

Review of scientific development, current initiatives and future perspectives on Chilean subduction zone science

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- Input**
- Websites of ANID, universities and specific projects.
 - Information provided by contacted colleagues
 - My own knowledge of the community

↳ Apologies for any unintended omission!!!

- **Geoscience groups in space and time at Chilean universities**
- **Categories of research projects fund by ANID**
- **Individual and collaborative projects; present and future**



Geoscience groups in space and time at Chilean universities



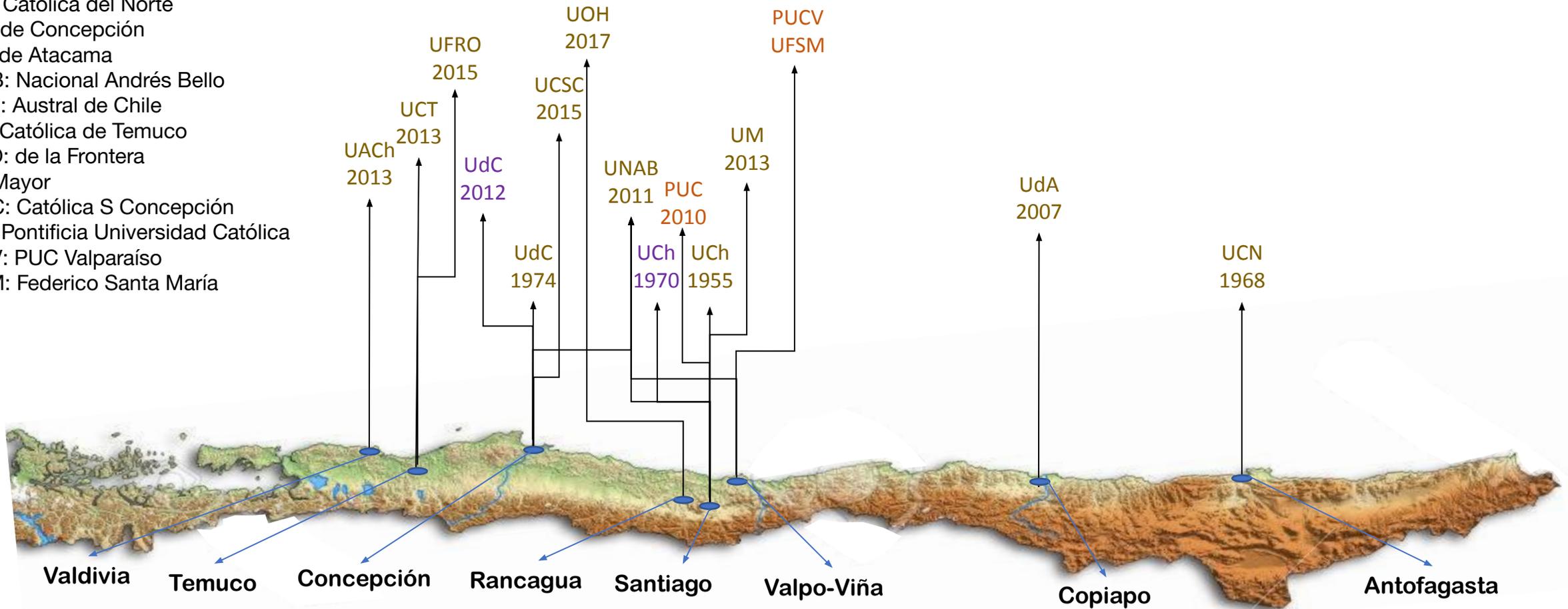
Geoscience groups in space and time at Chilean universities

GEOLOGY

GEOFYSICS

OTHERS

- UCh: de Chile
- UCN: Católica del Norte
- UdC: de Concepción
- UdA: de Atacama
- UNAB: Nacional Andrés Bello
- UACH: Austral de Chile
- UCT: Católica de Temuco
- UFRO: de la Frontera
- UM: Mayor
- UCSC: Católica S Concepción
- PUC: Pontificia Universidad Católica
- PUCV: PUC Valparaíso
- UFSM: Federico Santa María



Categories of research projects fund by ANID

Strategic Axes

Research Projects

- Postdoc
- Initiation
- **Regular**
□ **US\$60.000/yr x 3-4 yrs**

Applied Research

- Several lines of liaison with the Industry
- **Fondef IDeA R+D**
□ **<US\$125.000 x 2 yrs**

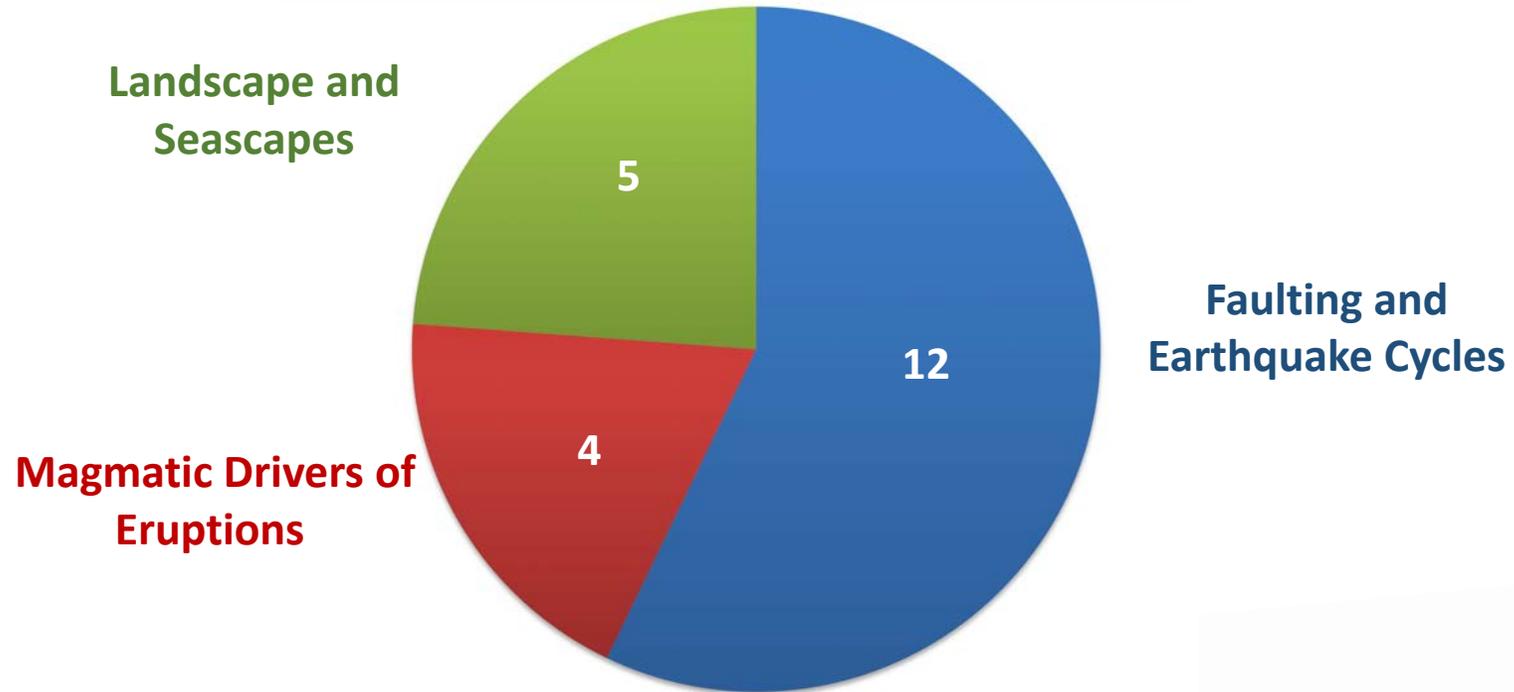
Centres

- **Fondequip**
□ **<US\$1.000.000 x 5 yrs**
- **Millenium Nucleus & Anillos**
□ **US\$250.000/yr x 3-6 yrs**
- **Millenium Institutes & Fondap**
□ **US\$1.000.000/yr x 5-10 yrs**

Individual and collaborative projects; present and future

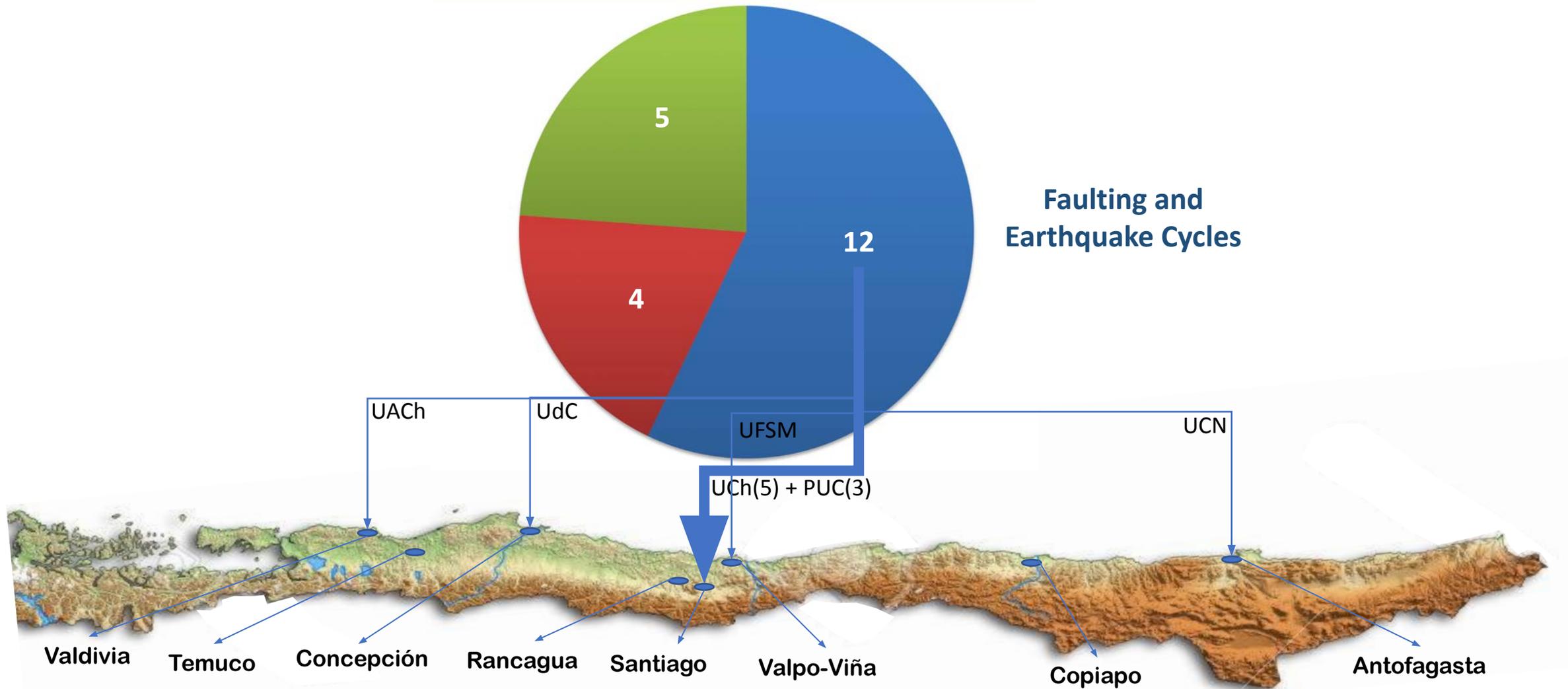
Current Fondecyt Regular (Approved 2020-2022)

21 projects FES+MDE+L&S = 36% of group Earth Sciences



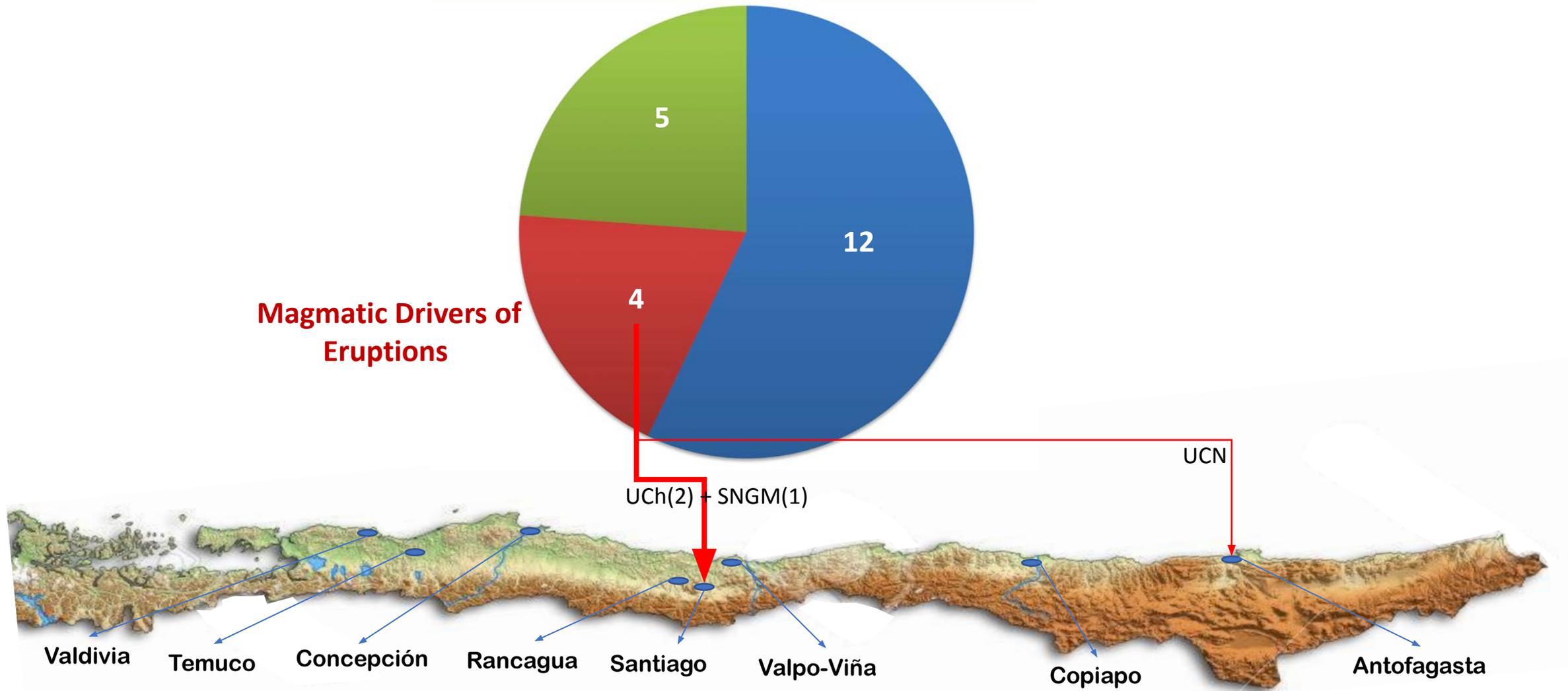
Individual and collaborative projects; present and future

Current Fondecyt Regular (Approved 2020-2022)



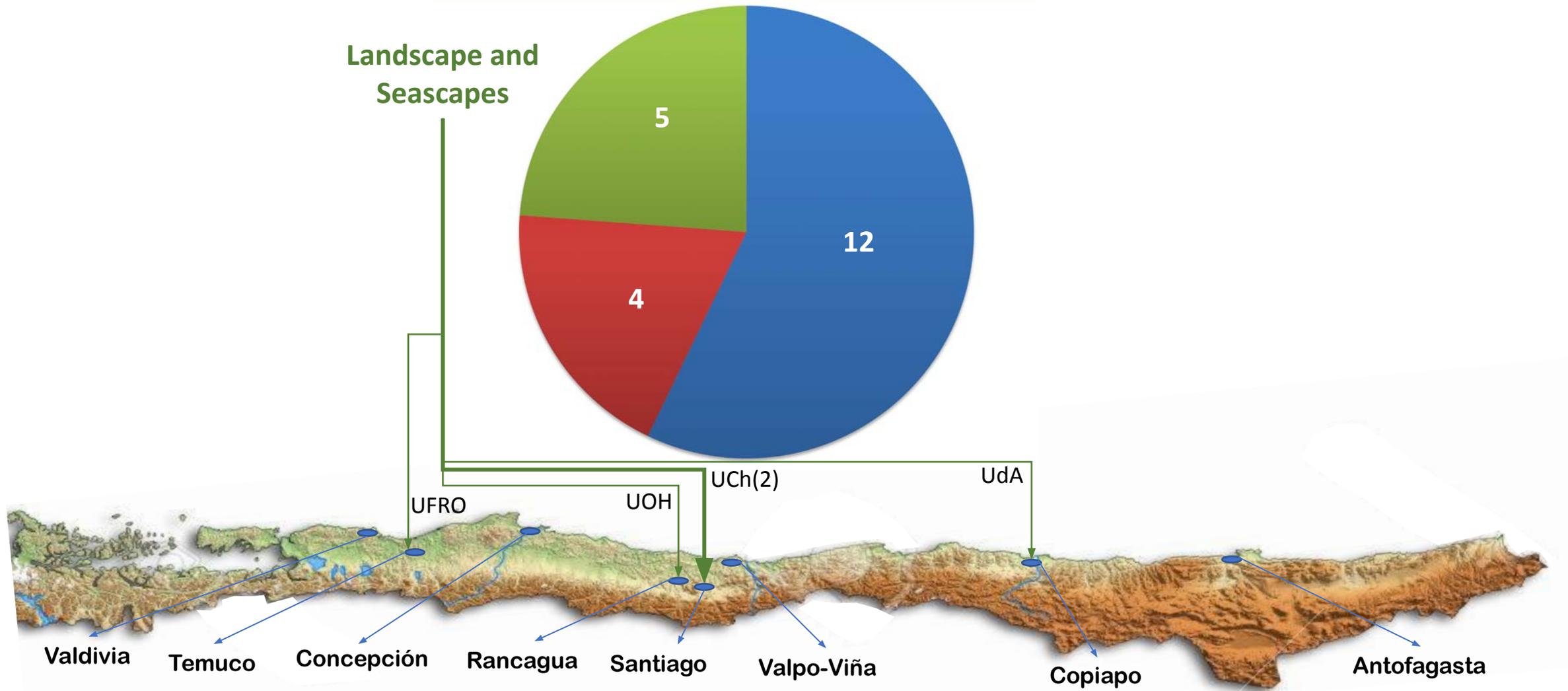
Individual and collaborative projects; present and future

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Individual and collaborative projects; present and future

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Individual and collaborative projects; present and future

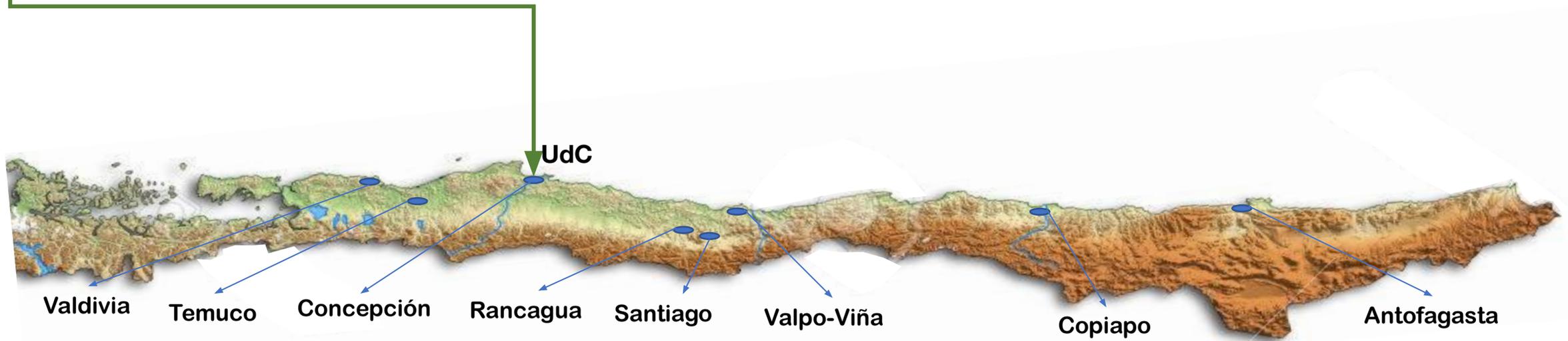
Fondef IDeA R+D

Desarrollo científico y tecnológico de alto impacto para la detección, alerta temprana y gestión del riesgo de aluviones

Director: Jose Luis Palma
2022-2024

Research Lines

- Flood (lahar) detection with seismicity+infrasound
- Development of hardware for acquisition, processing and data transmission
- Early warning and emergency management of floods



Individual and collaborative projects; present and future

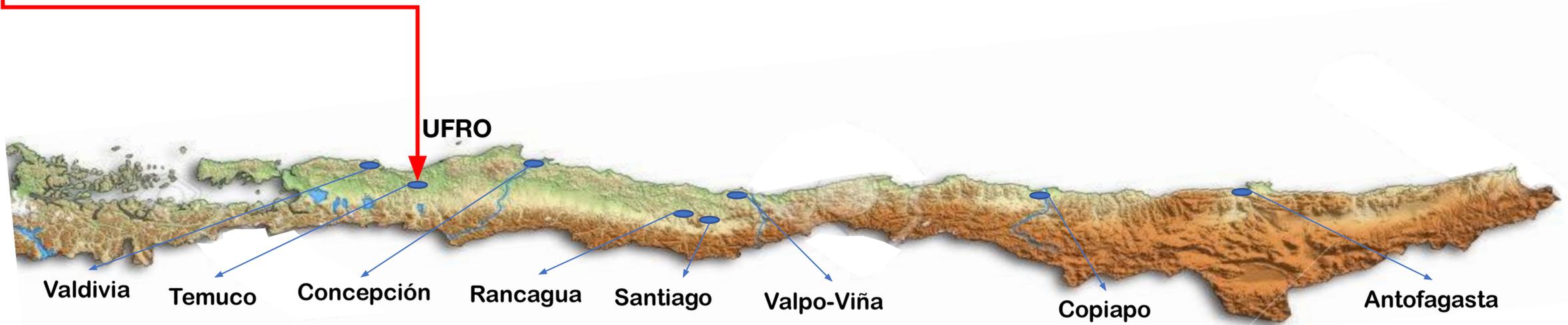
Fondef IDeA R+D

Automatización de herramientas de monitoreo volcánico en OVDAS

Directora: Millaray Curilem + Ivo Fustos
2020-2022

Research Lines

- Detection, classification and localization of multi-station seismic records
- Spectral properties of continuous seismic traces
- Automatization of volcanic monitoring



Individual and collaborative projects; present and future

ANILLO

The interplay between subduction processes and natural disasters in Chile (INSUD)



2018-2021



Daniel Díaz

Eduardo Contreras-Reyes (Director)

Sergio Ruiz

RESEARCH LINES



Geofísica Marina



Sismología



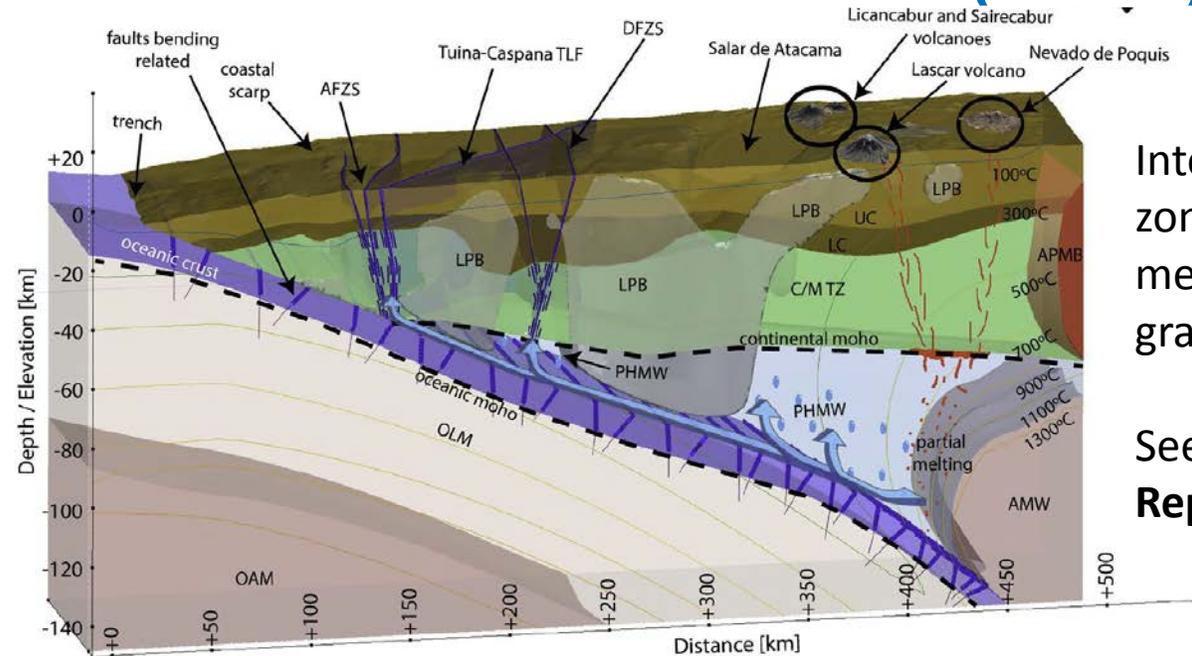
Procesos Volcánicos en Los Andes chilenos



Individual and collaborative projects; present and future

ANILLO

The interplay between subduction processes and natural disasters in Chile (INSUD)



Interpretation across the Antofagasta subduction zone based on the geophysical results of integrated methods (marine active seismic, natural seismology, gravimetry, magnetotellurics and thermal modelling)

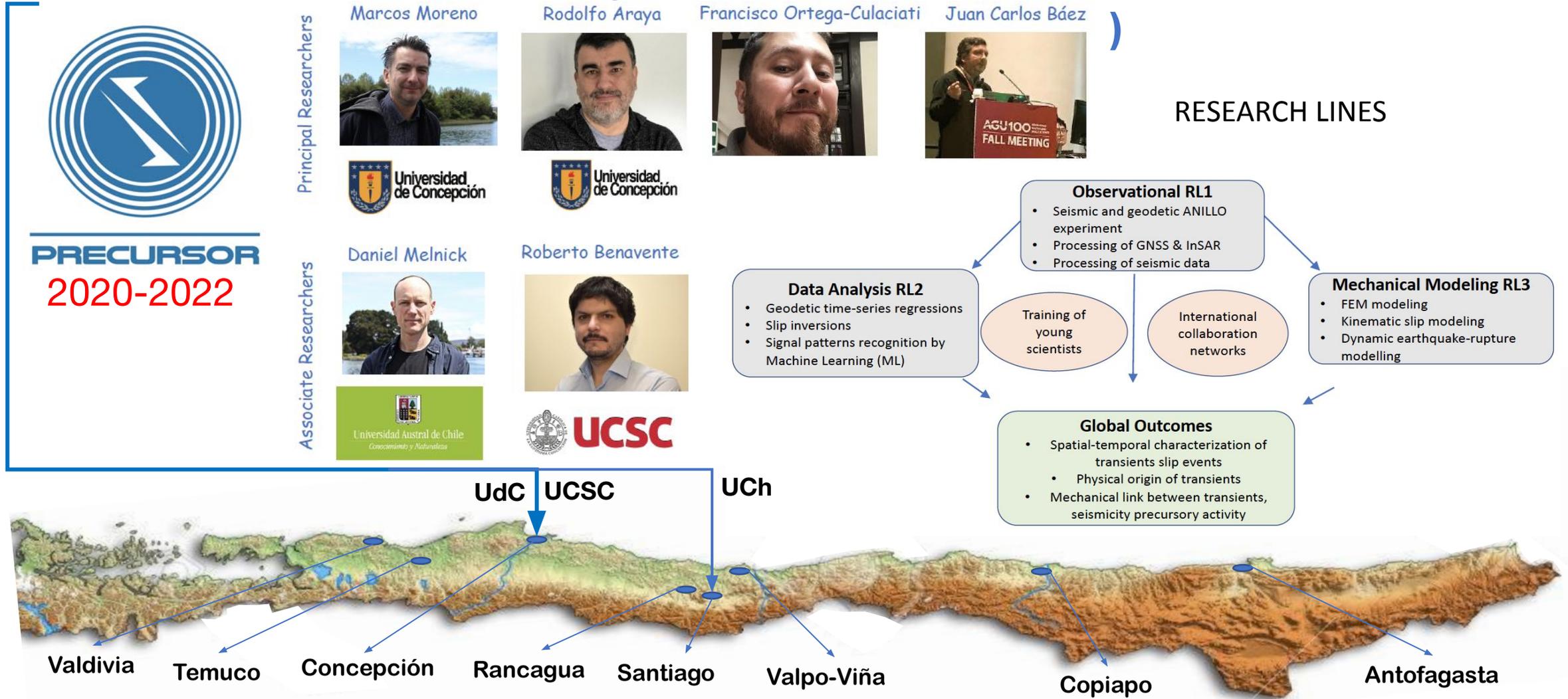
See further details in **Contreras-Reyes et al., (Sci. Report. 2021)**



Individual and collaborative projects; present and future

ANILLO

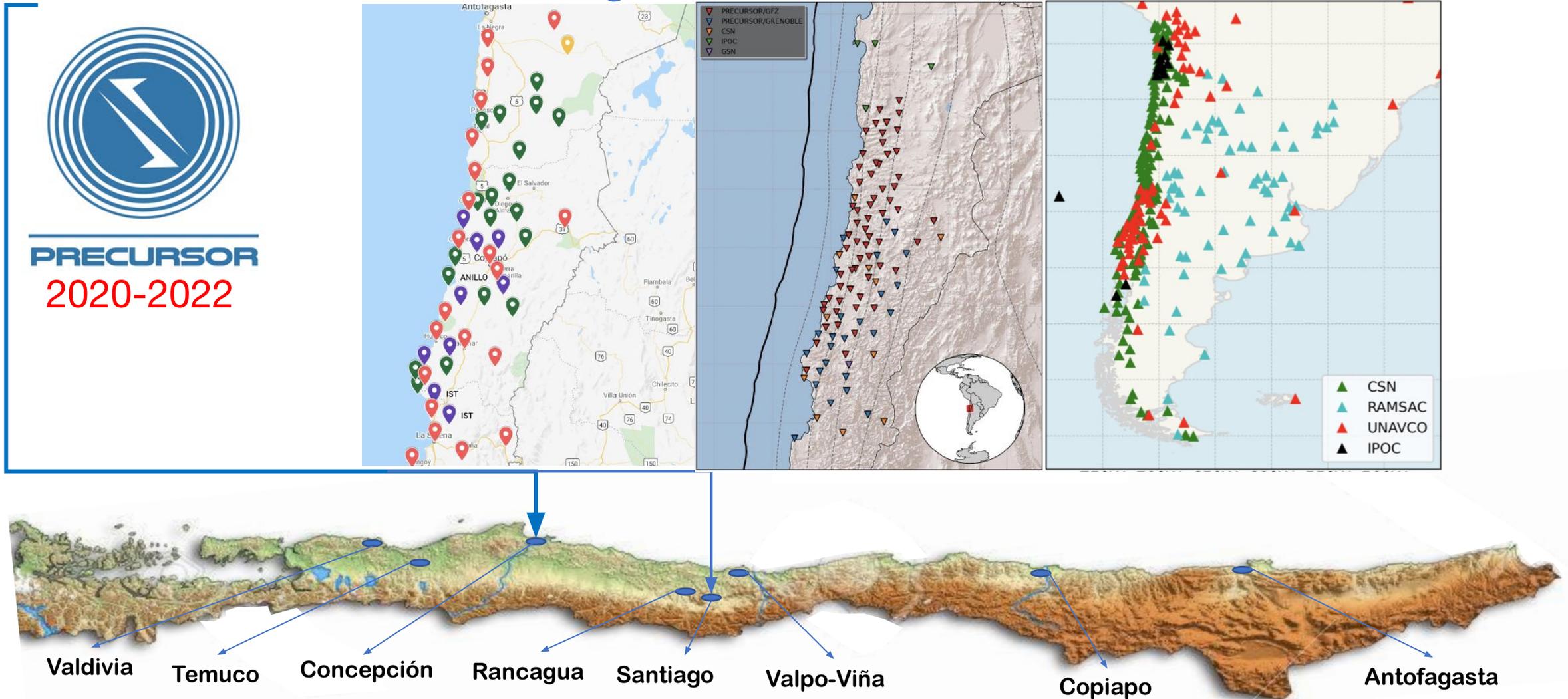
Toward understanding transient-to-precursory earthquake



Individual and collaborative projects; present and future

ANILLO

Toward understanding transient-to-precursory earthquake

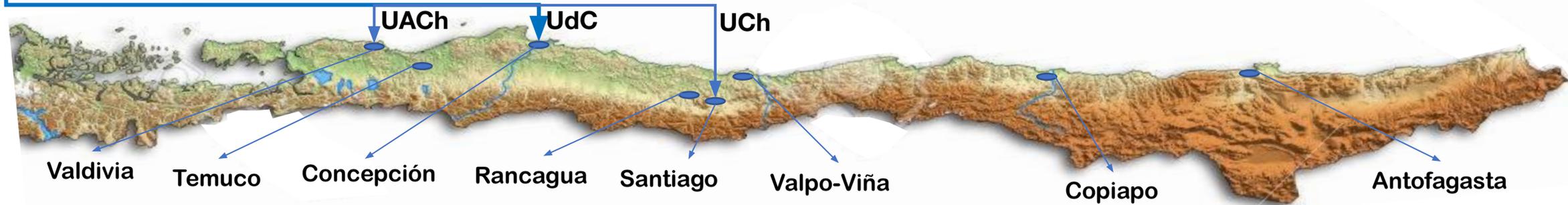
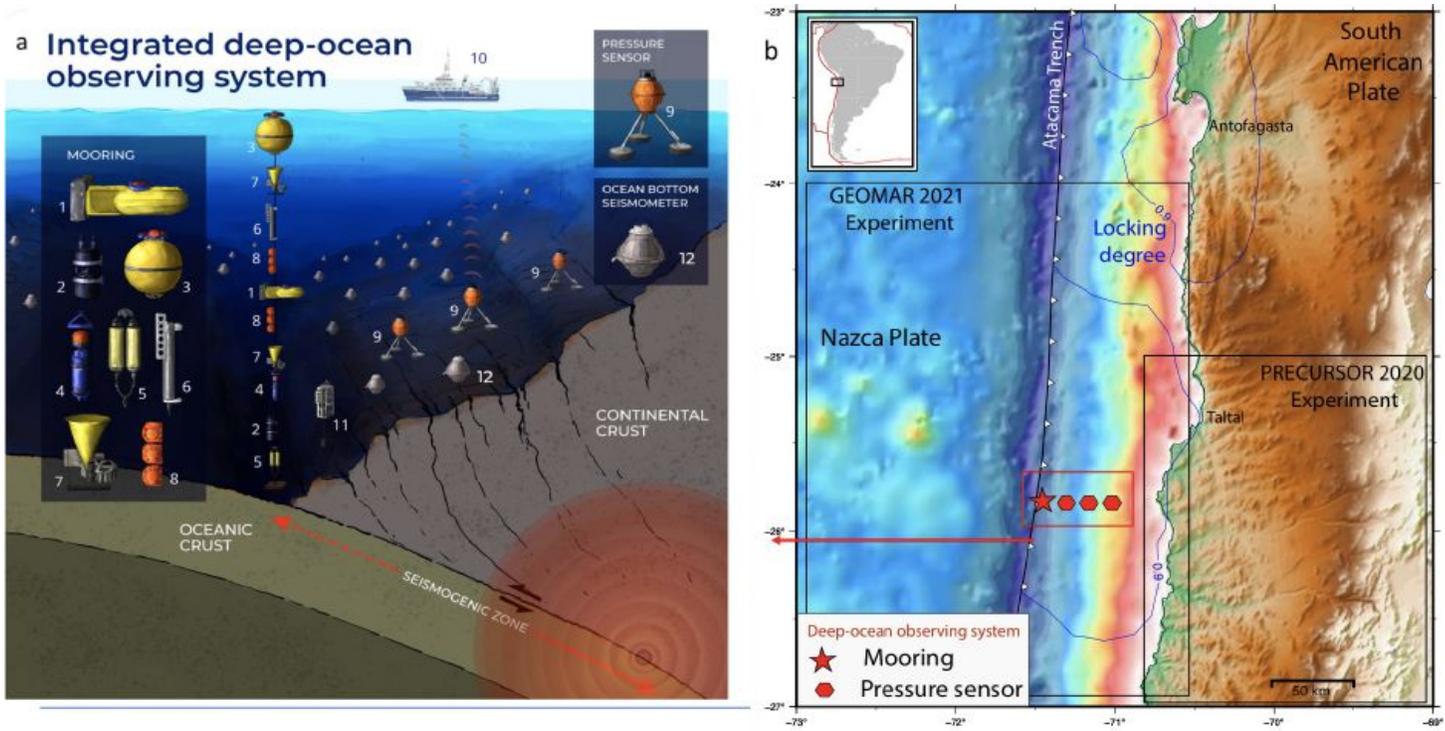


Individual and collaborative projects; present and future

FONDEQUIP

Integrated deep-ocean observing system (IDOOS)

2021-2024



Individual and collaborative projects; present and future

Millenium Nucleus

The seismic cycle along subduction zones (CYCLO)



CYCLO

T1: 2018-2020

T2: 2021-2023

Associate Researchers



Marco Cisternas Vega
Pontificia Universidad Católica de Valparaíso



Andrés Tassara Oddo
Alternate Director
Universidad de Concepción



Daniel Melnick d'Etigny
Director
Universidad Austral de Chile



Gonzalo Montalva Alvarado
Universidad de Concepción

Adjoint Researchers



Marcos Moreno
Universidad de Concepción



Ana Abarzúa
Universidad Austral de Chile

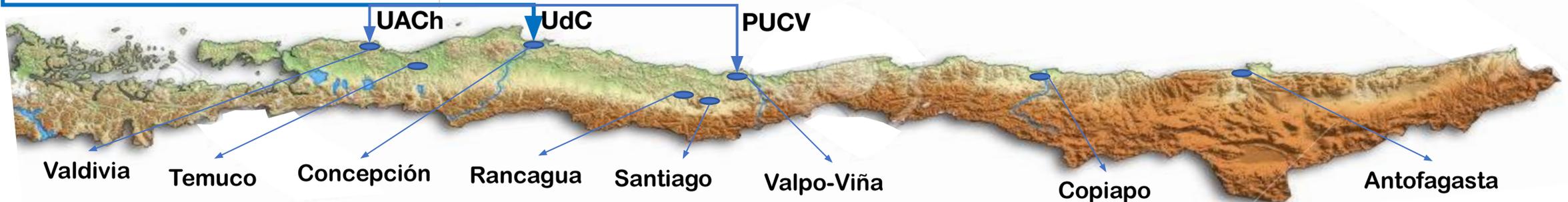
Young researchers



Ignacia Calisto
Universidad de Concepción



Joaquín Cortés
Universidad de Concepción



Individual and collaborative projects; present and future

Millenium Nucleus

The seismic cycle along subduction zones (CYCLO)



T1: 2018-2020
T2: 2021-2023

RESEARCH LINES

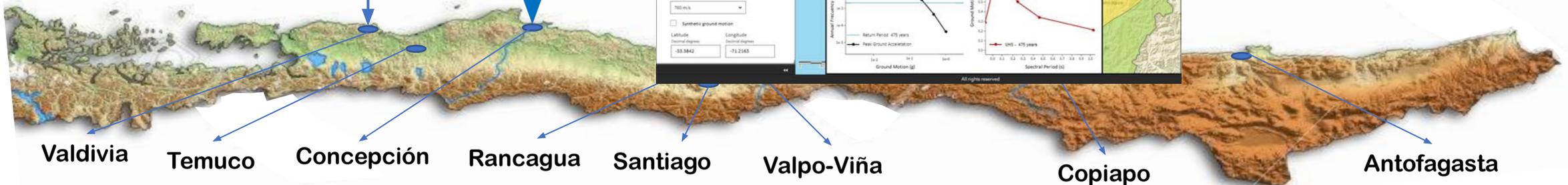
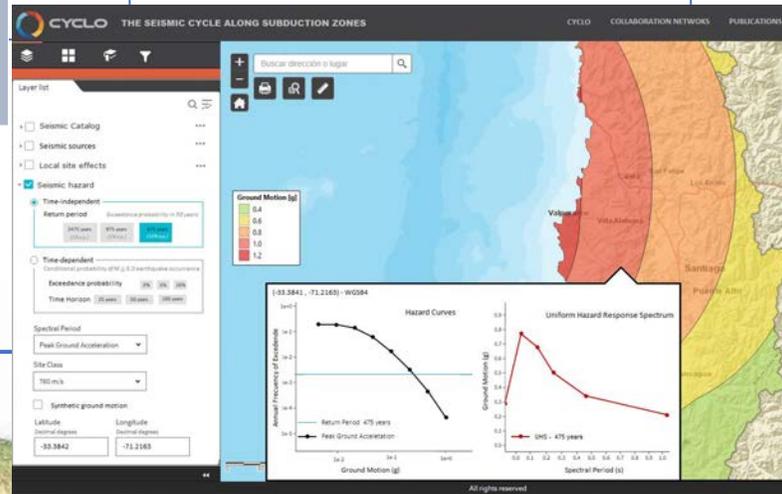
L2: Mechanical model
EQ cycle simulation
Tassara, Melnick, Moreno

L3: Upper-plate response
Continental deformation
Melnick, Tassara, Cisternas

L1: Temporal dimension
Earthquake recurrence
Cisternas, Melnick

CYCLO Hazards Geoportal

L5: Decadal deformation
Geodetic imaging
Moreno, Melnick



Individual and collaborative projects; present and future

Millenium Nucleus

The seismic cycle along subduction zones (CYCLO)

Towards Millenium Institute *iCYCLO*



+



+

IDOOS

+ ?



Individual and collaborative projects; present and future

FONDAP

National Research Center for Integrated Risk Management (CIGIDEN)



CIGIDEN

2013-2022
2023-2028?

SOCIAL PRACTICES

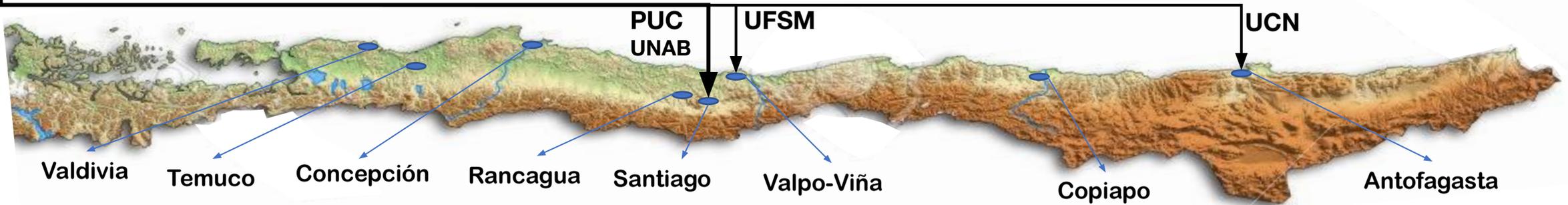
RL4 DISASTER CULTURES AND RISK GOVERNANCE	RL6 CITIZEN GOVERNANCE
 <p>Manuel Tironi Sociology & Anthropology</p>	 <p>Paula Repetto Disaster Behavioral Health</p>
	 <p>Carolina Martínez Geography & Territorial Planning</p>

NATURAL SYSTEMS AND PROCESSES

RL1 SOLID EARTH PROCESSES AND ASSOCIATED HAZARDS	RL2 SURFACE WATER PROCESSES AND ASSOCIATED HAZARDS
 <p>Gabriel González – Deputy Director Earth Sciences & Natural Hazards</p>	 <p>Patricio Catalán Coastal Processes & Civil Engineering</p>
	 <p>Rodrigo Cienfuegos – Director Earth Sciences & Civil Engineering</p>

RISK AND RESILIENCE ANALYSIS

RL3 RISK AND RESILIENCE OF COMPLEX SYSTEMS AND NETWORKS	RL5 SOCIO-ECONOMIC OF DISASTERS AND MITIGATION STRATEGIES FOR RESILIENT CRITICAL INFRASTRUCTURE SYSTEMS
 <p>Juan Carlos De la Llera Civil Engineering/Risk Resilience of Physical Systems</p>	 <p>Nicolás Bronfman Risk Perception and Socio-Economic Assessment</p>
	 <p>Alondra Chamorro Civil Engineering & Infrastructure Management</p>



Individual and collaborative projects; present and future

FONDAP

National Research Center for Integrated Risk Management (CIGIDEN)



CIGIDEN

2013-2022
2023-2028?

1. Hazard Characterization	2. Exposure Models	3. Physical & Social Vulnerability	4. Direct Damage/Loss Assessment
<ul style="list-style-type: none"> Deterministic extreme scenarios Synthetic hazard maps Earthquake-tsunamis-flash floods Volcanic hazards Multihazard assessment 	<ul style="list-style-type: none"> Night and daytime population distribution Essential facilities (health, education, emergency). Lifelines (water, electricity, roads) Building type distribution Demographic characteristics 	<ul style="list-style-type: none"> Development and adaptation of fragility curves Development and adaptation of social vulnerability indexes Risk perception, preparedness and awareness Mental health outcomes 	<ul style="list-style-type: none"> Physical damage to buildings, essential facilities and lifelines Casualties Humanitarian logistics Direct economic losses

5. Early warning systems and evacuation modelling



Individual and collaborative projects; present and future

Millenium Institute

Millenium Institute on Volcanic Risk Research – Ckelar Volcanoes



2022-2032!!!

Director

Dr. Felipe Aguilera (UCN)

Co-Director

Dr. Pablo Salazar (UCN)

Principal Investigators

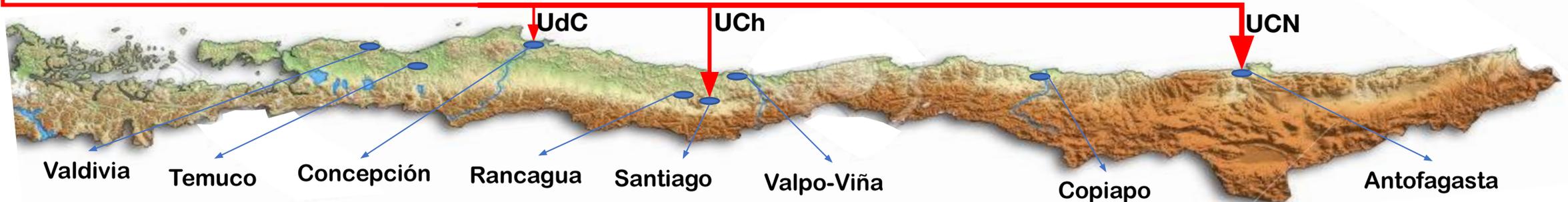
Dr. Joseline Tapia (UCN)

Dr. Verónica Oliveros (UDEC)

Dr. Mahesh Shrivastava (UCN)

Dr. Rodrigo González (UCN)

Dr. Daniel Díaz (Uch)



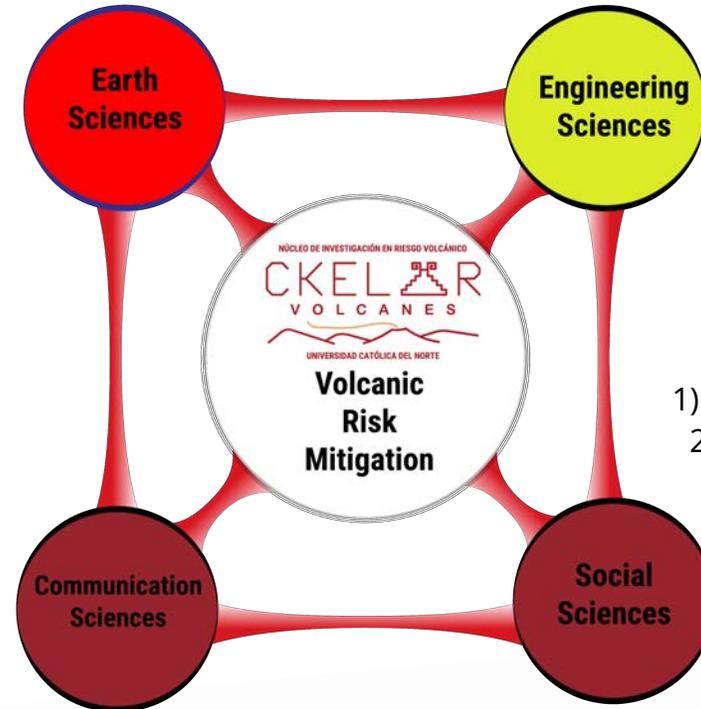
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Millenium Institute

Millenium Institute on Volcanic Risk Research – Ckelar Volcanoes

CKELAR
VOLCANES

2022-2032!!!



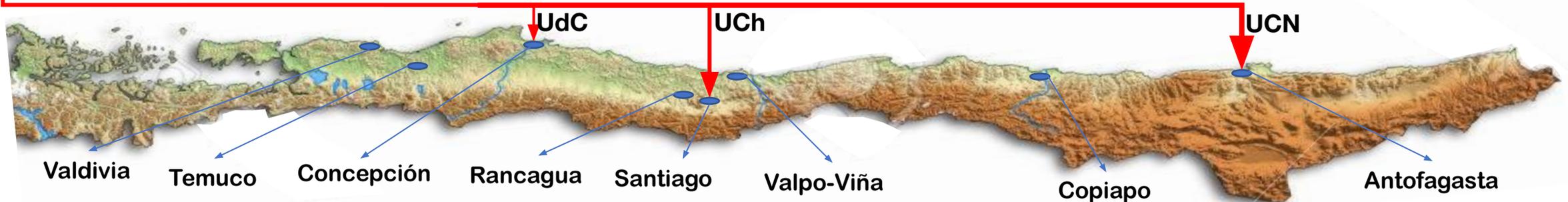
Objectives

General

To determine the factors that control the recurrence, rate and size of eruptions along the CVZA.

Specific

- 1) To establish the physicochemical processes that control the volcanic activity
- 2) to better understand the role of regional tectonic processes on magmatic and volcanic activity
- 3) to constrain the effects of volcanism on the environment
- 4) to assess the volcanic hazards and risks in specific areas.



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**LET'S WORK ALL TOGETHER, AS
ONE SCIENTIFIC COMMUNITY, TO
BE THE BEST PARTNER TO SZ4D!!!**

