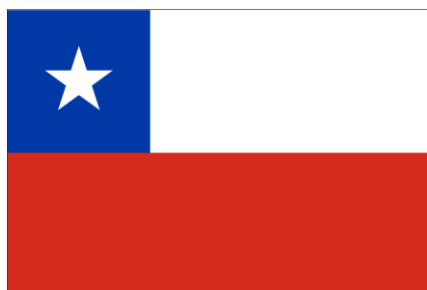


ARMY OF CHILE  
MILITARY GEOGRAPHIC INSTITUTE OF CHILE



## REPORT ON CARTOGRAPHY IN THE REPUBLIC OF CHILE 2019 - 2023

PRESENTED BY THE CHILEAN NATIONAL COMMITTEE OF THE  
INTERNATIONAL CARTOGRAPHIC ASSOCIATION

AT THE NINETEENTH GENERAL ASSEMBLY  
OF THE INTERNATIONAL CARTOGRAPHIC ASSOCIATION

AUGUST 2023

PREPARED BY:

MILITARY GEOGRAPHIC INSTITUTE OF CHILE -  
HEADQUARTERS OF THE CHILEAN NATIONAL COMMITTEE OF THE  
INTERNATIONAL CARTOGRAPHIC ASSOCIATION



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**PART ONE: CHILEAN ICA NATIONAL COMMITTEE DURING 2019 - 2023**

The National Committee of the ICA in Chile is sustained by the Military Geographic Institute of Chile (IGM), due to the fact that the IGM is the official authority representing the Chilean State in matters involving geography, mapping, surveying and the portrayal of Chilean territory in official cartography, also representing the State in international organizations related to geography and geo-spatial information<sup>1</sup>, including the ICA. This representation is assigned specifically to the Director of the IGM, who leads the ICA National Committee.

The contact details for the National Committee are:

<i>Director of IGM &amp; National Committee President</i>	direccion@igm.cl
<i>IGM Geographic Department</i>	dgeo@igm.cl
<i>IGM International Relations Analyst (contact for this report)</i>	rrii@igm.cl

Telephone: (56) – 2 – 24109314. See also the contact details of the IGM below in 3.1.

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

- December 2018 to December 2019: Colonel Eduardo Cayul Aristondo
- January 2020 to December 2021: Colonel Jaime Ramírez
- December 2021 to December 2022: Colonel Lautaro Rivas Reveco
- December 2022 to date: Colonel Carlos Prado Casanova

From the year 2015 to 2019 the Chilean National Committee supported the chair of the Commission for Maps and Graphics for the Blind and Visually Handicapped Prof. Alejandra Coll Escanilla, an outstanding Chilean academic and cartographer attached to the Metropolitan Technological University, until the 17<sup>th</sup> General Assembly in 2019, when this commission was handed over to the current chair.

At the XXVIII ICC and 17<sup>th</sup> General Assembly, held in Tokyo, Japan, in July 2019, the Chilean National Committee participated through the official Chilean delegation of a member of IGM staff. For the XXX ICC, held in Florence, Italy in December of 2021, the IGM participated by means of remote connections and had one submission<sup>2</sup> in the programme. Currently the National Committee is preparing to participate in the ICC and General Assembly of this year, 2023, to be held in Cape Town, South Africa.

Up until the year 2019 the annual membership fees corresponding to Chile and its ICA National Committee were paid by the Chilean Ministry for Foreign Relations, with the IGM monitoring payments. In that year, responsibility for these payments was transferred to the IGM itself, so this institute has managed these payments directly since then.

<sup>1</sup> Decreto N° 18, Sub-Secretaria de Guerra (Defence Ministry), in effect from 22nd January 1979, published in the “Diario Oficial” n° 30.307 on 6<sup>th</sup> March 1979.

<sup>2</sup> Paper “Making Progress in Determining Quality: Positional Accuracy of the New 1:25,000 Scale Digital Cartography”, B. Cubillos and other authors, all of them staff at the IGM.

## PART TWO: MULTI-INSTITUTIONAL ACTIVITIES

### 2.1. National Spatial Data Infrastructure of Chile

	<i>Official name:</i>	Secretaría Ejecutiva, Infraestructura de Datos Espaciales, Ministerio de Bienes Nacionales
	<i>Address:</i>	Alameda Bernardo O'Higgins 720 piso 8, Santiago, Región Metropolitana
	<i>Web site:</i>	<a href="http://www.ide.cl">www.ide.cl</a>
	<i>E-mail:</i>	<a href="mailto:snit@mbienes.cl">snit@mbienes.cl</a>
	<i>Telephone:</i>	(56) – 2 – 2937 5896

The Chilean NSDI is known as the “Infraestructura de Datos Espaciales de Chile” or simply IDE-Chile (Chilean spatial data infrastructure). 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 major government ministries, while receiving technical advice from an inter-ministerial technical committee.

The work of the IDE-Chile is distributed across ten thematic areas, each of which groups together several institutions active in a specific area or sector. There are also organisations active in IDE issues at a local or regional level which are grouped by geographic region; these include 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. 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.


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 committee for the Americas (see <http://www.un-ggim-americas.org/>). With the close involvement of the IDE-Chile, the 9<sup>th</sup> Session of the UN-GGIM:Americas was held in Santiago, Chile, in the month of November 2022.

An even larger event (see <https://www.ide.cl/index.php/conferencia-2022>), again in Santiago and involving both UN-GGIM and the IDE-Chile, was “IDE Chile International Conference”, held in December 2022, at which Chilean and international speakers discussed the latest developments in Geospatial data, SDI, and their applications for issues such as climate change, migrations, natural hazards, territorial management, land use and geoservices, among others.

Associated with the web site ([www.ide.cl](http://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 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, can be selected to display over a georeferenced base map 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](http://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 – Chilean National Section

	<i>Official name:</i>	Sección Nacional del IPGH de Chile, Instituto Panamericano de Geografía e Historia - IPGH
	<i>Address:</i>	Dpto. Geográfico, Instituto Geográfico Militar, Nueva Santa Isabel 1651, Santiago, Región Metropolitana
	<i>Web page:</i>	<a href="http://www.igm.cl/IPGH/">http://www.igm.cl/IPGH/</a>
	<i>E-mail:</i>	rrnn@igm.cl
	<i>Telephone:</i>	(56) – 2- 24109314

The Pan-American Institute for Geography and History (PAIGH) is an inter-american organization of a scientific-technical nature, of the Organization of American States (OAS). It promotes activities grouped under and organized by the four PAIGH Commissions, including the Cartography Commission. The PAIGH has had a Cooperation Agreement with the ICA since the year 2004.

The Chilean National Section has its headquarters at the IGM and is supported by local institutions. As follows, some examples of support for the work of the PAIGH at international level by specialists in Chile are given:

- In 2017 a 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 for the period up to the year 2021. Mrs Coll is the same cartographer and academic who chaired an ICA Commission until 2019.
- A Chilean geographer, Hermann Manríquez Tirado (based at the Geography Institute of the Catholic University of Valparaiso - UCV), served the PAIGH as coordinator of the committee of PAIGH journal editors up until 2021, then as President of the PAIGH Geography Commission from that year up to the present.
- 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).
- In November of 2019, the annual meeting of the PAIGH was going to be held in Santiago, Chile, being hosted by the Metropolitan Technological University (UTEM), supported where necessary by the PAIGH National Section; however, in the end this meeting was run via virtual media due to circumstances outside the control of the organizers.

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 is chaired by a specialist of the University of Talca and has participated in the tasks of announcing and distributing knowledge of the geosciences managed by the PAIGH National Section (central offices in the IGM), moreover supporting the PAIGH in announcing and making widely known the activities of this organization in Chile, such as by means of the PAIGH Technical Assistance Program

It should be pointed out that, as part of the PAIGH Cartography Commission, there are some Chilean contributors who participate in the working groups of that commission, including:

- For the ‘Tactile Cartography’ Working Group, involving the a long-standing program of the PAIGH to support the development of tactile and 3D maps and portrayals of space, the headquarters of this Committee is at the Tactile Cartography Center (see 4.1.) of the UTEM in Chile.
- As part of the ‘Aeronautical Charts’ Working Group, the Aero Photogrammetric Service of the Air force of Chile (SAF - see 3.3) together with other bodies within PAIGH member states, make up this initiative for aeronautical navigation.

The ‘Technical Cooperation Projects’ receive partial funding from the PAIGH and are international in scope while having a center of coordination in one country. Several projects have had Chile as their coordination center; the projects of this period associated specifically

with the Cartography Commission have been:


- Four projects (in 2019, 2020, 2021 and 2023) associated with educational methods and tactile cartography, managed by Enrique Pérez de Prada, UTEM
- Project associated with the conference on SDI in December 2022 (see point 2.1), on the IDE–Chile.
- Project associated with the seminar in July 2022 at the IGM, see below, on the IGM.
- 2022; “Evaluation of scientific sources of the 16th and 17th centuries for the creation of climate maps of America”, Luis Valenzuela Olivares, Andres Bello University.
- 2021; “Workshop: requirements and availability of geographic information in the case of natural catastrophes”, Maria Ester Gonzalez (University of Concepción).
- 2019; Project associated with the PAIGH journals, including the Cartographic Journal.

### 2.3 National Committee of Antarctic Geographic Names - CNNGA

This committee is sustained by the Chilean state organizations and entities involved in managing official geographic, geospatial and cartographic information; these are the IGM (see point 3.1), the SHOA (see point 3.2), the SAF (see point 3.3) and three different agencies attached to the Chilean Ministry of Foreign Relations. The committee meets regularly to coordinate, among Chilean institutions, a common methodology and criteria for geographic names in the continent of Antarctica, particularly in the Chilean Antarctic Territory.

## PART THREE: STATE AND PUBLIC INSTITUTIONS

### 3.1. Military Geographic Institute of Chile - IGM

	<i>Official name:</i>	Instituto Geográfico Militar
	<i>Address</i>	Nueva Santa Isabel 1651, Santiago Región Metropolitana
	<i>Web site:</i>	<a href="https://www.igm.cl">https://www.igm.cl</a>
	<i>E-mail for sales:</i>	ventas@igm.cl; compras@igm.cl
	<i>Telephone:</i>	(56) – 2- 24109314

The Military Geographic Institute (IGM) is the main cartographic agency of Chile, being the official authority representing the state in matters involving geography, surveying and maps of Chilean territory. It is attached to the Army of Chile.

The standard reference framework for horizontal positioning in Chile is the “National Geodesic Network” (RGN in Spanish initials), which 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, so the RGN is also known as “RGN SIRGAS-Chile” and constitutes the framework and Datum for IGM survey information and cartography. There is also a gravity network made up of both absolute and relative gravity stations.

The IGM is responsible for the official map coverages of Chilean territory, portraying the relief and major physical terrain features. The externally-certified quality management system, governed by the ISO 9001 standard of 2015, applies to this process.

The primary map series up until this period had been the 1:50,000 series, which covers all of continental (i.e. South American) Chile. During recent years a new map coverage of this territory at 1:25,000 scale has been established; the completed map sheets of this series now cover most of continental Chile and the digital versions of those sheets which cover the territory from the northern end of Chile down to and just beyond latitude 48° south have recently been made available for sale to the public. It is intended to complete and publish analogue versions on paper, with full marginal information, in the near future. For the 1:25,000 series, remote sensing data was used as the primary source.

Having been founded in the year 1922, during 2022 the IGM celebrated its hundredth anniversary, marking this milestone with special activities and events. These included a seminar run over the 4<sup>th</sup> to the 8<sup>th</sup> of July, 2022, titled “Interdisciplinary Seminars of the




Geosciences: views, challenges and progress made of benefit to the community”, with attendees and speakers from diverse sectors and professions of the geosciences, mainly from Chile with some international participation. One of the PAIGH projects for 2022 was associated with this seminar.

Concerning the ICC of 2023, four of the products recently published by the IGM have been selected for presentation in the International Cartographic Exhibition. Three of these are maps:

- Map of Chile, 1:1,000,000 scale, April 2022
- Physical Map of the World, 1:36,000,000 scale, May 2022
- America – Physical, 1:15,000,000 scale, June 2023

The fourth product is a collection of maps and illustrations titled “Kit del Profesor” (teacher’s kit), intended for use by teachers with schoolchildren for their education in basic geographic concepts involving Chilean territory, published in June 2022.

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

	<i>Official name:</i>	Servicio Hidrográfico y Oceanográfico de la Armada - SHOA
	<i>Address</i>	Calle Errázuriz 254, Playa Ancha, Valparaíso, V Región
	<i>Web site:</i>	<a href="https://www.shoa.cl">https://www.shoa.cl</a>
	<i>E-mail:</i>	shoa@shoa.cl
	<i>Telephone</i>	(56) – 32 – 2266666 / (56) – 32 – 2266611

The Director of the SHOA, Rear Admiral Arturo Oxley Lizana, has sent a special report for inclusion in this report, including the following text (translated here to English):

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“The Hydrographic and Oceanographic Service of the Navy (SHOA) has, within its mission, the creation of the official nautical cartography of the State of Chile for its territorial waters and areas of influence, both those of the continent and those of island and Antarctic zones.

These cartographic products are obtained after arduous work in the field, mainly involving the capture of bathymetric data necessary for setting up a clear and accurate portrayal of the marine seabed.

Moreover, it is required for geospatial information to be captured that is related to the positioning of features in the field and of all kinds of real world objects, for the purpose of their being a reference or aid to navigation, as these are what finally are portrayed on the nautical chart. For the above, detailed and systematic work is performed in the office workspaces, by means of remote sensing field classification campaigns, for those features that are not detected by the aerial or satellite images.

The integration of the data, captured and processed by the staff of the SHOA, is expressed in cartographic products as the traditional media of analog cartography printed on paper and as its digital version, as in the case of the Electronic Nautical Charts (CNE) in the S-57 format of the International Hydrographic Organization (IHO), which is distributed at world level through the International Centre for Electronic Nautical Charts (IC-ENC).

Currently, this service is starting the work necessary for implementing the S-100 (IHO) standard and elements derived from that standard, adapting its production flows with the purpose of providing to our users new and better digital products linked to the release of geospatial information under a modern standard for transversal use.

The SHOA represents Chile in the IHO and is moreover an affiliated member of the International Federation of Surveyors (FIG).

The Hydrography Department of the SHOA, as appendix 1 of attachment “B”, is providing a list of its publications for the period from December 2021 to June 2023, considering material in both paper and electronic media.”


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The new charts mentioned in the report (appendix 1) are summarized in this table:

<i>Title</i>	<i>Translated title</i>	<i>Date of first version (prior to updates)</i>	<i>Scale</i>
“Seno Reloncavi Bahía Chincui”	Reloncavi Gulf – Chincui Bay	December 2019	1:10,000
“Brazo norweste – Canal Smyth”	Smyth channel – north-western arm	June 2020	1:100,000
“Canal Chacao: desde Punta Lenqui a Punta Tres Cruces”	Chacao channel: from Lenqui point to Tres Cruces point.	August 2020	1:25,000
“Antártica Chilena. Bahía Almirantazgo. Ensenadas Mackellar y Martel.”	Chilean Antarctic. Almirantazgo Bay. Mackellar and Martel coves.	July 2021	1:15,000
“Islas Diego Ramirez. Puntos de Base Normal”.	Diego Ramirez islands. Normal base points.	August 2021	1:12,000
“Aproximación a caleta Inio. De canal San Pedro a canal Quilán”	Approaches to Inio cove. From San Pedro channel to Quilán channel.	October 2022	1:60,000

In addition to these maps, the SHOA has also included another recent nautical chart in the Chilean sector of the 2023 International Cartographic Exhibition; this is a 1:20,000 scale chart titled “Canal Oeste” (west channel), of a channel in the “Ultima Esperanza” province of Chile’s 12th Region, including the approaches to “Corbeta Papudo” Bay and “Caracciolo” Port.

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

	<i>Official name:</i>	Servicio Aerofotogramétrico de la Fuerza Aérea - SAF
	<i>Address (corporate center):</i>	Av. Diego Barros Ortiz N° 2300, Aeropuerto Arturo Merino Benítez, Pudahuel, Región Metropolitana
	<i>Address (sales office):</i>	Avda. L. B. O’Higgins (Alameda) 1316 Of. 63, Santiago, Región Metropolitana
	<i>Web site:</i>	<a href="https://www.saf.cl">https://www.saf.cl</a>
	<i>E-mail:</i>	ventas@saf.cl
	<i>Telephone</i>	(56) – 2 – 29776343 / (56) – 2 – 29776344

The Aerophotogrammetric Service has sent a special report for inclusion in this report, included here (translated here to English):

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 “The Aerophotogrammetric Service of the Air Force of Chile (SAF) is a technical, official and permanent organisation of the State in matters concerning remote sensing and related techniques. Its main mission is based on creating and making available the official aeronautical cartography of the State of Chile and the plans which support those maps.

Over the sixty years of its history, the SAF has been a pioneer in the use and operation of remote systems for the capture of data, concentrating its efforts on the creation of solutions linked to remote sensing, and, in particular, to aeronautical cartography, aerial photogrammetry and spatial technologies over a wide range of resolutions. These make possible analysis and decision-making processes, actively contributing to aeronautical safety, defence and development in Chile.

In the year 2021, the Aerophotogrammetric Service was re-assigned to be attached to the Space Command Center of the Air Force of Chile and has been confirmed as the official distributor of the State for materials including aerial, satellite and radar images, thus placing it as a leading technological example for the region.


Currently, various aspects of innovation, development and research are being worked on, for the area of Space, remote sensing and artificial intelligence.”

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 In addition to the above report, information from the SAF web site indicates that the aeronautical maps include those at 1:250,000, 1:500,000, 1:1,000,000 and 1:2,000,000 scales, referenced to the WGS 84 Datum and applying the standards for symbology of the International Civil Aviation Organization (ICAO).

For the Chilean sector of the 2023 International Cartographic Exhibition, the SAF has provided a 1:2,000,000 aeronautical map of a large part of Antarctica, including part of the Chilean territory in that continent, titled "Península Fildes - Teniente Parodi". This is a map originally completed in 2012 in a version issued in 2022.

### 3.4. Agriculture Ministry and Dependant Agencies

#### 3.4.1 Natural Resources Information Center - CIREN

	<i>Official name:</i>	Centro de Información de Recursos Naturales - CIREN
	<i>Address</i>	Avenida Manuel Montt 1164, Providencia, Región Metropolitana
	<i>Web site:</i>	<a href="https://www.ciren.cl">https://www.ciren.cl</a>
	<i>E-mail:</i>	<a href="mailto:info@ciren.cl">info@ciren.cl</a>
	<i>Telephone</i>	(56) – 2 – 222008900

CIREN is a state institution dedicated to creating, gathering, maintaining and updating information related to natural resources and agriculture. The range of products developed and supplied include cartography with a base deriving from aerial orthophotographs and satellite images, overlaid with thematic data portraying thematic, georeferenced information such as:

- Cadastral data and boundaries for properties in agricultural and livestock uses, related to legal and taxation criteria.
- Soil types and their suitability for agricultural use
- Hydrogeological data, including watercourses and basins, irrigation channels, reservoirs and other water resources
- Surveys of fruit-production, with quantification of the productive areas.
- Studies of vegetation types for specific areas
- Other territorial data involving classifications for climate, land use, environmental impact, erosion of land (real and potential), forest ecosystems, cadastral and other criteria

CIREN can generate vector cartography over the image bases, also process multi-spectral and hyper-spectral remote sensing images to determine vegetation types and their areal coverage. Clients can request a digital map of a specific area in which the thematic detail in the vector layer is linked to alphanumeric data, such as the register and code of the Chilean Internal Taxation Service (SII) for a specific agricultural property. Apart from the currently-valid spatial data products that are of recent creation, the CIREN also retains many older maps, aerial photographs and images as material of historic interest.

The general public can access a large part of the maps and spatial data through the on-line viewers, digital library system and catalogue services linked to the main web site.

#### 3.4.2. National Forestry Corporation – CONAF

	<i>Name:</i>	Corporación Nacional Forestal – CONAF
	<i>Address</i>	Paseo Bulnes 285, Santiago, Región Metropolitana
	<i>Web site:</i>	<a href="https://www.conaf.cl">https://www.conaf.cl</a>
	<i>Geoportal:</i>	<a href="http://sit.conaf.cl">sit.conaf.cl</a>
	<i>E-mail:</i>	<a href="mailto:consulta.oirs@conaf.cl">consulta.oirs@conaf.cl</a> ; <a href="mailto:sit@conaf.cl">sit@conaf.cl</a>
	<i>Telephone:</i>	(56) - 2 - 26630000 / (56) - 2 – 26630269


The “Corporación Nacional Forestal” (National Forestry Corporation – CONAF) is responsible for the sustainable management of forest ecosystems, monitoring compliance with legislation on forest and environmental issues, protecting vegetation resources and managing protected woodland areas, among other duties involving forested areas.

CONAF continues to 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. This includes recent updates to the survey and quantification of vegetational resources, with spatial data on the distribution of natural plant species.

### 3.4.3. Office of Agrarian Studies and Policies – ODEPA

	<i>Official Name:</i>	Oficina de Estudios y Políticas Agrarias – ODEPA Ministerio de Agricultura
	<i>Address:</i>	Teatinos 40 piso 7, Santiago, Región Metropolitana
	<i>Geoportal:</i>	<a href="http://icet.odepa.gob.cl/">http://icet.odepa.gob.cl/</a>
	<i>Telephone:</i>	(56) – 2 – 800 360 990

The Office of Agrarian Studies and Policies – ODEPA - 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. It has published a 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


	<i>Official name:</i>	Servicio Nacional de Geología y Minería – SERNAGEOMIN
	<i>Address:</i>	Avenida Santa María 0104, Providencia, Santiago, Región Metropolitana
	<i>Web site:</i>	<a href="https://www.sernageomin.cl">https:// www.sernageomin.cl</a>
	<i>E-mail:</i>	<a href="mailto:comunicaciones@sernageomin.cl">comunicaciones@sernageomin.cl</a>
	<i>Telephone:</i>	(56) – 2 - 2482 55 00

The Geology Division of the National Geological and Mining Service – SERNAGEOMIN - is responsible for developing geological knowledge and the production of official thematic cartography for basic geology, geological hazards, mineral resources, geophysics, geothermal aspects, hydrogeology and related matters. It continues to maintain, update and expand its large collection of thematic maps and geospatial datasets. A large portion of this information can be viewed on-line at the geoportal <https://portalgeomin.sernageomin.cl/>. The map series covering most or a large part of Chilean territory include those focused on basic geology, on geophysics and geo-chemistry. Several specific areas are portrayed in maps of the natural hazard risks there.

A team of GIS analysts compiles thematic spatial data from various sources, develops the cartographic representation of that data, manages the resulting databases and provides support to the rest of SERNAGEOMIN in the interpretation, use and application of the spatial data. This team has included a 1:25,000 scale geological chart in the Chilean sector of the 2023 International Cartographic Exhibition; this is “Geología de las Islas Robinson Crusoe y Santa Clara” published in 2022.


### 3.6. Other Government Ministries and Specialized Agencies

#### 3.6.1. National Statistics Institute – INE

	<b>Official Name:</b>	Instituto Nacional de Estadísticas
	<b>Address:</b>	Morande 801 – piso 22, Santiago, Región Metropolitana
	<b>Geoportal:</b>	<a href="http://www.ine.cl">http://www.ine.cl</a>
	<b>E-mail:</b>	<a href="mailto:ine@ine.gob.cl">ine@ine.gob.cl</a>
	<b>Telephone:</b>	(56) - 2 – 32461010 / (56) - 2 – 32461018

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 political-administrative divisions, urban plans identifying individual blocks between streets, and other sources adapted for census tasks. Its web site includes access to 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

	<b>Official Name:</b>	Ministerio de Obras Públicas
	<b>Address:</b>	Morande 59, Santiago, Región Metropolitana
	<b>Geoportal:</b>	<a href="http://www.mop.gob.cl">http://www.mop.gob.cl</a>
	<b>Telephone:</b>	(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 infrastructure in general. Certain divisions of the MOP, including those responsible for roads and highways, also for supervising water resources, have published spatial data, mainly through on-line portals and spatial data viewers.

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

	<b>Official Name:</b>	Dirección Nacional de Fronteras y Límites del Estado, Ministerio de Relaciones Exteriores
	<b>Address:</b>	Teatinos 180 piso 7, Santiago, Región Metropolitana
	<b>Geoportal:</b>	<a href="http://www.difrol.gob.cl">http://www.difrol.gob.cl</a>
	<b>E-mail:</b>	<a href="mailto:infodifrol@minrel.gov.cl">infodifrol@minrel.gov.cl</a>
	<b>Telephone:</b>	(56) – 2 - 2413 5700

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<sup>3, 4</sup>, 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.

#### 3.6.4 Environment Ministry

	<b>Official Name:</b>	Ministerio del Medio Ambiente
	<b>Address:</b>	San Martín 73, Santiago, Región Metropolitana
	<b>Geoportal:</b>	<a href="https://sinia.mma.gob.cl/">https://sinia.mma.gob.cl/</a> - <i>menu options “Recursos” – “Visor de Mapas”</i>
	<b>Telephone:</b>	(56) – 2 - 25735800


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,

<sup>3</sup> “Decreto con Fuerza de Ley N° 5: Reglamenta la internación de mapas y cartas geográficas”, Ministerio de Relaciones Exteriores, law decree, 1963.

<sup>4</sup> “Decreto con Fuerza de Ley N° 83: Estatuto orgánica de DIFROL”, Ministerio de Relaciones Exteriores, 1979.

nature reserves and protected biodiversity areas; the spatially referenced information can be accessed through the SINIA Geoportal.

### 3.6.5. National Service for Prevention of and Response to Disasters – SENAPRED

	<i>Official Name:</i>	Servicio Nacional de Prevención y Respuesta ante Desastres - SENAPRED
	<i>Address:</i>	Beaucheff 1671, Santiago, Región Metropolitana
	<i>Geoportal:</i>	<a href="http://www.senapred.cl">www.senapred.cl</a>
	<i>Telephone:</i>	(56) – 600 586700

The National Service for Prevention of and Response to Disasters (SENAPRED in Spanish initials, previously known as ONEMI), attached to the Interior Ministry, is the agency responsible for providing advice on the mitigation of risks from natural hazards and for coordinating the immediate response to crises such as those caused by earthquakes, tsunamis, volcanic eruptions, large-scale forest fires, and floods. These tasks rely, to a large extent, on the handling of base cartography and specialized geospatial information. A service attached to its web site provides public access 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 emergencies.

## PART FOUR: UNIVERSITIES, TRAINING AND RESEARCH CENTERS

### 4.1 Metropolitan Technological University – UTEM

	<i>Official name:</i>	Universidad Tecnológica Metropolitana – UTEM
	<i>Address</i>	Departamento de Cartografía, Facultad de Humanidades y Tecnologías de la Comunicación Social, Universidad Tecnológica Metropolitana, San Ignacio 171, Santiago, Región Metropolitana
	<i>Web site:</i>	<a href="http://www.utem.cl/">http://www.utem.cl/</a>
	<i>Telephone:</i>	(56) – 2 – 27877507

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 contributions to the programs of the PAIGH.

At international level one of the leading academics of the School and Department for Cartography was the Chair of the ICA Commission on Maps and Graphics for the Blind from the General Assembly of 2011 to 2019. This contribution to the ICA was made possible partly due to the work of that professional, Alejandra Coll, at one of the research centers of the UTEM, the Center for Tactile Cartography (CECAT).


The CECAT is attached to the Faculty for Humanities and Social Communications Technologies and also the Cartography Department within that faculty. 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.

The contact details for the CECAT are:

<i>Official Name:</i>	Programa Centro de Cartografía Táctil, Facultad de Humanidades y Tecnologías de la Comunicación Social, Universidad Tecnológica Metropolitana - UTEM
<i>Address:</i>	Dieciocho 414, Santiago, Región Metropolitana
<i>Geoportals:</i>	<a href="http://vtte.utem.cl/centro-de-cartografia-tactil/">vtte.utem.cl/centro-de-cartografia-tactil/</a>
<i>E-mail:</i>	ctactil@utem.cl
<i>Telephone:</i>	(56) – 2 – 27877361


## 4.2. University and Academic Sector

### 4.2.1. Bernardo O'Higgins University

	<i>Official name:</i>	Facultad de Ingeniería, Ciencia y Tecnología, Universidad Bernardo O'Higgins
	<i>Address</i>	Avenida Viel 1497 / Ruta 5 Sur, Santiago, Región Metropolitana
	<i>Web site:</i>	<a href="https://www.ubo.cl">https://www.ubo.cl</a>
	<i>E-mail:</i>	fabiola.barrenechea@ubo.cl
	<i>Telephone:</i>	(56) – 600 366 5555

This University, through its Engineering, Science and Technology 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

	<i>Official name:</i>	Instituto de Geografía, Facultad de Historia, Geografía y Ciencia Política, Pontificia Universidad Católica de Chile
	<i>Address</i>	Campus San Joaquín, Avenida Vicuña Mackenna 4860 San Joaquín, Santiago, Región Metropolitana
	<i>Web site:</i>	<a href="http://geografia.uc.cl/">http://geografia.uc.cl/</a>
	<i>E-mail:</i>	maaliste@uc.cl
	<i>Telephone:</i>	(56) – 2 – 23544716


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. There is also a commitment to research on geographic issues, frequently involving the management and publication of thematic spatial data.

### 4.2.3. University of Chile

	<i>Official name:</i>	Departamento de Geografía, Facultad de Arquitectura y Urbanismo, Universidad de Chile
	<i>Address:</i>	3º Nivel, Torre Chica, Campus Universidad de Chile, Portugal 84, Santiago, Región Metropolitana
	<i>Web site:</i>	<a href="https://www.fau.uchile.cl/geografia">https://www.fau.uchile.cl/geografia</a>
	<i>E-mail:</i>	sec_geografia@uchilefau.cl
	<i>Telephone</i>	(56) – 2 – 9783095

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, Chile

	<i>Name:</i>	Departamento de Ingeniería Geoespacial y Ambiental, Facultad de Ingeniería, Universidad de Santiago de Chile (USACH)
	<i>Address:</i>	Enrique Kirberg Baltiansky 03, Estación Central, Región Metropolitana
	<i>Web site:</i>	<a href="http://www.digeo.usach.cl">www.digeo.usach.cl</a>
	<i>Telephone:</i>	56-2-2718 2200 / 56-2-2718 2202 / 56-2-2718 2206

The University of Santiago Engineering Faculty includes the Department of Geographic Engineering; the civil engineering courses run by this Department, especially that which focuses on surveying and geomatics, include elements covering cartography, remote sensing and geospatial data.

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

	<i>Name:</i>	Departamento de Geografía, Facultad de Arquitectura, Urbanismo y Geografía, Universidad de Concepción	Departamento de Ciencias Geodésicas y Geomática, Universidad de Concepción
	<i>Address:</i>	Barrio Universitario, Víctor Lamas 1290 Concepción, VIII Región	J.A. Coloma 0201, Los Angeles, VIII Región
	<i>Web site:</i>	<a href="http://faug.udec.cl/">http://faug.udec.cl/</a>	<a href="https://www.dcg-udec.cl/ingenieria-geomatica/">https://www.dcg- udec.cl/ingenieria-geomatica/</a>
	<i>E-mail :</i>	voalvarado@udec.cl; cdaidet@udec.cl	dcgg@udec.cl

A first degree course for professional Geographers at the Concepción campus and a degree course in Geomatics Engineering at the Los Angeles campus include components covering cartographic and geospatial information handling techniques.

## 4.2.6. Catholic University of Valparaíso


	<i>Name:</i>	Instituto de Geografía – Pontificia Universidad Católica de Valparaíso
	<i>Address:</i>	Avenida Brasil 2241, Valparaíso, V Región
	<i>Web site:</i>	<a href="http://www.pucv.cl/uuaa/site/edic/base/port/geografia.html">http://www.pucv.cl/uuaa/site/edic/base/port/geografia.html</a>
	<i>E-mail :</i>	<a href="mailto:direccion.geografia@pucv.cl">direccion.geografia@pucv.cl</a>
	<i>Telephone:</i>	(56) - 32 - 227 4081

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

The Geography Institute has provided information about an on-line service for inclusion in the ICC Map Exhibition of 2023; this is the “Plataforma de Monitoreo Fenológico”, for recent images of certain sites of interest for their plant species, with overlaid recent thematic spatial data concerning coverage by types of vegetation.




#### 4.2.7. Adolfo Ibañez University

	<i>Name:</i>	Centro de Inteligencia Territorial, Universidad Adolfo Ibañez - UAI
	<i>Address</i>	Avda. Presidente Errazuriz 3485, Las Condes, Región Metropolitana
	<i>Web site:</i>	<a href="https://cit.uai.cl">https://cit.uai.cl</a>
	<i>E-mail:</i>	contactocit@uai.cl
	<i>Telephone:</i>	(56) – 2 - 23321856

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, thematic atlases and the use of a territorial database system covering most of Chilean territory. It also runs courses and seminars in related geosciences.

#### 4.3 Military Polytechnic Academy

	<i>Official name:</i>	Academia Politécnica Militar – ACAPOMIL
	<i>Address</i>	Avenida Valenzuela Llanos 623, La Reina , Región Metropolitana
	<i>Web site:</i>	<a href="http://www.acapomil.cl">www.acapomil.cl</a>
	<i>E-mail:</i>	acapomil@acapomil.cl.
	<i>Telephone:</i>	(56) – 2 – 226683623 / (56) – 2 – 226683602

At the ‘Military Polytechnic Academy’ (ACAPOMIL), the armed forces provide, to their officers, training and education in three-year full-time courses equivalent to University engineering courses. One of these courses is titled ‘Information and Communications Technological Systems’, which has a few alternative configurations including one specialization titled “Geography”. After a grounding in basic engineering subjects common to all the engineering courses, those students who complete the course components of 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.

## PART FIVE: THE PRIVATE SECTOR

Cartography as a business and trade continues to evolve in the private sector. Inclusion in this listing is intended only as reference information and does not constitute an endorsement or recommendation of those organisations. As follows, a list of some of those private organizations known to this National Committee (there may be others), that provide services involving cartography and related geosciences:

Data Research (Asesorias Alicia Norambuena Belloni y Compania Ltda.)	<a href="http://www.dataresearch.cl">www.dataresearch.cl</a>
Digimapas Chile Ltda.	<a href="http://www.digimapas.cl">www.digimapas.cl</a>
ESRI Chile S.A.	<a href="http://www.esri.cl">www.esri.cl</a>
Geocen Ltda.	<a href="http://www.geocen.cl">www.geocen.cl</a>
Geocom	<a href="http://www.geocom.cl">www.geocom.cl</a>
Geoingeniería Digital Ltda.	<a href="http://www.geoingenieriadigital.cl">www.geoingenieriadigital.cl</a>
Geoservice	<a href="http://www.geoservice.cl/">www.geoservice.cl/</a>
GeoSoluciones	<a href="http://www.geosoluciones.cl">www.geosoluciones.cl</a>
Geosistemas S.A.	<a href="http://www.geosistemas.com">www.geosistemas.com</a>
Interra	<a href="http://www.interralatam.cl">www.interralatam.cl</a>
Mapcity Chile S.A.	<a href="http://corporativo.mapcity.com">corporativo.mapcity.com</a>
MiGeo	<a href="http://://microgeo.cl">://microgeo.cl</a>
Oriondata	<a href="http://www.oriondata-i.com">www.oriondata-i.com</a>
SIIGSA / Servicios Integrados en Información Geográfica S.A.	<a href="http://www.siijsa.cl">www.siijsa.cl</a>
Solfa (Sociedad Australiamericana Fotogrametria Perc Remota E Ingenieria S A)	<a href="http://www.solfa.cl">www.solfa.cl</a>
XYGO	<a href="http://www.xygo.cl">www.xygo.cl</a>

Two of the affiliate members of the ICA, ESRI and Hexagon Geospatial, are represented locally in Chile. The firm “ESRI Chile S.A.”, the Chilean subsidiary of ESRI, held “Users Conference” in Santiago (see <https://www.esri.cl/es-cl/noticias/overview>) during three days in October 2022, as a local version of the well-known “Users Conference” run annually by ESRI in the USA. The firms that focus on maps and atlases intended for the tourism and road travel markets include:

Chiletur – Copec	<a href="http://www.chiletur.cl/">www.chiletur.cl/</a>
Editorial Compass	<a href="http://www.editorialcompass.cl">www.editorialcompass.cl</a>
TrekkingChile	<a href="http://www.trekkingchile.com">www.trekkingchile.com</a>

A non-profit organisation with official recognition, the “Corporación Marítima de Chile” (Chilean Maritime Heritage Corporation) published in 2020 the book “The Strait of Magellan – Five Centuries of Cartography (1520 – 2020)”, about the history of surveying and mapping over the centuries of the areas around the Magellan Straits and nearby coastal and island areas; combining a bilingual (Spanish and English) text on this historical subject with reproductions of maps and charts from all the periods covered. The ISBN number is 978-956-09016-3-7; see further details in [www.patrimoniomaritimo.cl](http://www.patrimoniomaritimo.cl).

## PART SIX: ACKNOWLEDGEMENTS

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- SERVICIO AEROFOTOGRAFAMÉTRICO DE LA FUERZA AÉREA - SAF
- SERVICIO NACIONAL DE GEOLOGIA Y MINERIA – SERNAGEOMIN
- PONTIFICIA UNIVERSIDAD CATÓLICA DE VALPARAISO - UCV