

Servicio Nacional  
de Geología y  
Minería



**2018**

**International Convention, Trade Show & Investors Exchange**  
**March 4 - 7 Metro Toronto Convention Centre, Toronto, Canada**



GEOLOGICAL MAP OF CHILE  
SERNAGEOMIN  
2012



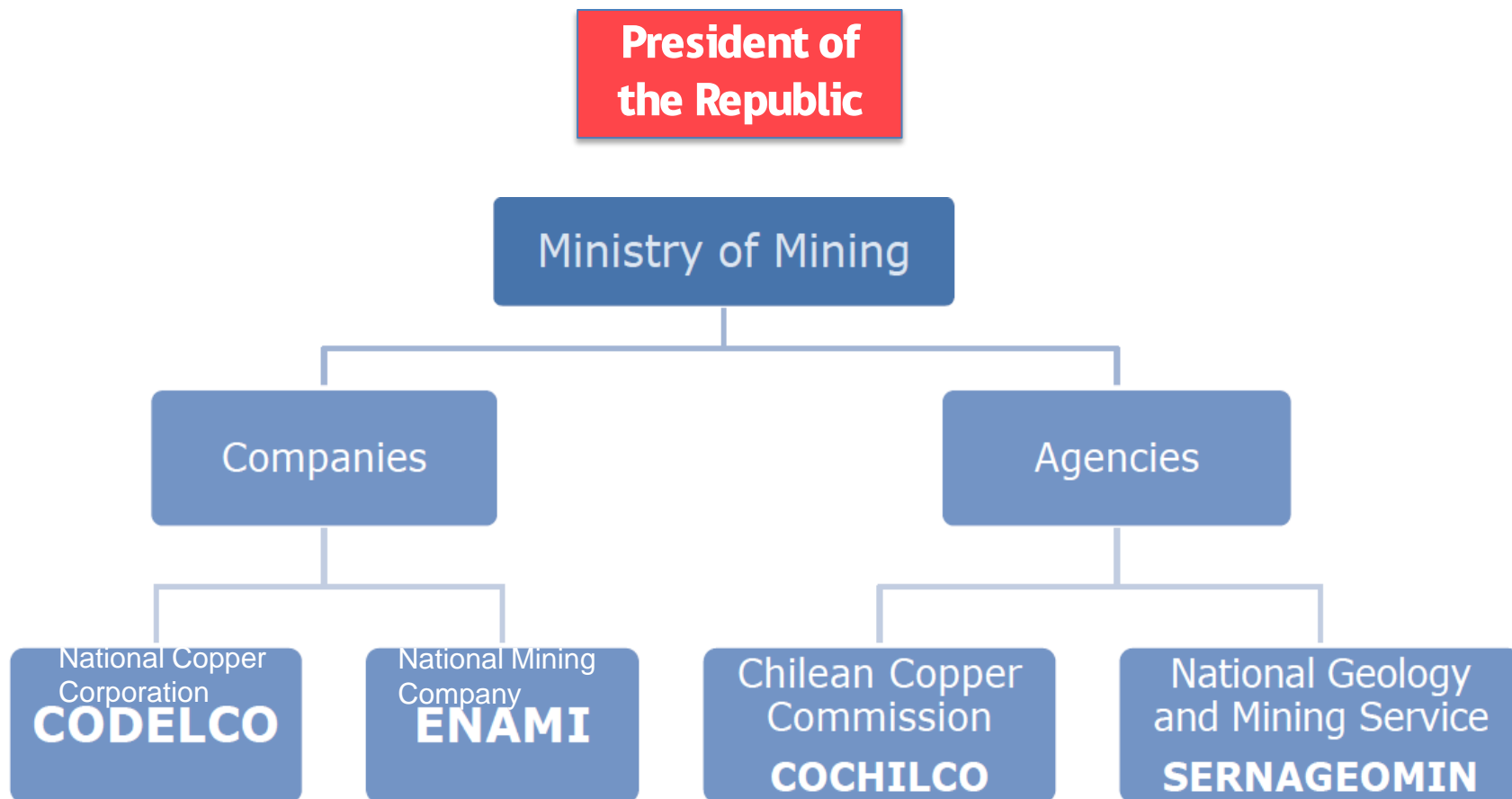
# CHILE NATIONAL MAPPING PROGRAM BY SERNAGEOMIN

Gobierno de Chile

# Outline

- 1) **SERNAGEOMIN**
- 2) **The need for Precompetitive Geoscientific Information**
- 3) **National Mapping Program (PNG)**
  - **Regional Geology, Geophysics, Geochemistry**
  - **Metallogenic maps and DataBases**
  - **Integration projects**
  - **DataBase from exploration projects (SIGEX)**
  - **Access to information**
- 4) **PNG 2020–2030: Development Strategy**
- 5) **What make us different?**
- 6) **Final thoughts**

# Public Institutions related to the Geology and Mining Sector



# Mining Policy



## Ministry of Mining

**Designing, publicize and promote the country's mining policies, incorporating sustainability and technological innovation, in order to maximize the contribution to the economic, environmental and social development.**

## Chilean Copper Commission. COCHILCO

**Advises the Ministry of Mining on matters related with country's mineral production of, mainly, copper and its byproducts, its prices and the markets.**



**National Geological and Mining Service. SERNAGEOMIN  
Provides technical assistance to the Ministry of Mining in the fields of geology and mining, generates information and publish related products.**

# The need for DATA

- ✓ **How to boost the exploration activity in Chile?**
- ✓ **What to do to attract more exploration projects to our country?**

**As stated by explorers all around the world:**

**“to do a good job with competitive results, we need good accessible basic geology maps and a *flexible mining tenements regulation*”**

**DATA = Precompetitive Geoscientific Information (PGI)**

**National and international studies (USA, Can, Aus) confirm a valuable economic return for the government for the provision of public PGI.**

**1 USD invested in PGI in Chile → 11.5 USD of government tax revenues (NPV; IRR: ~21%)**  
*Gildemeister et al. 2018, Resources Policy*

# DATA exploitation



# Chile National Mapping Program (PNG)

## *General Objective*

To generate and make available the basic geoscientific knowledge of the territory through the publication of three cartographic series:

1. **Regional Geology**
2. **Geochemistry**
3. **Geophysics**

## *Specific Objectives*

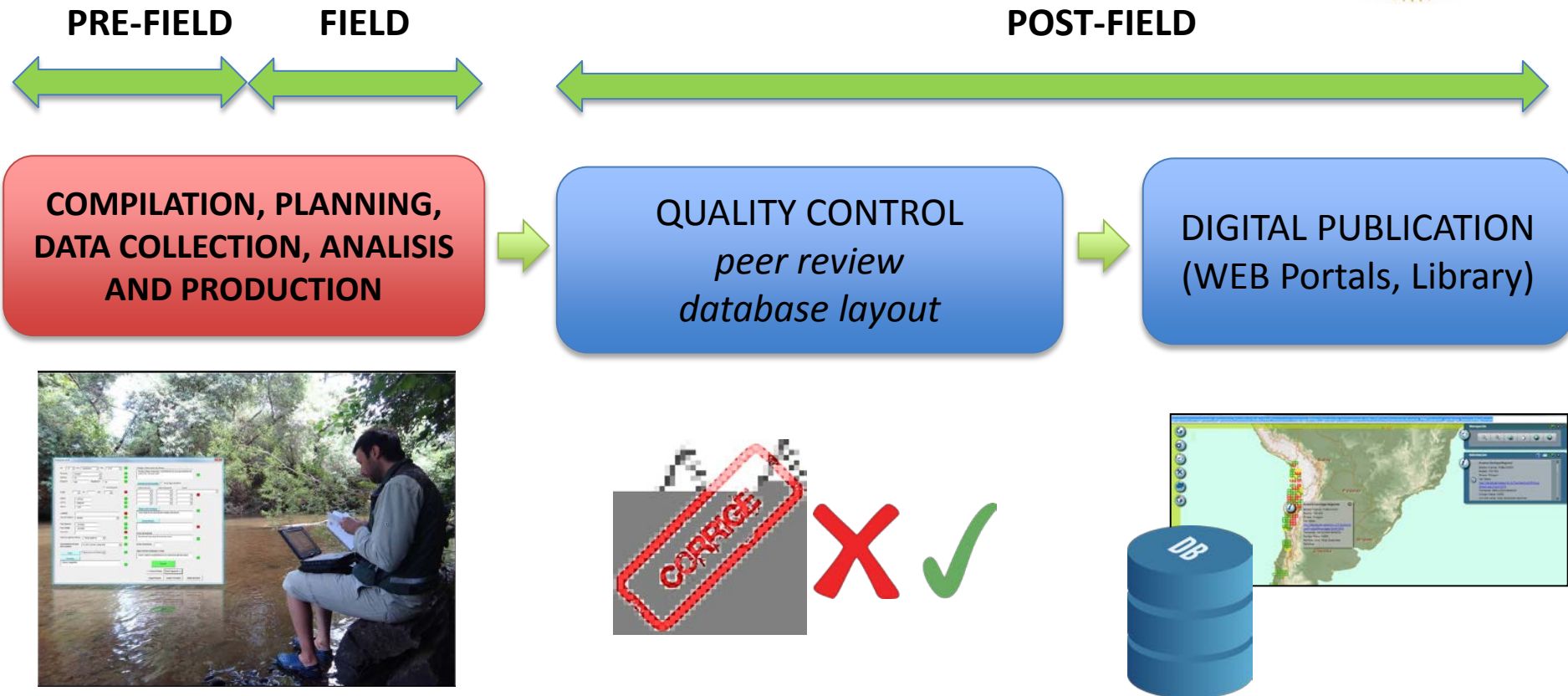
- **Complete** the geological cartography of the national territory.
- **Boost** the exploration of mineral, energetic and hidogeologic resources in the country.
- **Provide** basic information:
  - For the development of strategic productive industries
  - To improve the life quality of the population.



# Digital Geological Cartography Workflow

❑ Complete **workflow** includes data collection/production activities, milestones and related deliverables (*Quality Management System*)

❑ **Geomatic** Unit supporting data management





## In-House Analytical Support

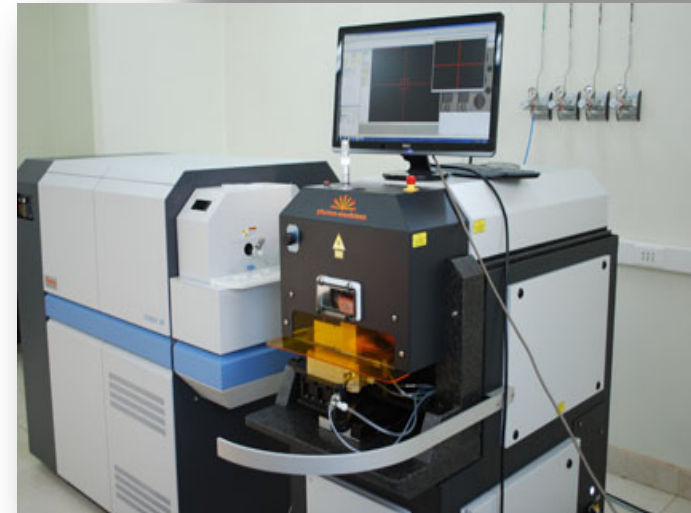
Systematic inversion in equipment, support and supplies

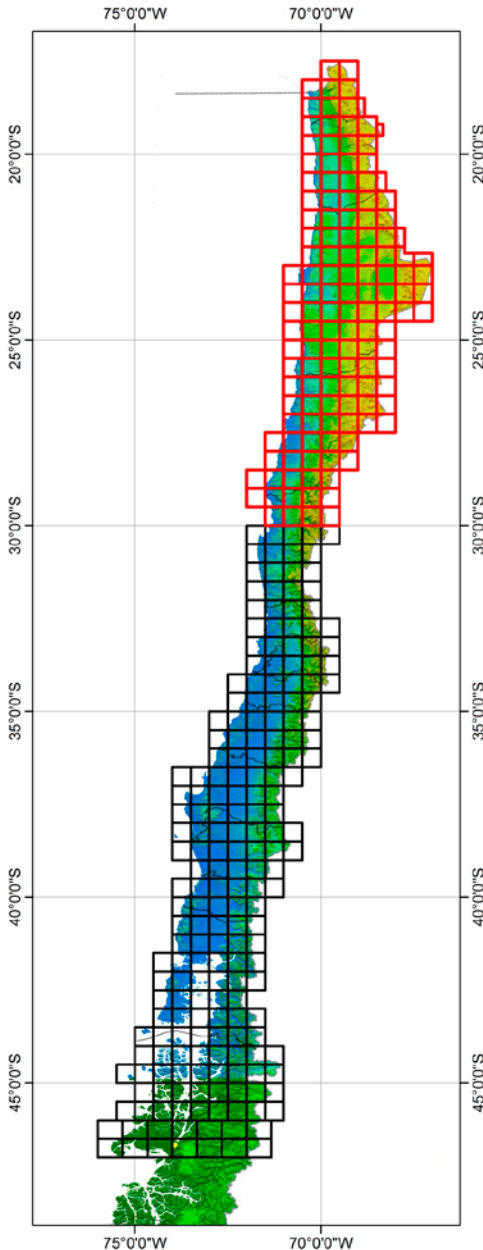
Isotopic geochemistry

- Geochronology (HR-LA-ICP-MS U-Pb, K-Ar,  $^{40}\text{Ar}/^{39}\text{Ar}$ )
- Scanning Electron microscope (SEM)
- Stable Isotopes spectroscopy

Geochemistry (rocks, sediments, fluids)

- X-Ray fluorescence (XRF)
- Atomic Absorption (AAS)
- ICP-MS
- Gas chromatography
  
- X-Ray Diffractometry (XRD)





## □ Stage 1 (2011-2019)

*Mapping north 30° S* (36% of Continental Chile)

### 1) Regional Geology (1:100.000)

→ 29%

### 2) AeroGeophysics (1:100.000)

- Magnetometry
  - gamma-Ray Spectrometry (U, Th, K)
- 22% (method restrictions)

### 3) Stream Sediments Geochemistry (1:250.000)

→ 25%

## □ Stage 2 (2020-20130?)

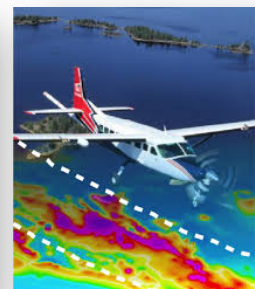
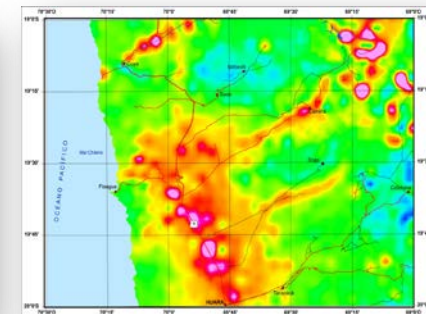
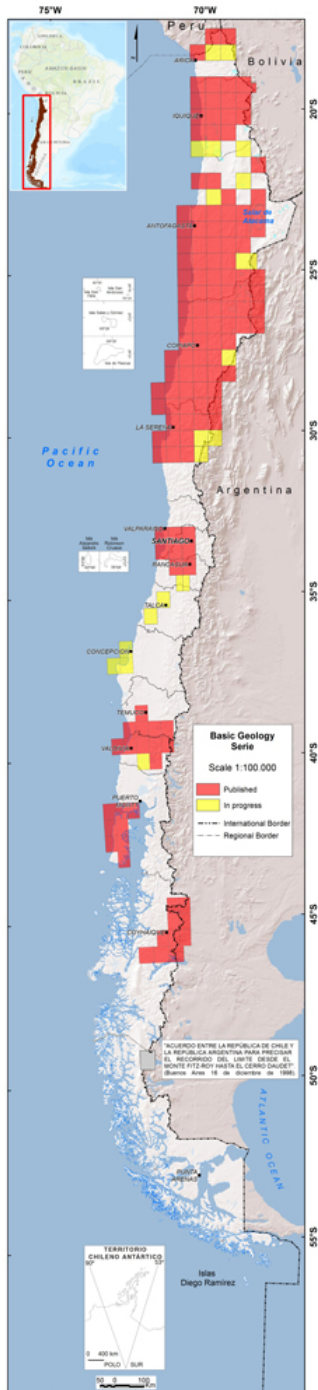
*Mapping 30° S - 42° S* (30% of Continental Chile)

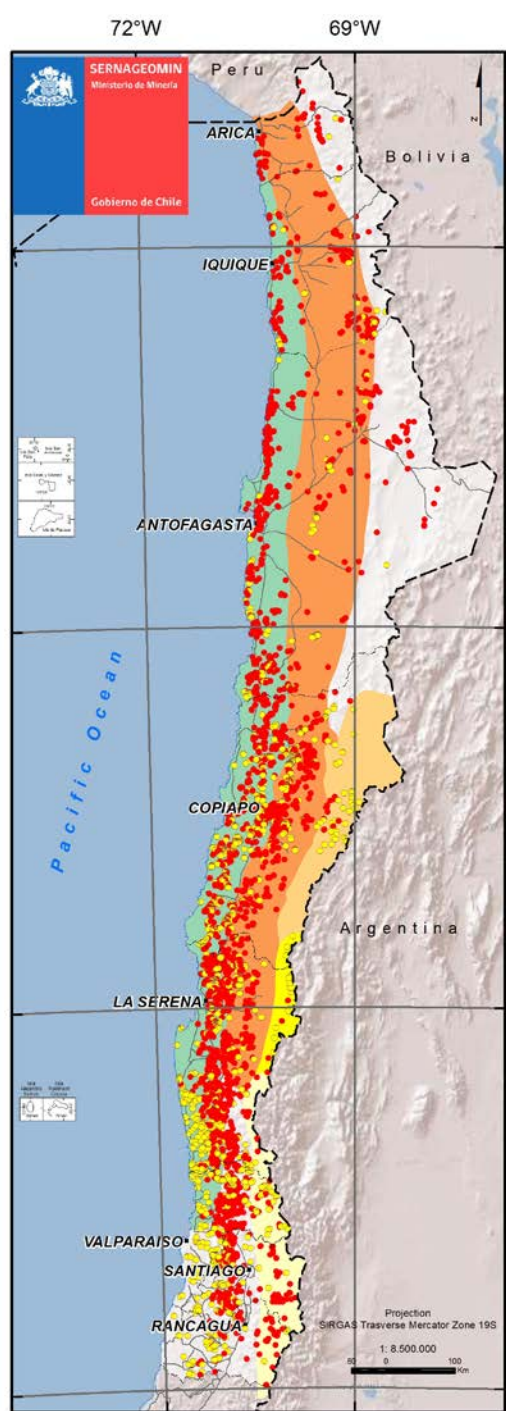
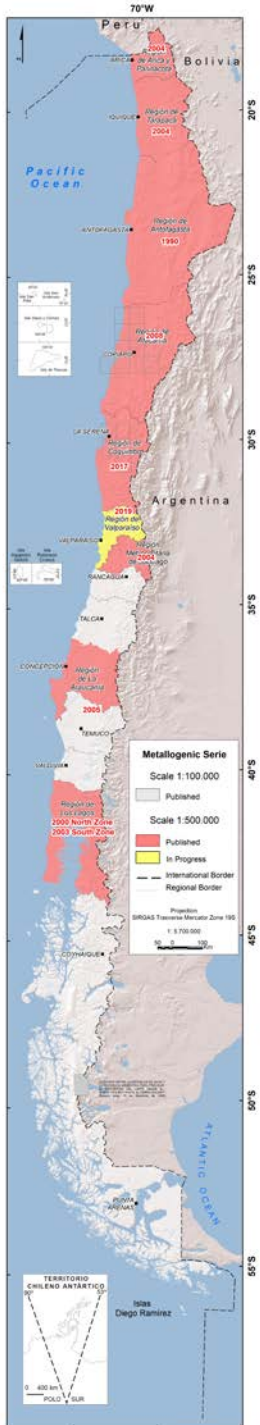
# PNG (2017): a work in progress

- ✓ PNG increases publication of Regional Geology maps from 3 to **9 per year**.
- ✓ First continium geophysical coverage (country-scale)
- ✓ First geochemistry initiative (country-scale)

## ☐ Total national coverage (% of the territory)

Regional Geo.:	1Million	100 %
	250M	87%
	<b>100M</b>	<b>37%</b>
	50M	4 %
Geochemistry	250M	9%
Geophysics	100M	19%





# Mineral Resources

## Metallogenic Maps

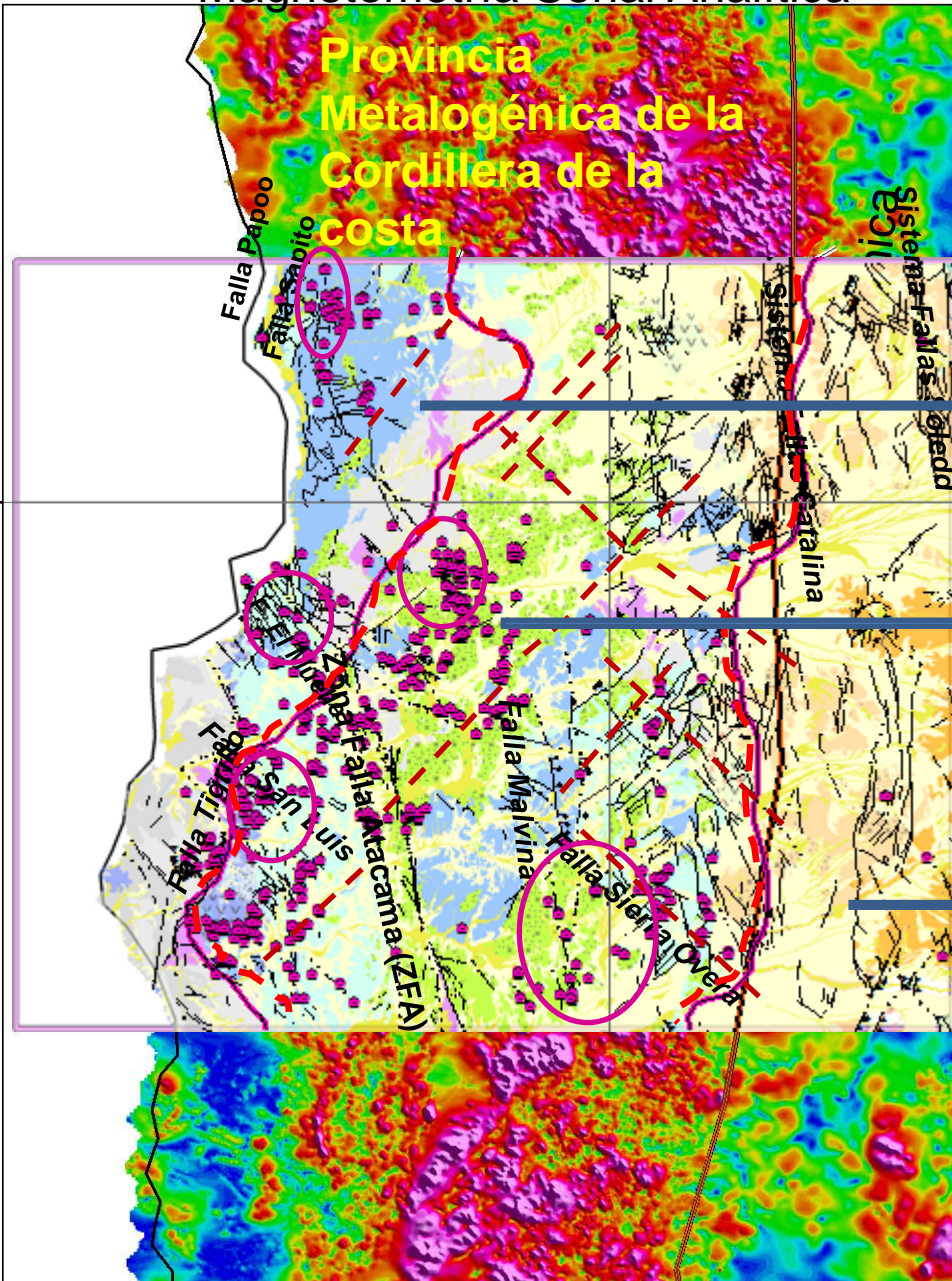
- 1:100,000; 1:500,000 scale
  - Metallic Mineral Resources
  - Industrial Rocks and Minerals
  - Relation to Metallogenic Belts
- 
- Mineral Deposits Database (*SIA-YACIMIENTOS*):
  - >10,000 mineral deposits in Chile

## Geological Integration projects Northern Chile

Data / information integration (magnetic, geological, geochemical and metallogenic)  
➔ recognition of / improvements on metallogenic belts

**Provincia Metalogénica de la Cordillera de la costa**

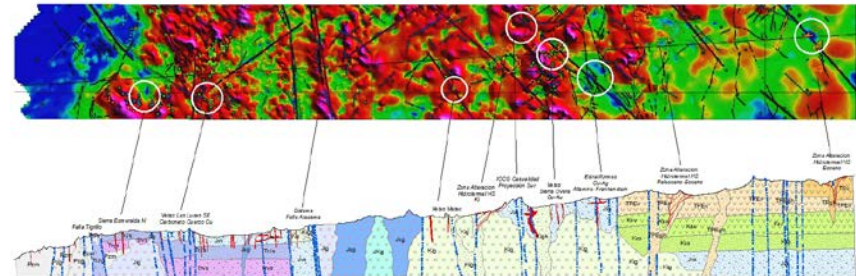
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Rx's Paleozoico - Jurásico  
Vetas Cu-Au, Cu-Au-Fe, Cu-Pb

Rx's principalmente jurásico y cretácico (volcánicas e intrusivas)  
Vetas Cu-Au, Cu-Au-Fe, Depósitos Estratiforme Cu-Ag, Depósitos Cu-Au-Fe, pórfidos Cu(Au-Mo)

Rx's volcánicas Paleoceno - Oligoceno  
Depósitos epitermales Au-Ag HS y LS



# SIGEX

## Exploration Geological Information System

According to new regulation (2017), **SERNAGEOMIN** is able to **request** the mining companies **basic geological information from exploration projects** to make it **public**.

**SIGEX** is a web platform to register and compile all kinds of technical data from exploration projects in Chile.

### Main effects

- Facilitate the access to the geological information for all interested parties.
- Support exploration companies' activities by reducing costs and time in the basic exploration stage.
- Keep a historical record of the exploration projects.

Easy access to published information through institutional webpage (queries and sales)



products catalog



On-line shop

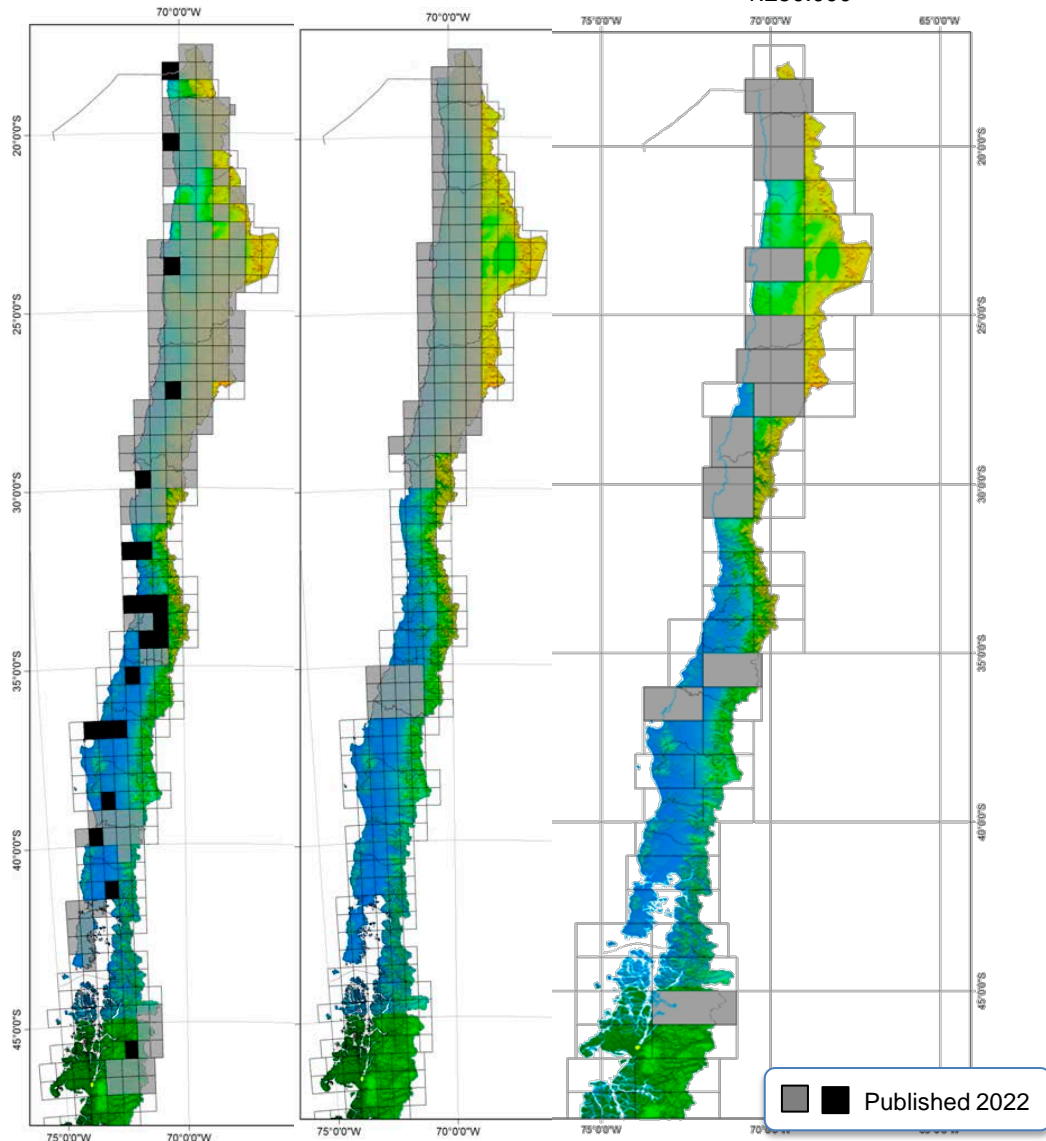
Gobierno de Chile

# PNG Development Strategy (2020–2030)

Basic Geology  
1:100.000

Geophysics  
1:100.000

Geochemistry  
1:250.000



## Challenges

### Geology south of 30° S

- ✓ **Mapping**  
Scarce geo-information
- ✓ **Land & Resource Management**  
60% inhabitants  
Drought areas
- ✓ **Methodologies & Technologies**  
Vegetable cover
- ✓ **Sustainability**  
Other economic activities
- ✓ **Opportunity**  
Mining & Geological Potential



## What make us different?

- Geological tradition & **Potential** (60% of the country's: 29°-35°S)
- Quality** data and certified workflow (ISO 9001:2015)
- Continuous **coverage** (systematics)
- In-House **analytical facilities** providing quality crucial data (e.g. geochronology).
- Long term **continuity** initiative  
(stage 1: **2011**-2019, stage 2: 2020-2030; stage 3...)
- Maturity** of the Program and teams → Adaptation and Evolution, approach
- Limited** data accessibility: Many products for free download, but other (maybe too much) are sell...

- Chilean Geological Survey teams have achieved a high level of maturation and understanding of the geological framework of the country, and wide usage of our cartographic products supports that.**
- Fact: Public Precompetitive Geoscientific Information (PGI) provision by government entities presents a valuable economic return.**
- PNG's Technical Programs and on-line data publication are in line with the modern information requested by the exploration experts.**
- SIGEX database will allow, for the first time, the usage of information that so far was lost, and will produce a cost reduction for companies and an increase in the level of geo-knowledge for everyone.**
- DATA have no value until they are used...**

# THANKS!

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