competition to be completed; however, two entries from Chilean school pupils were displayed in the corresponding exhibition (at the ICC 2015 held in Brazil) out of competition. For subsequent competitions, it has not been possible for Chile to participate.

[1] Decreto Nº 18, Sub-Secretaria de Guerra (Defence Ministry), in effect from 22nd January 1979, published in the "Diario Oficial" nº 30.307 on 6th March 1979.

1.2.4. International Cartographic Conferences

At both the XXVII ICC and 16th General Assembly, held in Rio de Janeiro, Brazil, in August 2015 and again at the XXVIII ICC and 16th General Assembly, held in Washington, United States, in July 2017, the Chilean National Committee participated through the official Chilean delegation of two members of IGM staff.

The National Committee sent, for inclusion in the “International Cartographic Exhibition” and competition at both ICC 2015 and 2017 maps from several Chilean organizations, including but not only the Military Geographic Institute of Chile

Currently the National Committee is preparing to participate in the ICC and General Assembly of this year, 2019, to be held in Tokyo, Japan.

PART TWO: MULTI-INSTITUTIONAL ACTIVITIES

2.1. National Spatial Data Infrastructure of Chile

www.ide.cl	Secretaria Ejecutiva, **INFRAESTRUCTURA DE DATOS ESPACIALES,** **MINISTERIO DE BIENES NACIONALES** Alameda Bernardo O’Higgins 720 piso 8 Santiago Región Metropolitana
Telephone	(56) – 2 – 29375896

2.1.1. Chilean SDI - Overview

The Chilean SDI has been described in outline in previous National Reports. It is now called the “Infraestructura de Datos Espaciales de Chile” or simply IDE-Chile (Chilean spatial data infrastructure). Initially it had been known as the “National Territorial Information Coordination System” or S.N.I.T.

The IDE-Chile Executive Secretariat (based at the Ministry for National Assets and Resources) acts as the central office of a cooperative alliance of the Ministries, public agencies, institutions and local governments that develop and use territorial spatial information. The Secretariat reports to an inter-ministerial committee made up of the Ministers and representatives of twelve major government ministries, while receiving technical advice from an inter-ministerial technical committee.

The work of the IDE is distributed across ten thematic areas, each of which groups together several institutions active in a specific area or sector; some of these are organizations covered by this report to the ICA.

There are also organisations active in IDE issues at a local or regional level which are grouped by geographic region; these include many municipal and regional bodies. In each of Chile’s sixteen regions, there is a regional coordinator of these activities, associated with the Regional superintendency and liaising with the IDE national secretariat.

During the period when it was called the SNIT, the IDE of Chile was actively linked to Technical Committee 211 of the ISO and also to the Global Spatial Data Infrastructure Association (GSDI). In recent years there has been an increasing involvement in the network led by the United Nations and its Statistics Division (UNSD), known as the “Global Geospatial Information Management” (GGIM), in which Chile is represented by the IDE-Chile Secretariat. Specifically, the IDE-Chile Secretariat has cooperated with the UN-GGIM regional entity for the Americas (see http://www.un-ggim-americas.org/).

2.1.2. On-Line Resources of SNIT

Associated with the web site (www.ide.cl), the Secretariat provides on-line access to:

- The IDE-Chile Metadata Catalogue at http://www.geoportal.cl/geoportal/, with records covering a very large proportion of cartographic holdings managed by the state, governmental and public entities of Chile.
- The Map Viewer at http://www.geoportal.cl/visorgeoportal/, where a user can select sets of objects from a wide variety of thematic sources, drawn from the institutions and bodies that cooperate with the IDE-Chile and its catalogue, to display over a single georeferenced base map image of Chilean territory. The base map too can be changed between a few alternative types of image.
- Datasets provided remotely through the “Geonode” system from many participating institutions for viewing in the Geoportal. Access is provided to state, public and academic institutions in Chile upon request to the IDE-Chile Secretariat.
- Resources available for downloading from the www.ide.cl web site; these include layers of cartographic information, spatial data images, and galleries of thematic map symbols.

2.2 Pan-American Institute for Geography and History - PAIGH

www.ipgh.org	**Sección Nacional del IPGH de Chile** **INSTITUTO PAN-AMERICANO DE GEOGRAFIA E HISTORIA – IPGH**
Chilean National Section	rrnn@igm.cl
National Section web page	http://www.igm.cl/IPGH/

2.2.1. Introduction

The Pan-American Institute for Geography and History (PAIGH) is an international agency supervised by the Organization of American States (OAS) that promotes activities grouped under and organized by the four PAIGH Commissions, the Geography, Cartography, Geophysics and History Commissions. PAIGH coordinates a network of 21 National Sections, one in each of the PAIGH member states. The Chilean National Section has its headquarters at the IGM and is supported by several local institutions.

2.2.2. Chilean Support for the PAIGH at International Level

In the year 2013 a Chilean engineer, former Army colonel and former director of the IGM, Rodrigo Barriga Vargas, took over the fundamental, critical role of PAIGH General Secretary, leading the PAIGH permanent secretariat based in Mexico City. Rodrigo Barriga successfully exercised this leadership role at the international level of the Americas until the year 2017, when he handed over this role to his successor, elected at the PAIGH General Assembly.

Also in 2017, another leading figure of Chilean cartography, Alejandra Coll, an academic of the Metropolitan Technological University of Chile, was selected to be the Vice-President of the PAIGH at international level. Mrs Coll is the same cartographer and academic who is currently the chair of an ICA Commission; she will continue as PAIGH Vice-President until the year 2021.

A Chilean geographer, Hermann Manriquez Tirado (formerly of the IGM, now based at the Geography Institute of the Catholic University of Valparaiso - UCV), has acted in this period as coordinator of the committee of PAIGH journal editors.

This year, in November of 2019, Santiago, Chile, will be the venue for the annual meeting of the PAIGH Council, the most important event in the sequence of PAIGH events in the year.

2.2.3. PAIGH Cartography Commissions

In Chile, support is especially strong for the PAIGH Cartography Commission. A Chilean academic, Dr. Maria Ester Gonzalez of the University of Concepción (UDEC), is the Editor of one of the Journals published by the PAIGH; this is the “Revista Cartográfica” (cartographic journal).

The PAIGH National Section of Chile coordinates the four local Commissions that are the Chilean counterparts to the four international commissions. The Chilean Cartography Commission, sustained by several of the institutions covered in this report, has been active in supporting the technical projects and technical committees coordinated by the international PAIGH Cartography Commission. It is chaired by the Director of the CENGEO (see 4.2.8.**).**

2.2.4. PAIGH Cartography Commission Technical Committees in Chile

A large part of the PAIGH Cartography Commission's technical work is sustained by permanent technical committees; two of these have their headquarters in Chile:

- The 'Tactile Cartography' Committee relates to a long-standing program of the PAIGH to support the development of tactile and 3D maps and representations of space; the headquarters of this Committee is at the Tactile Cartography Center (see 4.1.3.) of the UTEM. Note that this is also the location of the Chair of the ICA Commission on Maps & Graphics for the Blind.
- The 'Aeronautical Charts' Committee is sustained by the SAF (see 3.3) together with other bodies within PAIGH member states that are involved in aeronautical navigation.

2.2.5. PAIGH Cartography Commission Projects in Chile

The 'Technical Cooperation Projects' differ from the Technical Committees in that they receive partial funding (the Committees do not) but at the same time they are not permanent. The projects are international in scope while having a center of operations or coordination in one country. A significant number of these projects are run from Chile; the projects of this period associated specifically with the Cartography Commission (excluding those linked to the other Commissions) have been:

- 2014 to date; "Proposal for standardizing tactile symbology for Latin America: application to cartography for tourism" Enrique Pérez, UTEM
- 2017; Identification and analysis of alternatives and stages aimed at improving the quality of the periodic journal publications of the PAIGH"; Hermann Manriquez, UCV
- 2017; "Usability of SDI Geoportals; assessment by means of eye-tracking", Maria Ester Gonzalez, UDEC.
- 2018; "Historical Atlas of America - Indigenous Peoples", Luis Valenzuela, UAI

PART THREE: STATE AND PUBLIC INSTITUTIONS

3.1. Military Geographic Institute of Chile - IGM

www.igm.cl	**INSTITUTO GEOGRAFICO MILITAR DE CHILE** Nueva Santa Isabel 1651 Santiago Región Metropolitana
Telephone	(56) – 2 – 24109300 / (56) – 2 – 24109308
E-mail for sales	ventas@igm.cl; compras@igm.cl
Web Map Viewer	http://200.27.184.149/IGMChile/ (needs Adobe Flash Player v. 10)

3.1.1. Introduction

The Military Geographic Institute (IGM) is the principal cartographic agency of Chile, being the official authority representing the state in matters involving geography, surveying and maps of Chilean territory. Its mission is to maintain the fundamental base cartography of Chilean terrestrial territory, together with other tasks involving the geo-sciences. The IGM is attached to the Army of Chile and staffed by a mix of uniformed and civilian personnel.

3.1.2. Reference Systems

The standard reference framework for accurate horizontal positioning in Chile is the “National Geodesic Network” (RGN in Spanish initials). The RGN is integrated with the international geodesic program covering the whole of the American continents called “Geocentric Reference System for the Americas” or SIRGAS in Spanish initials; for this reason the RGN is now known as “RGN SIRGAS-Chile”. The IGM uses SIRGAS-Chile as a framework for survey information and cartography. There is also a gravity network made up of both absolute and relative gravity stations and relative.

3.1.3. Main Map Series

The central production process of the IGM concerns the coverages of Chilean territory in map series portraying the relief and major physical terrain features.

The primary map series up until this period has been the 1:50,000 series, which covers all of continental (i.e. South American) Chile. Of these, the great majority are available for purchase in both printed and digital media. Of the remainder, many are available to the general public in digital media only.

The 1:250,000 scale series covers continental Chile with sheets available in printed format. Some years ago these were converted from the previous Datum, PSAD-56 to the newer SIRGAS-Chile Datum.

There are also older map coverages at 1:25,000 and 1:100,000, scales, which cover selected areas of Chile, while the 1:500,000 scale series covers the whole of continental Chile.

3.1.4. Current Cartographic Projects

The central cartographic production process has recently undergone substantial change (compared to the process applied to the earlier 1:50.000 and 1:250.000 map series) as a result of a new map coverage of Chilean territory at 1:25.000 scale, which uses remote sensing data as the main source. Currently this program has entered the final phases of production.

Previous reports to the ICA have referred to the development of the Integrated Information System for Emergencies (SIIE); currently this system is being reconfigured.

A major change for the IGM has been to overhaul the whole of the quality management system that governs the main production process, to adapt it to the ISO 9001 standard of 2015. The system had already been set up and certified under the previous ISO 9001 standard several years previously. After updating the documentation and retraining the internal auditors and personnel, recertification under the standard of 2015 was achieved in July of 2019.

3.1.5. Some Recent Publications of the IGM

Among the topographic maps of physical terrain, the map of “Isla Rey Jorge” (King George island in Antarctica) at 1:100,000 scale, was published in the year 2018. Based on multiple sources, it has a bilingual legend.

The map titled "Political and Administrative Map of Chile" (1:2.200.000 scale, printed paper) has been updated; the version issued in 2018 now includes the latest important change to the internal boundaries (a new region in central Chile). Other maps showing the whole of continental Chile at 1.3.000.000 and 1:6.000.000 scales were also updated for publication in 2018.

The atlas developed by the IGM jointly with the Catholic University (see point 4.2.2) has been made available for sale to the general public from 2016 onwards.

3.2. Hydrographic and Oceanographic Service of the Chilean Navy – SHOA

www.shoa.cl	**SERVICIO HÍDROGRÁFICO Y OCEANOGRÁFICO DE LA ARMADA – SHOA** Calle Errázuriz 254, Playa Ancha, Valparaíso V Región
Telephone	(56) – 32 – 2266666
E-mail – general information	shoa@shoa.cl

3.2.1 Introduction

The Hydrographic and Oceanographic Service of the Navy (SHOA), among other duties, performs hydrographic surveys and produces the official nautical cartography of Chile.

During this period operations have continued to obtain data from the field by surveys on land along the coast and by bathymetric surveys. Aerophotogrammetric and bathymetric survey data has been processed to update a range of maps and produce a range of nautical and navigation cartography on paper and as electronic charts. At sea, naval vessels carry SHOA echo sounding equipment to survey and map the ocean floor in Chilean territorial waters.

Another responsibility of the SHOA is to manage the national network, along the coasts, of tide and sea level gauges which, among other benefits, contributes to the frame of vertical reference for accurate mapping.

3.2.2 Report from the SHOA and list of Maps Published in this Period

The Director of the SHOA, Admiral Patricio Carrasco Hellwig, sent a special report for inclusion in this report; this consists mainly of the list of publications for the years 2016 to 2018, covering paper, electronic, “CITSU” format and other publication formats.

The report is as follows:

1.- Cartas Náuticas de Papel (Paper Nautical Chart):

CARTA N°	NOMBRE	ESCALA	AÑO
10211	Canal Trinidad Puerto Alert.	1 : 15.000	2016
1323	Mejillones. Aproximación a Caleta Michilla.	1 : 15.000	2016
1324	Mejillones. Caleta Michilla.	1 : 5.000	2016
9920	Isla Taggart a Canal Trinidad.	1 : 60.000	2016
5312	Radas Pelluhue y Curanipe y Buchupureo.	1 : 15.000	2016
	Radas Buchupureo.	1 : 15.000	2016
13100	Canal Beagle. Canal Murray a Puerto Williams.	1 : 80.000	2016
	Paso Mackinlay.	1 : 40.000	2016
1000	Rada de Arica a Bahía Mejillones del Sur.	1 : 500.000	2016
8910	Lago General Carrera.	1 : 100.000	2016
	Puerto Río Tranquilo.	1 : 40.000	2016
	Puerto Ingeniero Ibáñez a Chile Chico.	1 : 60.000	2016
	Puerto Guadal.	1 : 20.000	2016
9420	Lago O´Higgins.	1 : 70.000	2016
	Puerto Bahamóndez.	1 : 15.000	2016
	Puerto Candelario Mancilla.	1 : 15.000	2016
10750	Canal Smyth. Isla Bedwell a Islas Green.	1 : 30.000	2016
10760	Canal Smyth. Islas Green a Paso Tamar.	1 : 30.000	2016
15350 / INT. 9104	Territorio Chileno Antártico. Estrecho Gerlache, Islote Useful a Isla Wednesday.	1 : 50.000	2016
2111	Rada de Antofagasta.	1 : 10.000	2016
10700	Canal Sarmiento, Estrecho Collingwood y Canal Smyth.	1 : 100.000	2016
12810	Isla Tierra del Fuego. Canal Beagle. Brazos Noroeste y Sudoeste.	1 : 80.000	2016
10300	Canal Wide a Canales Concepción e Inocentes.	1 : 100.000	2016
5212	Puerto Constitución y Rada Llico. Puerto Constitución.	1 : 20.000	2017
	Puerto Constitución y Rada Llico. Rada Llico.	1 : 20.000	2017
5112	Punta Ángeles a Rada Quintay.	1 : 20.000	2017
13112	Fiordo Fouqué.	1 : 20.000	2017
15340 / INT. 9103	Bahía Markmann a Bahía Andvord.	1 : 50.000	2017
6241	Bahía y Puerto Corral.	1 : 20.000	2017
	Puerto Corral.	1 : 10.000	2017
12711	Canal Ocasión, Paso Aguirre y Caletas Burnt y Ancha. Canal Ocasión.	1 : 20.000	2017
	Canal Ocasión, Paso Aguirre y Caletas Burnt y Ancha. Paso Aguirre.	1 : 20.000	2017
	Canal Ocasión, Paso Aguirre y Caletas Burnt y Ancha. Caletas Burnt y Ancha.	1 : 20.000	2017
5115	Puerto San Antonio.	1 : 5.000	2018

6224	Lago Budi.	1 : 20.000	2018
	Puerto Domínguez.	1 : 5.000	2018
9700	Archipiélago Wellington. Canal Fallos. Islas Bynoe a Isla Knorr.	1 : 100.000	2018
	Canal Albatross. Angostura Alemana.	1 : 15.000	2018
10500	Canales Sarmiento, Esteban, Castro, García Domínguez.	1 : 100.000	2018
9800	Canales Fallos y Ladrillero. Canal Adalberto a Golfo Ladrillero.	1 : 100.000	2018
	Paso The Kinck.	1 : 40.000	2018

2.- Cartas Náuticas Electrónicas (Electronic Nautical Chart):

CARTA N°	CELDA	NOMBRE	ESCALA	AÑO
14220	CL3MA820	Estrecho Nelson.	1 : 45.000	2016
	CL4MA950	Caleta Armonía.	1 : 22.000	2016
12720	CL4MA720	Canal O´Brien y Paso Timbales.	1 : 22.000	2016
6110	CL3BB010	Bahías Concepción y San Vicente.	1 : 45.000	2016
	CL5BB005	Puerto Tomé.	1 : 12.000	2016
7360	CL4LL055	Fiordo Reñihué.	1 : 45.000	2016
	CL5LL056	Caleta Ayacara.	1 : 12.000	2016
	CL5LL057	Caleta Buill.	1 : 12.000	2016
	CL5LL058	Caleta Gonzalo.	1 : 12.000	2016
10327	CL4MA150	Canal Tres Cerros.	1 : 22.000	2016
9520	CL4AI210	Fiordos Eyre, Falcon y Exmouth.	1 : 22.000	2016
	CL5AI120	Caleta Oyarzún.	1 : 12.000	2016
4100	CL3CO010	Punta Poroto a Punta Lengua de Vaca.	1 : 90.000	2016
1323	CL5AN011	Aproximación a Caleta Michilla.	1 : 12.000	2016
1324	CL6AN005	Caleta Michilla.	1 : 4.000	2016
10642	CL5MA340	Bahía Año Nuevo.	1 : 12.000	2016
8412	CL5AI080	Puertos en el Canal Moraleda. Puerto Ballena.	1 : 12.000	2016
	CL5AI081	Puertos en el Canal Moraleda. Puerto Nassau.	1 : 12.000	2016
	CL5AI082	Puertos en el Canal Moraleda. Puerto Cuptana.	1 : 12.000	2016
	CL5AI083	Puertos en el Canal Moraleda. Puerto Francés.	1 : 12.000	2016
10325	CL5MA200	Fondeaderos en el Canal Concepción. Bahía Portland.	1 : 8.000	2016
	CL5MA210	Fondeaderos en el Canal Concepción. Bahía Hugh.	1 : 12.000	2016
	CL5MA220	Fondeaderos en el Canal Concepción. Bahía Tom.	1 : 12.000	2016
12400	CL3MA631	Canales Magdalena, Cockburn y Adyacentes (Celda Oeste).	1 : 90.000	2016
	CL3MA632	Canales Magdalena, Cockburn y Adyacentes (Celda Centro-Oeste).	1 : 90.000	2016
	CL3MA633	Canales Magdalena, Cockburn y Adyacentes (Celda Centro-Este).	1 : 90.000	2016
	CL3MA634	Canales Magdalena, Cockburn y Adyacentes (Celda Este).	1 : 90.000	2016
11512	CL5MA600	Bahía Gregorio. Puerto Sara.	1 : 12.000	2016
9920	CL3AI901	Canal Picton. Isla Taggart a Canal Trinidad (Celda Norte).	1 : 45.000	2016
	CL3AI902	Canal Picton. Isla Taggart a Canal Trinidad (Celda Sur).	1 : 45.000	2016
9921	CL5AI900	Canal Picton. Paso Picton.	1 : 12.000	2016
9922	CL5AI910	Puertos en el Canal Picton. Puerto Payne.	1 : 8.000	2016
	CL5AI920	Puertos en el Canal Picton. Bahía Clara.	1 : 8.000	2016
10211	CL5MA100	Canal Trinidad. Puerto Alert.	1 : 12.000	2016
10200	CL3MA130	Canal Trinidad. .	1 : 90.000	2016

10700	CL3MA201	Canal Sarmiento, Estrecho Collingwood y Canal Smyth.	1 : 90.000	2017
	CL3MA202	Canal Sarmiento, Estrecho Collingwood y Canal Smyth.	1 : 90.000	2017
	CL3MA203	Canal Sarmiento, Estrecho Collingwood y Canal Smyth.	1 : 90.000	2017
	CL3MA204	Canal Sarmiento, Estrecho Collingwood y Canal Smyth.	1 : 90.000	2017
10750	CL4MA250	Canal Smyth. Isla Bedwell a Islas Green.	1 : 22.000	2017
	CL4MA251	Canal Smyth. Isla Bedwell a Islas Green.	1 : 22.000	2017
10760	CL4MA261	Canal Smyth. Islas Green a Paso Tamar.	1 : 22.000	2017
	CL4MA262	Canal Smyth. Islas Green a Paso Tamar.	1 : 22.000	2017
2111	CL5AN015	Rada de Antofagasta.	1 : 8.000	2017
10500	CL3MA191	Canales Sarmiento, Esteban, Castro, García Domínguez (Celda Norte).	1 : 90.000	2017
	CL3MA192	Canales Sarmiento, Esteban, Castro, García Domínguez (Celda Sur).	1 : 90.000	2017
10730	CL4MA200	Estrecho Collingwood y Canal Smyth. Paso Victoria a Paso Summer.	1 : 45.000	2017
9541	CL4AI400	Fiordo Ringdove, Caletas Chacabuco y Richmond.	1 : 22.000	2017
9542	CL5AI125	Fiordo Gage.	1 : 12.000	2017
	CL5AI126	Fiordo Antrim.	1: 12.000	2017
13143	CL6MA700	Puerto Williams, Muelle Guardián Brito y Arturo Prat.	1 : 1.000	2017
12810	CL4MA750	Isla Tierra del Fuego. Canal Beagle. Brazos Noroeste y Sudoeste (Celda Oeste).	1 : 45.000	2017
	CL4MA751	Isla Tierra del Fuego. Canal Beagle. Brazos Noroeste y Sudoeste (Celda Este).	1 : 45.000	2017
5212	CL5VA022	Puerto Constitución.	1 : 12.000	2017
	CL5VA023	Rada Llico.	1 : 12.000	2017
5112	CL5VA017	Punta Ángeles a Rada Quintay.	1 : 12.000	2017
5114	CL5VA020	Aproximación a Puerto San Antonio.	1 : 8.000	2018
5115	CL6VA020	Puerto San Antonio.	1 : 4.000	2018
13112	CL5MA720	Fiordo Fouqué.	1 : 12.000	2018
15340	CL4MA956	Bahía Markmann a Bahía Andvord (Celda Norte).	1 : 45.000	2018
	CL4MA957	Bahía Markmann a Bahía Andvord (Celda Sur).	1 : 45.000	2018
12711	CL5MA650	Canal Ocasión, Paso Aguirre y Caletas Burnt y Ancha. Canal Ocasión.	1 : 12.000	2018
	CL5MA651	Canal Ocasión, Paso Aguirre y Caletas Burnt y Ancha. Caletas Burnt y Ancha.	1 : 12.000	2018
	CL5MA652	Canal Ocasión, Paso Aguirre y Caletas Burnt y Ancha. Paso Aguirre.	1 : 12.000	2018
6241	CL5LL005	Bahía y Puerto Corral.	1 : 12.000	2018
	CL6LL005	Puerto Corral.	1 : 12.000	2018
5115	CL6VA020	Puerto San Antonio.	1 : 4.000	2018
9300	CL3AI301	Acceso Norte a Canal Messier. Boca de Canales a Isla Van Der Meulen.	1 : 90.000	2018
9400	CL3AI401	Acceso Sur al Canal Messier. Isla Van Der Meulen a Paso del Indio.	1 : 90.000	2018
9700	CL3AI701	Archipiélago Wellington. Canal Fallos. Islas Bynoe a Isla Knorr (Celda Norte).	1 : 90.000	2018
	CL3AI702	Archipiélago Wellington. Canal Fallos. Islas Bynoe a Isla Knorr (Celda Sur).	1 : 90.000	2018
	CL5AI701	Canal Albatross. Angostura Alemana.	1 : 12.000	2018
9800	CL3AI801	Canales Fallos y Ladrillero. Canal Adalberto a Golfo Ladrillero (Celda Norte).	1 : 90.000	2018
	CL3AI802	Canales Fallos y Ladrillero. Canal Adalberto a Golfo Ladrillero (Celda Sur).	1 : 90.000	2018
	CL4AI801	Paso The Kinck..	1 : 22.000	2018

3.- Cartas de Inundación por Tsunamis (Tsunami Inundation Chart):

CARTA N°	NOMBRE	ESCALA	AÑO
TSU-VII-40	Constitución.	1 : 15.000	2016
TSU-VIII-20	Cobquecura.	1 : 7.000	2016
TSU-VIII-30	Boca Itata-Perales.	1 : 15.000	2016
TSU-VIII-40	Pingueral - Dichato – Coliumo.	1 : 10.000	2016
TSU-X-50	Maullín.	1 : 15.000	2016
TSU-XII-50	Punta Arenas.	1 : 7.000	2016
TSU-XII-80	Puerto Williams.	1 : 5.000	2016
TSU-IV-80	Los Vilos.	1 : 10.000	2017
TSU-V-25	Papudo.	1 : 10.000	2017
TSU-V-55	Laguna Verde.	1 : 5.000	2017
TSU-VIII-70	Chivilingo-Laraquete-Arauco.	1 : 20.000	2017
TSU-VIII-75	Tubul-Llico-Lavapié.	1 : 20.000	2017
TSU-XII-65	Porvenir.	1 : 5.000	2017
TSU-II-30	Michilla.	1 : 5.000	2018
TSU-V-65	Algarrobo.	1 : 10.000	2018
TSU-V-60	Quintay.	1 : 7.000	2018
TSU-V-70	Las Cruces-San Sebastián-Cartagena.	1 : 10.000	2018
TSU-VII-70	Pelluhue-Curanipe.	1 : 10.000	2018
TSU-VIII-77	Lebu.	1 : 10.000	2018
TSU-XI-50	Puerto Aysén	1 : 10.000	2018

4.- Publicaciones:

NOMBRE	AÑO
Anuario Hidrográfico y Oceanográfico de la Armada de Chile. Volumen 67, 2015.	2016
Taller CIMAR 21. Informes Preliminares.	2016
Anuario Hidrográfico y Oceanográfico de la Armada de Chile. Volumen 68, 2016.	2017
Taller CIMAR 22. Informes Preliminares.	2017
Anuario Hidrográfico y Oceanográfico de la Armada de Chile. Volumen 69, 2017.	2017
Taller CIMAR 23. Informes Preliminares.	2018
Hydrographic and Oceanographic Yearbook of The Chilean Navy, year 2017.	2018
La Oceanografía en Chile. Historia de un Desarrollo imperativo. 1ª edición.	2018

Note - some translations for the report from the SHOA:

Año: Year
Aproximación : route of approach
Bahía : bay
Caleta : small bay
Canal : channel, strait
Carta : chart
Celda : cell / map area
Desarrollo: development
Escala : scale
Estrecho : strait
Fiordo : fjord
Fondeaderos: anchorages
Informes : reports
Isla : island
Nombre : Name
Rada : cove, small bay
Taller : workshop
y : and

3.2.3 International Cooperation

The SHOA represents Chile in the International Hydrographic Organisation (IHO). It has also attended international conferences managed by the International Centre for Electronic Navigational Charts (IC-ENC).

3.3. Aero-Photogrammetric Service of the Air Force – SAF

www.saf.cl	SERVICIO AEROFOTOGRAMÉTRICO DE LA FUERZA AEREA – SAF	
	Corporate center	*Sales office*
	Av. Diego Barros Ortiz Nº 2300, Aeropuerto Arturo Merino Benítez, Pudahuel, Región Metropolitana	Avda. L. B. O'Higgins (Alameda) 1316 Of. 63, Santiago, Región Metropolitana
Telephone	(56) – 2 – 29769300	(56) – 2 – 29776344
E-mail – general information	ventas@saf.cl	
E-mail – contact for this report	viviana.barrientos@saf.cl	

3.3.1 Introduction

The Aerophotogrammetric Service is the state agency, attached to the Chilean Air Force, responsible for creating and standardizing official aeronautical navigation cartography covering Chilean territory, also for providing the photogrammetric or satellite image coverages used in the creation of the official cartography of Chile. The Director of this service, Aviation colonel Francisco Pizarro aste, has provided the following report about the SAF in this period.

3.3.2 Report from the SAF

"INFORMATION FOR THE XXIX INTERNATIONAL CARTOGRAPHIC CONFERENCE (ICC)

II. NATIONAL REPORT

Among the activities and products made by the Aerophotogrammetric Service in the period from 2015 to 2019, there are:

A. Cartographic Products:
   1. 1:1,000,000 Aeronautical chart
      Fladerer Bay – "Unión" Glaciar (2016)
   2. 1:1,000,000 Aeronautical chart
      "Piloto Pardo" Island – Biscoe Island (2016)
   3. 1:2,000,000 Aeronautical chart
      Punta Arenas – Fildes Peninsula (2016)

B. Contacts:
   1. Administrative Contact
      Captain Cesar Molina Aguilar
      Head of Operational Management
   2. Sales Room
      Non-commissioned officer Luis Bernales Romero
      ventas@saf.cl
   3. Technical Contact
      Sergeant Oscar Zuñiga Betancourt
      oscar.zuniga@saf.cl

C. Geospatial Products:
   1. Development of innovative products

      LIDAR survey for preparing the "Electronic Terrain and Obstacle Data" (e-TOD) for the "Andrés Sabella" International Airport of Antofagasta.

      The electronic data of the terrain and the vertical obstacles (e-TOD) are a digital portrayal of the terrain and of obstacles on it. This includes the horizontal and vertical extents of natural and artificial features; these are provided as a dataset intended for satisfying the needs of flight safety in the areas around airports and for other aerial and terrestrial applications.

2. Announcing and distributing knowledge of and capabilities for geospatial information.

   In April of the year 2018, the Aerophotogrammetric Service held the fourth international scientific conference "Latin American Remote Sensing Week – LARS", an event intended for encouraging the use of remote sensing and geospatial data, for the understanding of phenomena that occur in geographic spaces, thus facilitating management of the territory and decision making.

   We would request that this event be made known to the community of specialists who participate in the ICC 2019. The fifth LARS event will be held between the 31st of March and the 3rd of April of the year 2020, as part of the activities of the International Air and Space Fair – FIDAE.

3. Implementation of Standards

   The SAF is at present developing a model for quality assurance for geospatial information, which covers the life cycle of the cartographic product, quality control, traceability, standardization and inter-operability, using as a frame of reference the international ISO 9001 standard, the standards of ISO Technical Committee N° 211 and the use of tools for statistics, for the purpose of documenting and understanding the quality of the spatial data being created.

   The model covers the design of the product, the creation of the product and, if this is required, incorporating protocols that ensure that these products or services announced in web sites are 100 % interoperable. In order to guarantee their correct functioning, a quality assurance system is being built, based on the ISO 9001 and ISO 19158 standards.

   ISO 19157 is being used to assess, quantitatively and qualitatively, the features that make up the cartographic product or service, reporting the results for positional accuracy, logical consistency, completeness, temporal accuracy, among others, for real knowledge of the parameters of each geospatial product or service that this Service creates.

4. Training Courses

   In the period indicated, the SAF has run the following training courses, both of its own personnel and of specialists from other Chilean organizations:

   - Course of internal auditor of processes, intended for obtaining a sufficient amount of human resources from which to draw the auditors for geospatial information management processes.
   - Course in photo-interpretation, intended for supporting institutions in the defense sector and public organizations in order to have available photo-interpreters in various areas of geographic knowledge.
   - Course in Geospatial Sciences and Geomatics Sciences, aimed at obtaining sufficient human resources as support for military operations.

Javier Carrasco Vergara
Acting Head of Development and Projects"

3.3.3 Background Information

The main cartographic products of the SAF are:

- Processed satellite images, panchromatic or multi-spectral
- Images of aerial photography, which may be georeferenced, ortho-rectified, or combined into mosaics
- Ortho-images
- Image-based cartography (vector map objects overlaid on a georeferenced base of images from aerial photography)
- Aeronautical maps oriented to flight planning and in-flight navigation

– Digital vector cartography, oriented to various user sectors
– Digital Elevation Models

The SAF has shared with other state institutions the products obtained from the SSOT program and the Chilean satellite. The “Satellite System for Terrestrial Observation” – SSOT - was the first remote sensing system to be commissioned, operated and owned by the Chilean state. A satellite launched in 2011 is operated by the Chilean Air Force while the SAF continues to handle the requests from user-clients from various sectors in Chile.

3.4. Agriculture Ministry and Dependant Agencies

3.4.1 Natural Resources Information Center - CIREN

www.ciren.cl	**CENTRO DE INFORMACION DE RECURSOS NATURALES – CIREN** Avenida Manuel Montt 1164 Providencia Región Metropolitana
Telephone	(56) – 2 – 2008900
Fax	(56) – 2 – 2008900
E-mail – general information	*Form on web site*

CIREN is a state institution attached to the Agriculture Ministry dedicated to creating, gathering, maintaining and updating information related to natural resources and agriculture.

The range of products developed and supplied by CIREN include, especially, cartography with a base deriving from aerial orthophotographs and satellite images, overlaid with thematic data portraying thematic, georeferenced information such as :

- Surveys of fruit-production, with quantification of the productive areas.
- Cadastral data and boundaries for properties in agricultural and livestock uses, related to legal and taxation criteria.
- Land use classifications
- Erosion of land (real and potential)
- Soil types
- Climatic districts and their suitability for agricultural use
- Hydrogeological data, watercourses and basins, irrigation channels, reservoirs and other water resources
- Some studies of vegetation types for specific areas
- Basic environmental information intended for use in environmental impact assessments

CIREN has the capacity to generate vector cartography over the image bases. It can also processimulti-spectral and hyper-spectral remote sensing images to determine vegetation types and their areal coverage. Points surveyed in the field are incorporated to georeference spatial data and determine UTM coordinates for the whole map/image. Clients can request a digital map of a specific area in which the thematic detail in the vector layer sis linked to alphanumeric data, such as the register and code Chilean Internal Taxation Service (SII).for a specific agricultural property.

CIREN also runs training courses available to organisations in Chile.

The previous report to the ICA (2011 – 2015) has listed some of the projects, on-line resources and publications of the CIREN, thus indicating its interests and capabilities.

3.4.2. National Forestry Corporation – CONAF

www.conaf.cl	**CORPORACION NACIONAL FORESTAL – CONAF** Paseo Bulnes 285 Santiago Región Metropolitana Chile
Telephone – general information	(56) - 2 - 26630000 / (56) - 2 – 26630269
E-mail – general information	consulta.oirs@conaf.cl; sit@conaf.cl
Geoportal	sit.conaf.cl

The "Corporacion Nacional Forestal" (National Forestry Corporation – CONAF) has stated (for a previous report to the ICA) that it is "… the institution dependent on the Agriculture Ministry, responsible for contributing to the development of the country through the sustainable management of forest ecosystems and the mitigation of the effects of climate change, by encouraging the development of and monitoring compliance with legislation on forest and environmental issues, the protection of vegetation resources and the management of the protected woodland areas of the State".

CONAF continues to gradually update its maps of land use and vegetation classifications portraying various locations. It uses its geospatial datasets for management of natural woodland reserves, information on the industrial forestry sector, surveys of biodiversity resources, and the handling of forest fires. A large part of these holdings is available to the public through the Territorial Information System 'SIT-CONAF', which is accessible to the public as a web map server.

In recent years CONAF has mapped and classified (by land use and vegetation types) several key areas of Chile with a minimum mappable area of 0.5 hectares, using satellite images.

3.4.3. Office of Agrarian Studies and Policies – ODEPA

Official Name:	**Oficina de Estudios y Políticas Agrarias –** ODEPA Ministerio de Agriculture
Address:	Teatinos 40 piso 8, Santiago, Región Metropolitana
Geoportal:	http://icet.odepa.gob.cl/
Telephone:	(56) – 2 – 2397 3000

The Office of Agrarian Studies and Policies – ODEPA - is part of the Ministry of Agriculture and is responsible for researching, preparing and distributing the technical and scientific information required for the formulation of policies in the fields of agriculture, forestry and fisheries. The ODEPA has published a very large part of the documentation and cartography that it handles through a portal at http://icet.odepa.gob.cl/ and the "ICET" (sistema de Consulta Estadístico Territorial) system; this includes a map viewer for certain datasets and also access to catalogues of maps for download.

3.5 National Geological and Mining Service – SERNAGEOMIN

www.sernageomin.cl	**SERVICIO NACIONAL DE GEOLOGÍA Y MINERIA – SERNAGEOMIN** Avenida Santa Maria 0104 Providencia Región Metropolitana
Telephone	(56) - 2 - 482 55 00
E-mail – general information	comunicaciones@sernageomin.cl

In a previous report, SERNAGEOMIN has stated that “the National Geology Division of SERNAGEOMIN, is responsible for developing geological knowledge and the production of thematic cartography at governmental level, mainly in basic geology, geological hazards, mineral resources, geophysics, geothermal aspects, hydrogeology and territorial planning.”

SERNAGEOMIN continues to maintain, update and expand its large collection of thematic maps and geospatial datasets that include:

- a 1:100,000 scale series on the basic geology of Chilean territory
- a 1:100,000 scale series on the theme of geophysics (made by gamma-ray spectrometry of the magnetic field of certain metals in the upper rock strata)
- a 1:250,000 scale series on the theme of geo-chemistry (made by sampling for the presence of heavy metals and other chemical elements)
- maps of zones with natural hazards, used in preparations for risks and catastrophes

Recent publications include these two maps:

- “Peligros del Volcán Tupungatito” (hazards around tupungatito volcano), 2018, scale 1:50,000, of an area in the Metropolitan Region (central Chile), part of the “Geological Cart of Chile” map series, with ISSN 0717-7305. Felipe Flores L. and Gabriela Jara A. named as lead authors.

- “Geología de las áreas Guanta-Los Cuartitos y Paso de Vacas Heladas” (geology of the “Guanta-Los Cuartitos” and “Vacas Heladas” Pass areas), 2017, scale 1:50,000, of an area in the Atacama and Coquimbo Regions (northern Chile), part of the “Geological Cart of Chile” map series, with ISSN 0717-7283. Ismael Murillo R., Ricardo Velásquez H., Christian Creixell T., named as lead authors.

The on-line resources of SERNAGEOMIN made available to the public include these web sites:

Geoportal	http://portalgeo.sernageomin.cl/geoportal/
On-line sales catalogue	http://tienda.sernageomin.cl/tiendavirtual/
On-line library index	http://biblioserver.sernageomin.cl/opac/index.asp

3.6. Other Government Ministries and Specialized Agencies

3.6.1. National Statistics Institute - INE

www.ine.cl	**INSTITUTO NACIONAL DE ESTADÍSTICAS** Morande 801 Santiago Región Metropolitana
Telephone	(56) - 2 – 32461010
E-mail – general information	ine@ine.cl

The National Statistics Institute – INE – is the governmental agency that provides official statistics and manages the official census. INE organizes a large part of its statistical research and publications using maps of Chile’s local political-administrative divisions, urban plans identifying individual blocks between streets, and other sources adapted for census tasks by a small in-house unit with capability for geospatial information handling.

The INE has made available through its web site “Geodatos Abiertos INE” at http://geoine-ine-chile.opendata.arcgis.com), an on-line system presenting a series of thematic maps of Chilean territory based on census data.

3.6.2. Ministry of Public Works - MOP

Official Name:	**Ministerio de Obras Públicas** - MOP
Address:	Morandé 59, Santiago, Región Metropolitana
Web sites:	www.mop.cl, www.vialidad.cl, www.dga.cl
Telephone:	(56) – 2 - 2449 4000

The Ministry of Public Works (MOP) uses geo-spatial data for engineering and surveying purposes involving the country's transport networks, water resources, and public works in general. The Division responsible for the roads and highways ("Dirección de Vialidad") manages the map server at www.mapas.mop.cl.

The Division responsible for supervising water resources (extraction, collection, measuring tasks, distribution, and removal networks for all kinds of water) has published spatial data showing the water networks (natural and artificial), local rights to and restrictions on water extraction, and glaciar locations through the web page http://snia.dga.cl/observatorio/.

3.6.3. National Office for Frontiers and Limits of the State - DIFROL

Official Name:	**Dirección Nacional de Fronteras y Limites del Estado** – DIFROL
Address:	Teatinos 180 piso 7, Santiago, Región Metropolitana
Web site:	https://difrol.gob.cl
Telephone:	(56) – 2 - 2827 5900
E-mail :	infodifrol@minrel.gov.cl

The National Office for Frontiers and Boundaries of the State (DIFROL) is where maps, charts and geo-spatial products are checked to ensure that they comply with Chilean laws[2], [3], before they are authorized for distribution or sale in Chile.

DIFROL has made available to the public part of the geo-referenced material it works with at its geoportal located through the link on its home page at "IDE-DIFROL" or "Ver Más".

3.6.4 Environment Ministry

Official Name:	Ministerio del Medio Ambiente
Addresses:	San Martin 73, Santiago, Región Metropolitana
SINIA Geoportal:	http://ide.mma.gob.cl/produccion/
Telephone:	(56) – 2 - 25735600

The Environment Ministry manages thematic data involving environmental impact studies and runs the system known as the National Environmental Information System – SINIA - a collection of documents and information services about environmental issues, resources, nature reserves and protected biodiversity areas. The spatially referenced information can be accessed through the public map server accessed at "Sistema de Mapas" on the SINIA Geoportal and located at ://ide.mma.gob.cl; this provides several thematic coverages over a base map of Chile.

3.6.5. National Emergency Office – ONEMI

Official Name:	**Oficina Nacional de Emergencia –** ONEMI
Address:	Beaucheff 1671, Santiago, Región Metropolitana
Web site:	www.onemi.gov.cl
Telephone:	(56) – 600 586700

[2] "Decreto con Fuerza de Ley Nº 5: Reglamenta la internación de mapas y cartas geográficas", Ministerio de Relaciones Exteriores, law decree, 1963.
[3] "Decreto con Fuerza de Ley Nº 83: Estatuto organica de DIFROL", Ministerio de Relaciones Exteriores, 1979.

The National Emergency Office, attached to the Interior Ministry, is the agency responsible for coordinating the actions of the state in relation to natural disasters; it advises on preparations that mitigate the effects of natural hazards, coordinates the immediate response to a crisis, and advises on recovery from disasters. Natural hazards considered here include earthquakes, tsunamis, volcanic eruptions, large-scale fires across both forested and urban areas, mudslides, and floods.

Within the ONEMI, there are specialists handling geographic information and providing access, through the web site ://geoportalonemi.maps.arcgis.com/, to a collection of spatial coverages that show, for each urban conurbation, community and settlement, the local zones of hazard or risk, along with the relevant evacuation routes and safe zones in case of emergenciess.

3.7 Regional and Local Government Bodies

3.7.1. Regional and local bodies, and the influence of the Chilean NSDI

Chile has three levels of local government; firstly the Regions, then the Provinces, and the Borough or Municipal units at the lowest level. There has been significant consolidation of earlier achievements guided mainly by the “IDE-Chile” (Chilean NSDI) network, making progress in capabilities and resources for handling spatial data. Some of the spatial data from these regional and local bodies reaches the public either through the IDE-Chile Geoportal or from map servers, portals or web sites set up by these regional and local authorities themselves. The web page www.ide.cl/ides-en-chile/regionales.html lists some of the regional geonodes.

PART FOUR: ACADEMIC, EDUCATIONAL AND TRAINING SECTOR

4.1 Metropolitan Technological University – UTEM

UTEM http://www.utem.cl/	Departamento de Cartografía, Facultad de Humanidades y Tecnologías de la Comunicación Social, **UNIVERSIDAD TECNOLÓGICA METROPOLITANA** San Ignacio 171 Santiago Región Metropolitana
Telephone	(56) – 2 – 27877630 / 27877507
E-mail – general information	jespinoz@utem.cl

4.1.1. Introduction

The Metropolitan Technological University (UTEM) contains the leading center in Chile for cartography in the academic sector. The School for Cartography runs a five-year course in cartography and geomatics leading to a degree as professional cartographer. The Cartography Department staff manage activities aimed at research and development, including a considerable contribution to the programs of the PAIGH.

4.1.2 International Cooperation

At international level one of the leading academics of the School and Department for Cartography was been President of the PAIGH Cartography Commission from 2006 up to November 2013. The same person, Alejandra Coll, was elected to be Chair of the ICA Commission on Maps and Graphics for the Blind in the General Assembly of 2011; she has continued in this post until this year, when she is due to hand this commission over (to a new Chair to be elected at the General Assembly of 2019).

4.1.3. Center for Tactile Cartography of the UTEM

Centro de Cartografía Táctil - UTEM	Programa Centro de Cartografía Táctil, Facultad de Humanidades y Tecnologías de la Comunicación Social, **UNIVERSIDAD TECNOLÓGICA METROPOLITANA** Dieciocho 414 Santiago Región Metropolitana
Telephone	(56) – 2 – 27877362 / 2 7877361
Web page	vtte.utem.cl/centro-de-cartografia-tactil/
E-mail	ctactil@utem.cl; acoll@utem.cl

The Center for Tactile Cartography (CECAT) is a research center attached to the Metropolitan Technological University and its Faculty for Humanities and Social Communications Technologies, with links to the Cartography Department. It performs research and training in the area of tactile cartography, multi-sensorial communication and educational techniques in these areas for persons with special needs. The CECAT produces tactile maps and materials oriented to the blind and the visually handicapped. It is the only academic center in Chile dedicated to this area, and has become a leader in its field at regional level through its contacts in Latin America.

The Pan American Institute for Geography and History (PAIGH, see 2.2) has for many years supported several joint projects involving tactile cartography, so the CECAT has worked in collaboration with other centers in Latin America. Since 2011, the Director of the CECAT, Prof. Alejandra Coll, has been the Chair of the ICA Commission on Maps & Graphics for Blind and Partially Sighted People, so the CECAT has been the location for meetings of this Commission. Several of the activities described in the annual bulletins of this Commission of the ICA have involved the CECAT; these include the preparation of the book “Guía Metodológica: Enseñanza y Aprendizaje del Espacio Mediante el Tacto” (methodological guide: teaching and learning about space by touch), which has been a major project of the CECAT and was published by the UTEM in late 2017 with the patronage of the ICA. The book was then distributed during 2018.

4.2. Universities with Geosciences Courses and Research Centers

4.2.1. Bernardo O’Higgins University

www.ubo.cl	Facultad de Ingenierìa, Ciencia y Tecnología, **UNIVERSIDAD BERNARDO O’HIGGINS** Avenida Viel 1497 / Ruta 5 Sur, Santiago Región Metropolitana
Telephone	(56) – 600 366 5555
E-mail	fabiola.barrenechea@ubo.cl

This University, through the Engineering and Management Faculty, runs a five-year course for students to qualify at Engineering level in Surveying and Cartography (“Ingeniería en Geomensura y Cartografía”).

4.2.2 Catholic University of Chile – PUC

http://geografia.uc.cl/	Instituto de Geografía, Facultad de Historia, Geografía y Ciencia Política, **PONTIFICIA UNIVERSIDAD CATOLICA DE CHILE** Campus San Joaquin Avenida Vicuña Mackenna 4860 San Joaquin Región Metropolitana
Telephone	(56) – 2 – 23544716
E-mail	Contact form on web site

The Geography Institute, within the Faculty for History, Geography and Political Sciences, runs a five-year full-time first degree course in geography, also a two-year part-time postgraduate course in Geography and Geomatics; these courses contain substantial cartographic content. In addition, the Institute has run Diploima and training courses in geomatics, GIS and geodatabases. The Geography Institute also continues to sustain a range of academic, scientific and applied research activities and to publish its findings and activities.

The atlas mentioned in the previous report to the ICA, titled "Policy in spatial extent; Historical atlas of the political - administrative divisions of Chile 1810-1940", was published in 2017. The research and publication involved academics of the Catholic University in a project perfromed jointly with the Military Geographic Institute of Chile (IGM) and the Chilean Central Office for Libraries, Archives and Museums (DIBAM). The atlas is about the internal administrative boundaries of Chile during the nineteenth and early twentieth centuries, covering the history and spatial location of units such as provinces.

4.2.3. University of Chile

www.geografia.uchilefau.cl	Departamento de Geografía Facultad de Arquitectura y Urbanismo **UNIVERSIDAD DE CHILE** 3º Nivel, Torre Chica Portugal 84 Santiago Región Metropolitana
Telephone	(56) – 2 – 29783095
E-mail – general information	sec_geografia@uchilefau.cl

The Geography Department, within the Faculty for Architecture and Urban Development, continues to run first degree and post-graduate courses in geography, with a substantial cartographic content.

4.2.4. University of Santiago

www.digeo.usach.cl	Departamento de Ingeniería Geográfica, Facultad de Ingenería **UNIVERSIDAD DE SANTIAGO DE CHILE - USACH** Enrique Kirberg Baltiansky 03 Estación Central Región Metropolitana
Telephone	(56) - 2 - 2718 2200 / 2718 2202 / 718 2206
E-mail – general information	yessica.ugarte@usach.cl

The University of Santiago Engineering Faculty includes the Department of Geographic Engineering. The courses it runs include:

- Civil engineering in Geography –six years, for a first engineer-level degree
- Engineering in Surveying - four years, for a first degree as surveyor
- Diploma courses in quality management of geospatial information, in organization of territorial information and in surveying with drones.

In addition, this department manages research projects and it has facilities for both learning and research activities in the fields of GIS, remote sensing photogrammetry, geodesy, surveying and data processing.

4.2.5. University of Concepción

Official Name	Departamento de Geografía, Facultad de Arquitectura Urbanismo y Geografía, **UNIVERSIDAD DE CONCEPCIÓN**	Departamento de Ciencias Geodésicas y Geomática, **UNIVERSIDAD DE CONCEPCIÓN**
Address:	Barrio Universitario, Concepción, VIII Región	J.A. Coloma 0201, Los Angeles, VIII Región
Web site:	http://faug.udec.cl/	www.geomatica.udec.cl
Telephone:	(56) - 41-2203233	(56) - 43 – 405206
E-mail :	mfarias@udec.cl; patriciasaez@udec.cl	geomatic@udec.cl

Several courses at this university include components covering cartographic and geospatial information handling techniques; the courses include a first degree course for professional Geographers at the Concepción campus, a degree course in Geomatics Engineering at the Los Angeles campus, and a diploma course in “Geomatics Applied to Territorial Planning”.

Among the research centers attached to the University of Concepción, the Geomatics section, part of the “EULA-Chile” Environmental Sciences Center, has capabilities for managing spatial data and thematic mapping.

4.2.6. Catholic University of Valparaíso

Official Name:	**Instituto de Geografía – Pontificia Universidad Católica de Valparaíso**
Address:	Avenida Brasil 2241, Valparaíso, V Región
Web site:	www.geografia.ucv.cl
Telephone:	(56) – 32 – 2274081
E-mail :	direccion.geografia@pucv.cl & form on web site

At the Catholic University of Valparaiso (PUCV) and within its Faculty for Ocean Sciences and Geography, the Geography Institute runs a four-year first degree course in geography, with a substantial cartographic content. Research projects have included the processing and application of remote sensing images.

4.2.7. Adolfo Ibañez University

cit.uai.cl	Centro de Inteligencia Territorial **UNIVERSIDAD ADOLFO IBAÑEZ - UAI** Avda. Presidente Errazuriz 3471, Las Condes, Región Metropolitana
Telephone	(56) - 2 - 23311686

The Territorial Intelligence Center, attached to the Adolfo Ibañez University (UAI) conducts projects and research into geospatially referenced social, economic, demographic and urban issues via modeling and the use of a territorial database for the major cities of Chile. It also runs courses and seminars in related geosciences.

4.2.8 Center for Geomatics at the University of Talca

http://geomatica.utalca.cl	**CENTRO GEOMÁTICA – CENGEO, UNIVERSIDAD DE TALCA** Avda. Lircay s/n Talca VII Region
Telephone:	(56) – 71 – 2201580
E-mail – contact for this report	Form on web site

The Geomatics Center - CENGEO - is attached to the University of Talca and is focused on the practical applications in specific business, administrative and industrial sectors of data derived from aerial photography, satellites and geodesic/GPS surveying, using digital cartography, GIS, DEM, and spatial data modelling. CENGEO provides support to several of the University's courses by teaching the geomatics course components and by providing study facilities. It also provides specialized advice, consultancy and training services to entities outside the University of Talca and performs research projects with them.

In 2013, the director of the CENGEO, Carlos Mena, took over as chair of the Cartography Commission attached to the Chilean National Section of the Pan American Institute for Geography and History (PAIGH), and he currently continues in this role.

The CENGEO continues to publish articles resulting from its research projects; some of these have, in recent years, appeared in journals outside Chile, occasionally in English language.

4.3 Military Polytechnic Academy

www.acapomil.cl	**ACADEMIA POLITÉCNICA MILITAR – ACAPOMIL** Avenida Valenzuela Llanos 623 La Reina Región Metropolitana
Telephone:	(56) – 2 – 226683639 / (56) – 2 – 226683608

The Chilean armed forces provide, to its officers, training and education at university level at the 'Military Polytechnic Academy' (ACAPOMIL), which runs five-year full-time courses equivalent to University engineering courses. These start with a grounding in basic engineering subjects common to all the engineering courses, then starting to specialize; one of these specializations is titled 'Information and Communications Technological Systems', within which the options for final specialization includes 'Geography'. Those who complete the course including the geography specialization graduate as Military Polytechnic Engineers with skills in surveying, geography, cartography, remote-sensing, geo-informatics and allied disciplines in the geo-sciences.

5: THE PRIVATE SECTOR

5.1 The Private Sector: Overview

Cartography as a business and trade continues to evolve in the private sector as outlined in previous reports. Inclusion in this listing is intended only as reference information and does not constitute an endorsement or recommendation of those organisations. As follows, the lists of those private organizations known to the National Committee (there may be others).

5.2. Cartographic Services

The following list is of those firms mainly focused on providing, to specific clients, technical services involving cartography and related geosciences, in a few cases also publishing materials intended for the general public.

Address	*Telephone*	*E-mail*	*Web site*
Data Research (Asesorias Alicia Norambuena Belloni y Compania Ltda.)			
Manuel Antonio Prieto 0152, Providencia, Santiago, Región Metropolitana	(56)-2- 26651730 Fax: (56)-2- 26659201	empresa@dataresearch.cl	www.dataresearch.cl
Digimapas Chile Ltda.			
Andrés Fuenzalida 17 of. 43/44, Providencia, Región Metropolitana	(56) – 2 - 23353393, (56) – 2 - 23359041	info@digimapas.cl	www.digimapas.cl
Eagle Mapping Sudamerica S.A.			
Encomenderos26, 0f. 12, Santiago, Reg. Metropolitana	(56) -2 - 23343677	ems@eaglemapping.cl	www.eaglemapping.cl
ESRI Chile S.A.			
Avda. Apoquindo 6550, Piso 7, Las Condes, Reg. Metropolitana	(56) - 2 -24819000	info@esri.cl	www.esri.cl
Fotogrametría – Blanco Garda Sergio			
Arquitecto Gonzalo Mardones 1181, Oficina 405, Providencia, Reg. Metropolitana	56 9 9888 4963	sergioblanco@fotogrametria.cl	www.fotogrametria.cl
Fotosig			
Nueva Amunátegui 1405 Oficina 802, Santiago, Region Metropolitana	(56)-2– 696 56 78	fotosig@adsl.tie.cl	www.fotosig.cl (?)
Geocen Ltda.			
Avenida Nueva Tajamar 481 of. 601, Torre Norte – World Trade Center, Las Condes, Santiago, Región Metropolitana	(56)-2-22946 0703 (56)-2-22946 0727	infor@geocen.cl	www.geocen.cl
Geocom			
Avenida Salvador 1105, Providencia, Santiago, Región Metropolitana	(56) - 2 - 24803600	ventas@geocom.cl; serviciotecnico@geocomsa.cl; soporte@geocom.cl	www.geocom.cl
Geogestión Ltda.			
Guayaquil 21 of. 31, Santiago, Región Metropolitana	56 2) 2848 8711	contacto@geogestion.cl	www.geogestion.cl/
Geoingeniería Digital Ltda.			
Cerro Colorado 5030 of. 504, Las Condes, Santiago, Región Metropolitana	(56) – 2 – 23785269	geoing@vtr.net	www.geoingenieriadigital.cl
Geomaps			
Address to be determined	(56) - 9 - 72085027 (56) - 9 - 82951891	info@geomaps.cl	www.geomaps.cl
Geoservice			
Marcoleta 381 of. 41, Santiago, Región Metropolitana	(56)-2-26323364 / (56)-2-26331908	geoserviproyecto@gmail.com	www.geoservice.cl/
GeoSoluciones			
Pedro de Valdivia 1783 Of.188, Providencia, Reg. Metropolitana	(56)-2-22091431	info@geosoluciones.cl	www.geosoluciones.cl

Address	*Telephone*	*E-mail*	*Web site*
Geospatial Technology S.A.			
Guardia Vieja 181 of. 506, Providencia, Santiago, Región Metropolitana	(56)-2-23020226 (56)-2-27970224	ventas@geospatial.cl	www.geospatial.cl
Geosystemas S.A.			
Av. Providencia 2370, of. 45, Providencia, Santiago, Región Metropolitana	(56) -2 - 27428501	geosystemas@gmail.com	www.geosystemas .com
Interra			
Av Salto 4001 Oficina 142, Edificio Portal Riesco, Huechuraba, Reg. Metropolitana	56-2-24985605	*Form on web site*	www.interralatam.cl
Mapcity Chile S.A.			
San Sebastián 2952 Piso 3, Las Condes, Santiago, Región Metropolitana	(56) – 2 – 26315360 Fax: (56) – 2 – 3330482	contacto@mapcity.com	://corporativo.mapcity.c om
MiGeo *(formerly "Microgeo")*			
Camino del Cerro 5154, Huechuraba, Santiago	(56) – 2 – 26580915	contacto@migeo.cl	://migeo.cl
Oriondata			
J.J. Pérez 918 -San Bernardo Santiago, Región Metropolitana	56 – 2 – 28582469	*Form on web site*	www.oriondata-i.com
SIIGSA / Servicios Integrados en Información Geográfica S.A.			
Avenida Santa Maria 2880 of. 302, Providencia, Santiago, Región Metropolitana	56 - 2 – 28940213	contacto@siigsa.cl & *Form on web site*	www.siigsa.cl
Solfa (Sociedad Australiamericana Fotogrametria Perc Remota E Ingenieria S A)			
Tarapaca 1113, of. 26C, Santiago, Región Metropolitana	(56)–2– 26962038 / (56)–2– 26882817	solfa@solfa.cl	www.solfa.cl
Terra Remote Sensing Ltda.			
Av. Tupungato 3850, Parque Industrial Curauma, Valparaíso, V Región	(56) – 32 -2996650	*Form on web site*	www.terraremote.com
XYGO			
Avenida Manquehue Sur 520 Piso 1, Las Condes, Región Metropolitana	(56) – 2 – 24314400	contacto@xygo.com	www.xygo.cl

5.3 Publications for the general public

These firms focus on maps and atlases intended for the tourism and road travel markets:

Address	*Telephone*	*E-mail*	*Web site*
Chiletur Copec			
Isidora Goyenechea 2915, Las Condes, Región Metropolitana	(56) – 2 – 600 200 0202	*Form on web site*	http://ww2.copec.cl/chil etur/
Editorial Compass			
Los Acantos 1320, Vitacura, Región Metropolitana	(56) – 2 – 29512375	contacto@editorialcompass.cl	www.editorialcompass. cl
TrekkingChile			
Rafael Canas 174, Providencia, Región Metropolitana	(56)- 2 - 22641719	maps@trekkingchile.com	www.trekkingchile.com

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- SERVICIO NACIONAL DE GEOLOGIA Y MINERIA - SERNAGEOMIN