

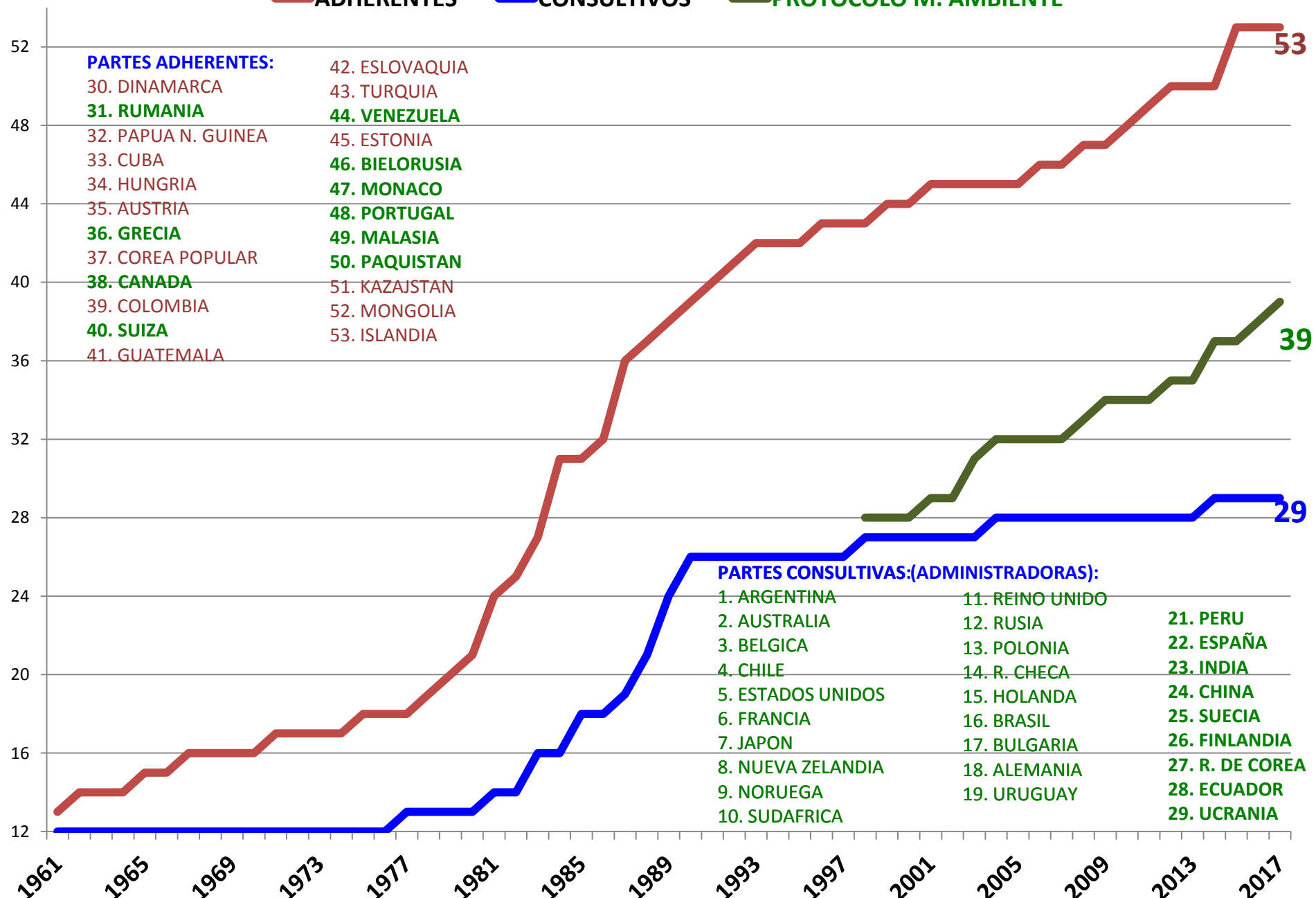
**LABORATORIOS
NATURALES PARA LA
CIENCIA CHILENA.**

**PONTIFICIA UNIVERSIDAD
CATOLICA DE CHILE
AGOSTO, 2017**



INTERES POLITICO

ADHERENTES CONSULTIVOS PROTOCOLO M. AMBIENTE



PARTES ADHERENTES:

- 30. DINAMARCA
- 31. RUMANIA
- 32. PAPUA N. GUINEA
- 33. CUBA
- 34. HUNGRIA
- 35. AUSTRIA
- 36. GRECIA
- 37. COREA POPULAR
- 38. CANADA
- 39. COLOMBIA
- 40. SUIZA
- 41. GUATEMALA
- 42. ESLOVAQUIA
- 43. TURQUIA
- 44. VENEZUELA
- 45. ESTONIA
- 46. BIELORUSIA
- 47. MONACO
- 48. PORTUGAL
- 49. MALASIA
- 50. PAQUISTAN
- 51. KAZAJSTAN
- 52. MONGOLIA
- 53. ISLANDIA

PARTES CONSULTIVAS:(ADMINISTRADORAS):

- 1. ARGENTINA
- 2. AUSTRALIA
- 3. BELGICA
- 4. CHILE
- 5. ESTADOS UNIDOS
- 6. FRANCIA
- 7. JAPON
- 8. NUEVA ZELANDIA
- 9. NORUEGA
- 10. SUDAFRICA
- 11. REINO UNIDO
- 12. RUSIA
- 13. POLONIA
- 14. R. CHECA
- 15. HOLANDA
- 16. BRASIL
- 17. BULGARIA
- 18. ALEMANIA
- 19. URUGUAY
- 20. CANADA
- 21. PERU
- 22. ESPAÑA
- 23. INDIA
- 24. CHINA
- 25. SUECIA
- 26. FINLANDIA
- 27. R. DE COREA
- 28. ECUADOR
- 29. UCRANIA

INTERÉS POLÍTICO - CIENTÍFICO

BASES ANTÁRTICAS DISTRIBUIDAS POR SECTOR Sudamérica, África y Australia-Nueva Zelandia

Fuente: INACH



CON BASES PROPIAS

Chile, Corea,
China, Polonia,
Brasil, Uruguay,
Argentina, Perú,
Rusia, España,
Estados Unidos,
Bulgaria, Reino
Unido, Ecuador,
Ucrania, Alemania y
República Checa.

SIN BASES PROPIAS

Holanda,
Venezuela,
Colombia, Portugal
y Malasia.

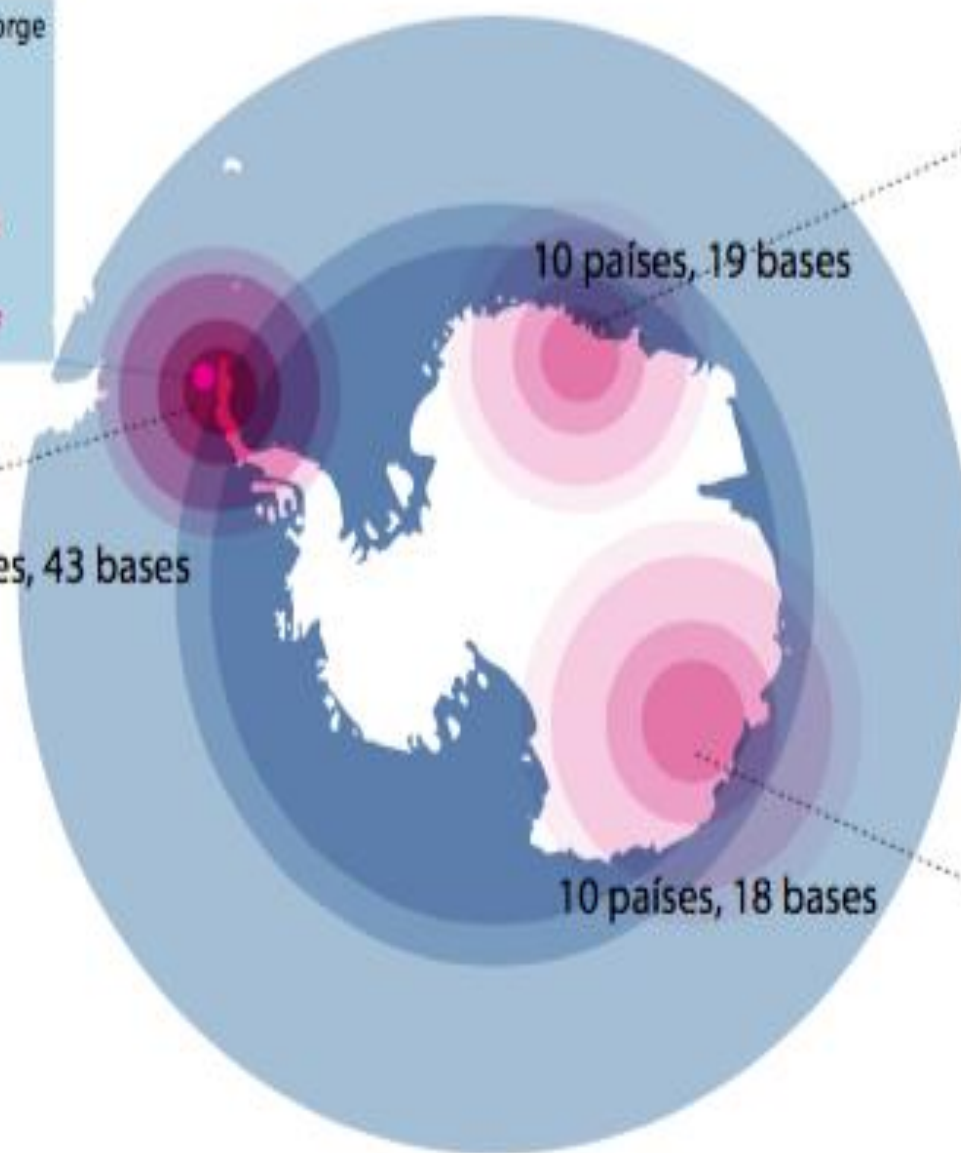
22 países, 43 bases

10 países, 19 bases

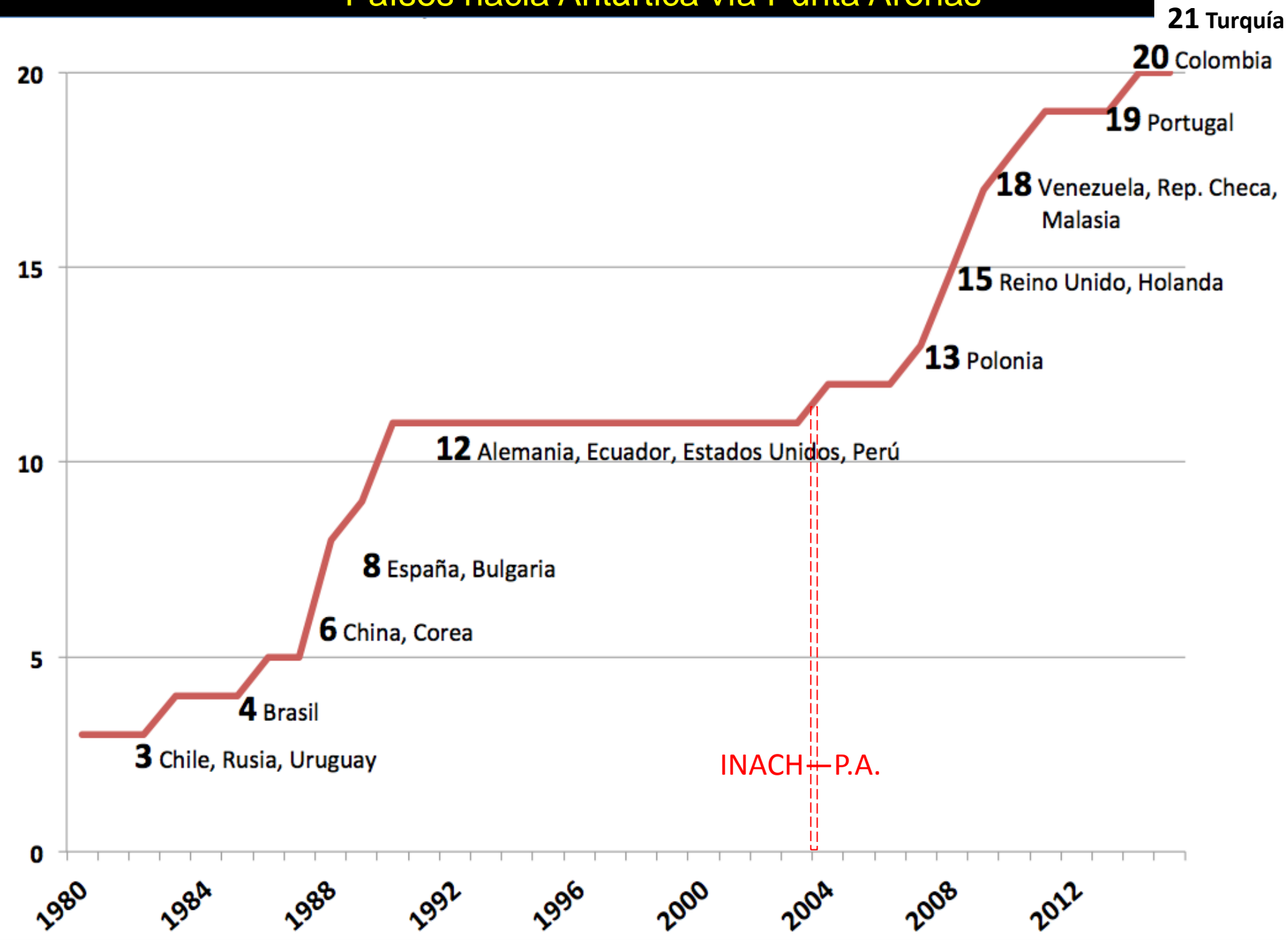
Rusia, Japón,
Suecia, Finlandia,
Noruega, Reino
Unido, India,
Bélgica, Alemania y
Sudáfrica.

10 países, 18 bases

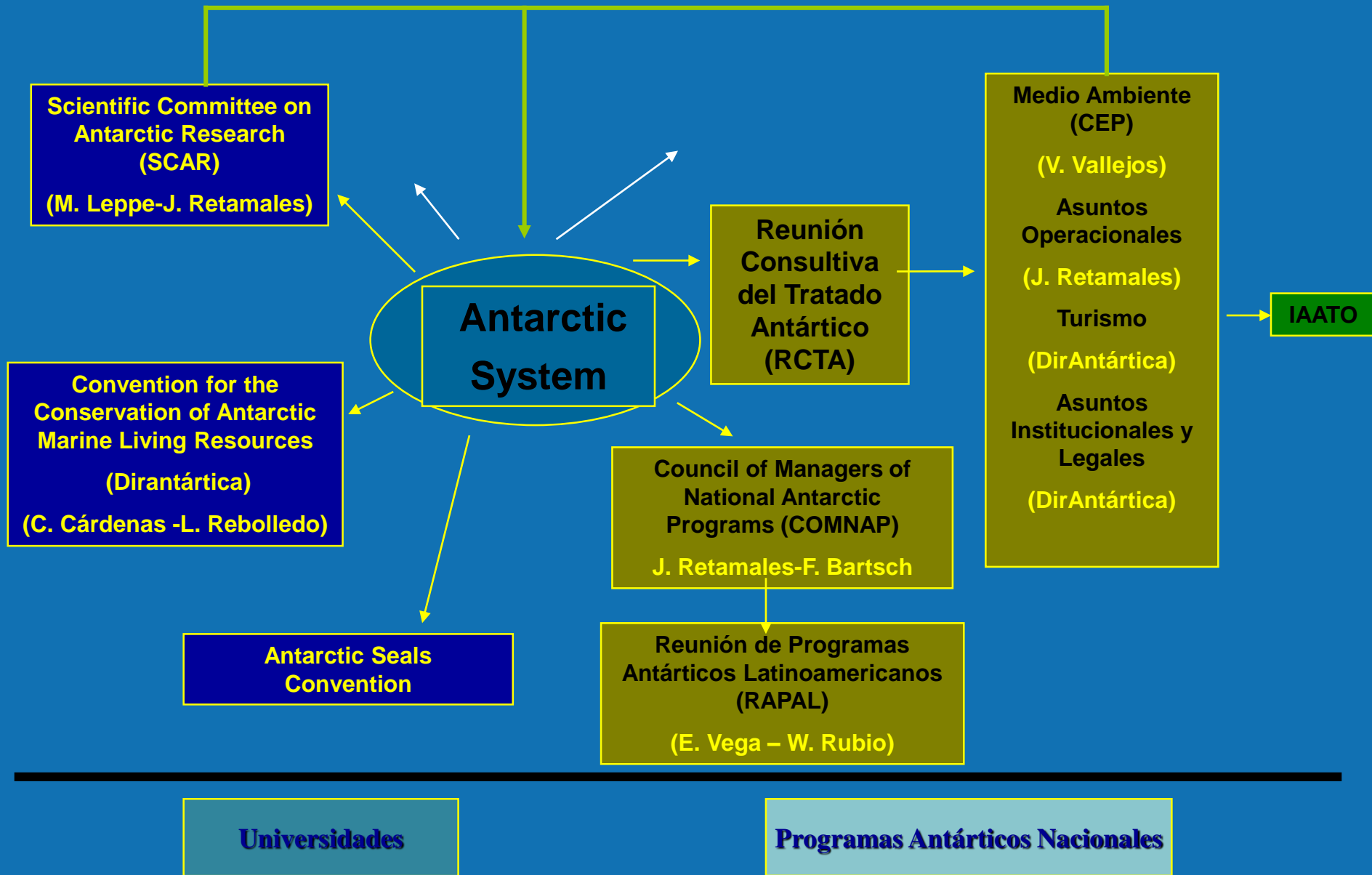
Australia, China,
Francia, Alemania,
India, Italia, Corea,
Nueva Zelandia,
Rusia y Estados
Unidos.



Países hacia Antártica vía Punta Arenas



INACH INTERNACIONAL



35
CIENTÍFICOS



x 7



238
CIENTÍFICOS

2005



2017

24
PROYECTOS
CIENTÍFICOS



x 4



96
PROYECTOS
CIENTÍFICOS

2005



2017

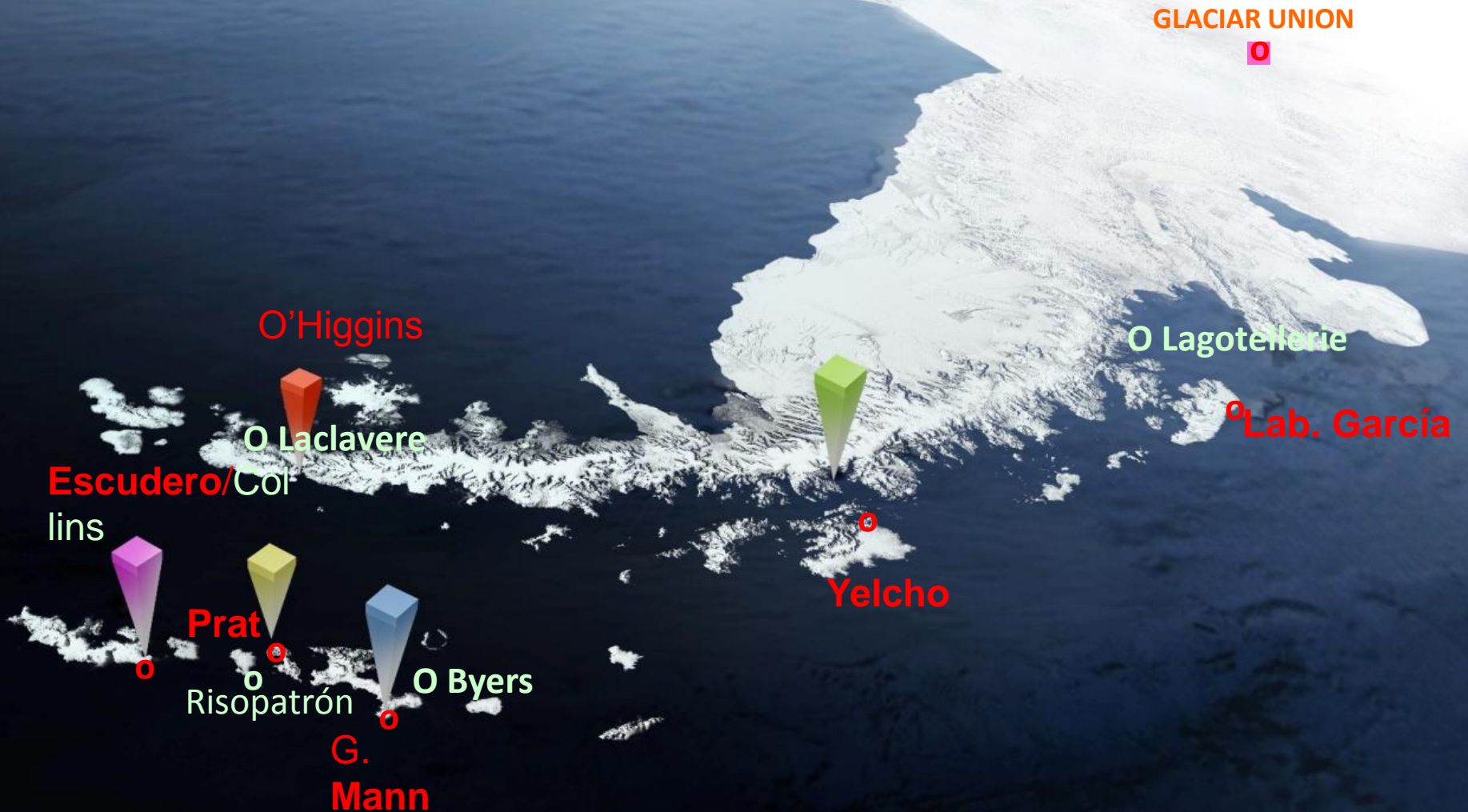
44
FUNCIONARIOS

x 1,5

68
FUNCIONARIOS

PARA COLABORAR NECESITABAMOS CRECER

BASES & REFUGIOS CIENTIFICOS 2017

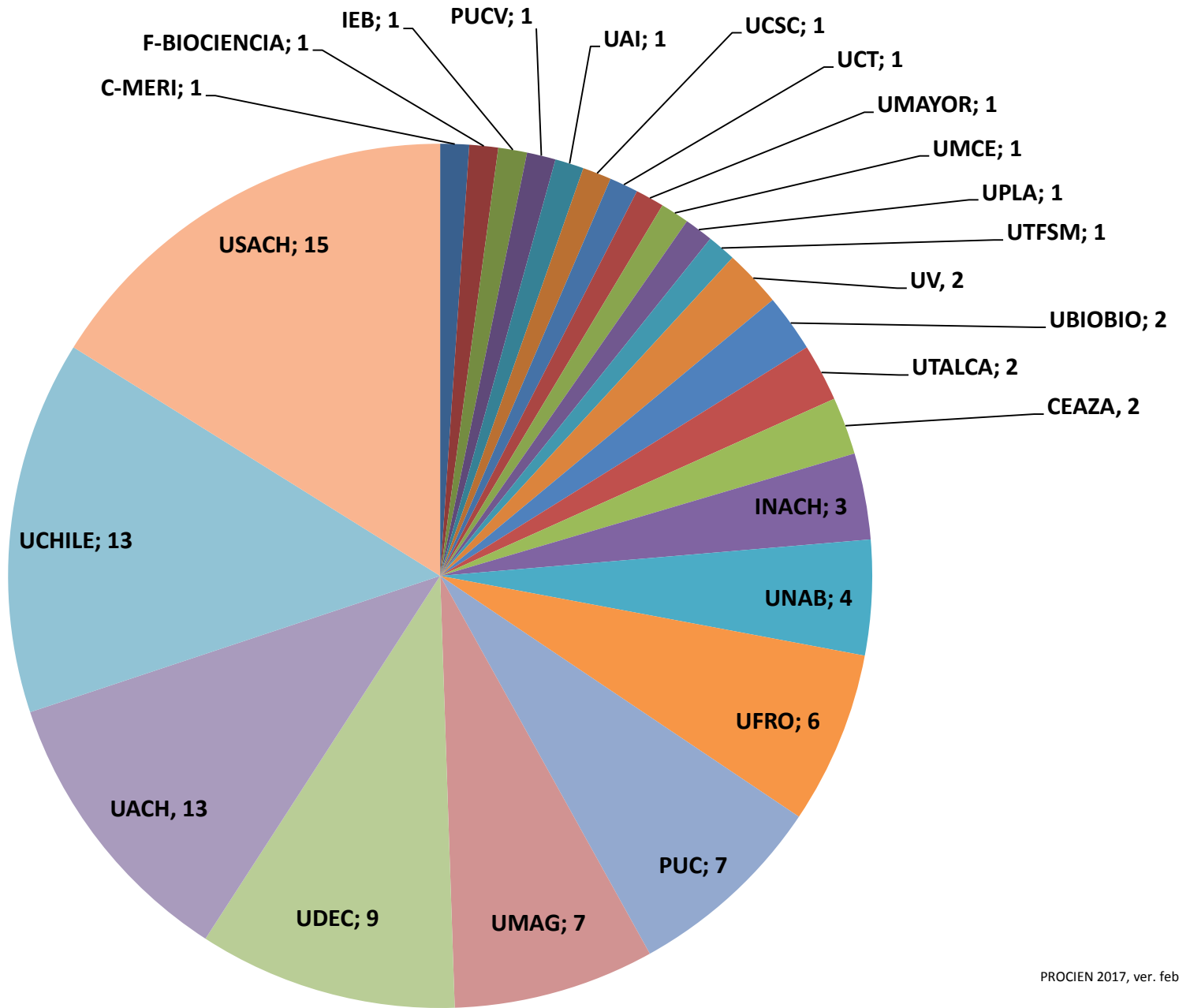


2016: RS/KARPUJ

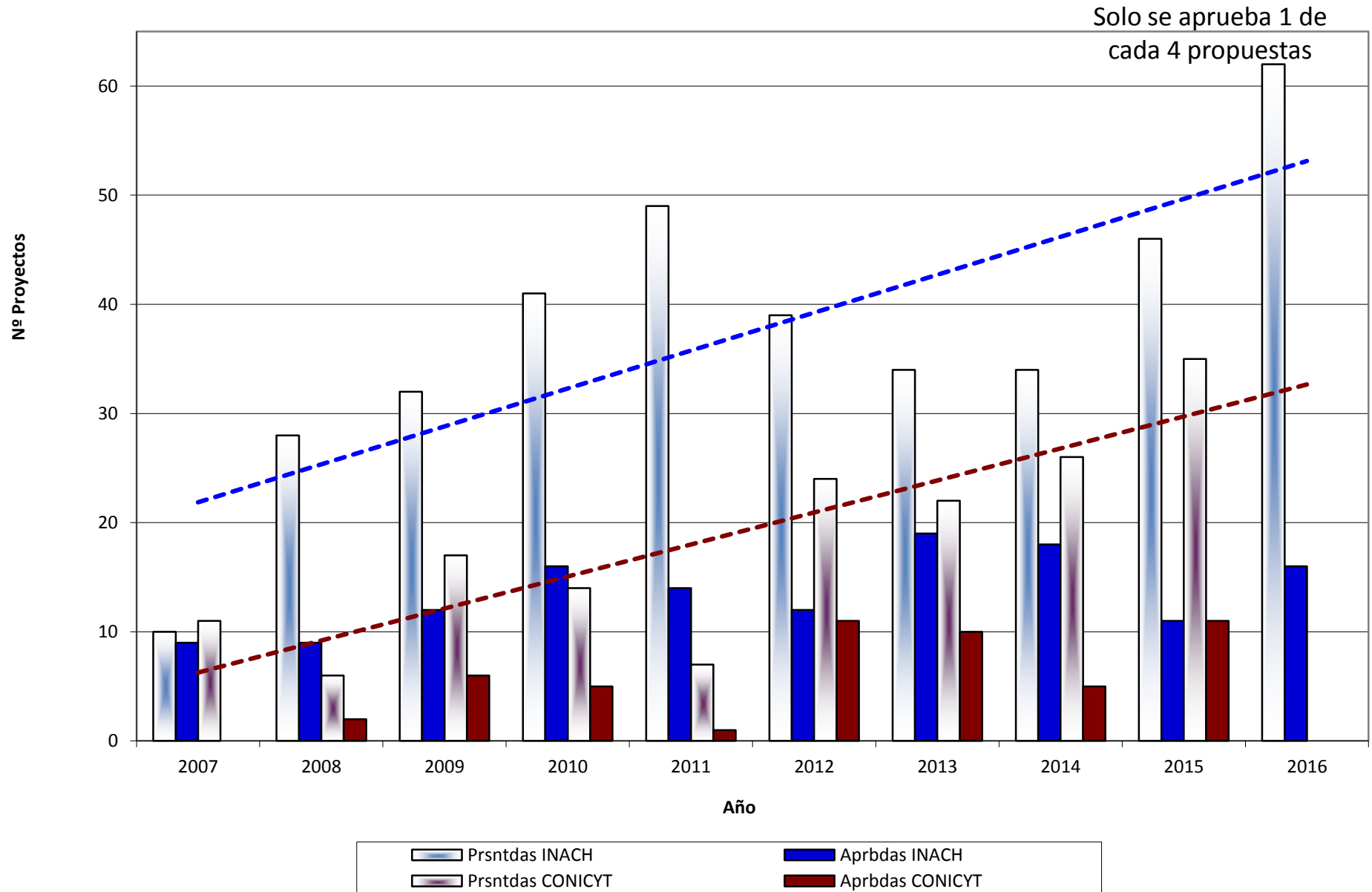


Programa Científico Nacional 2017

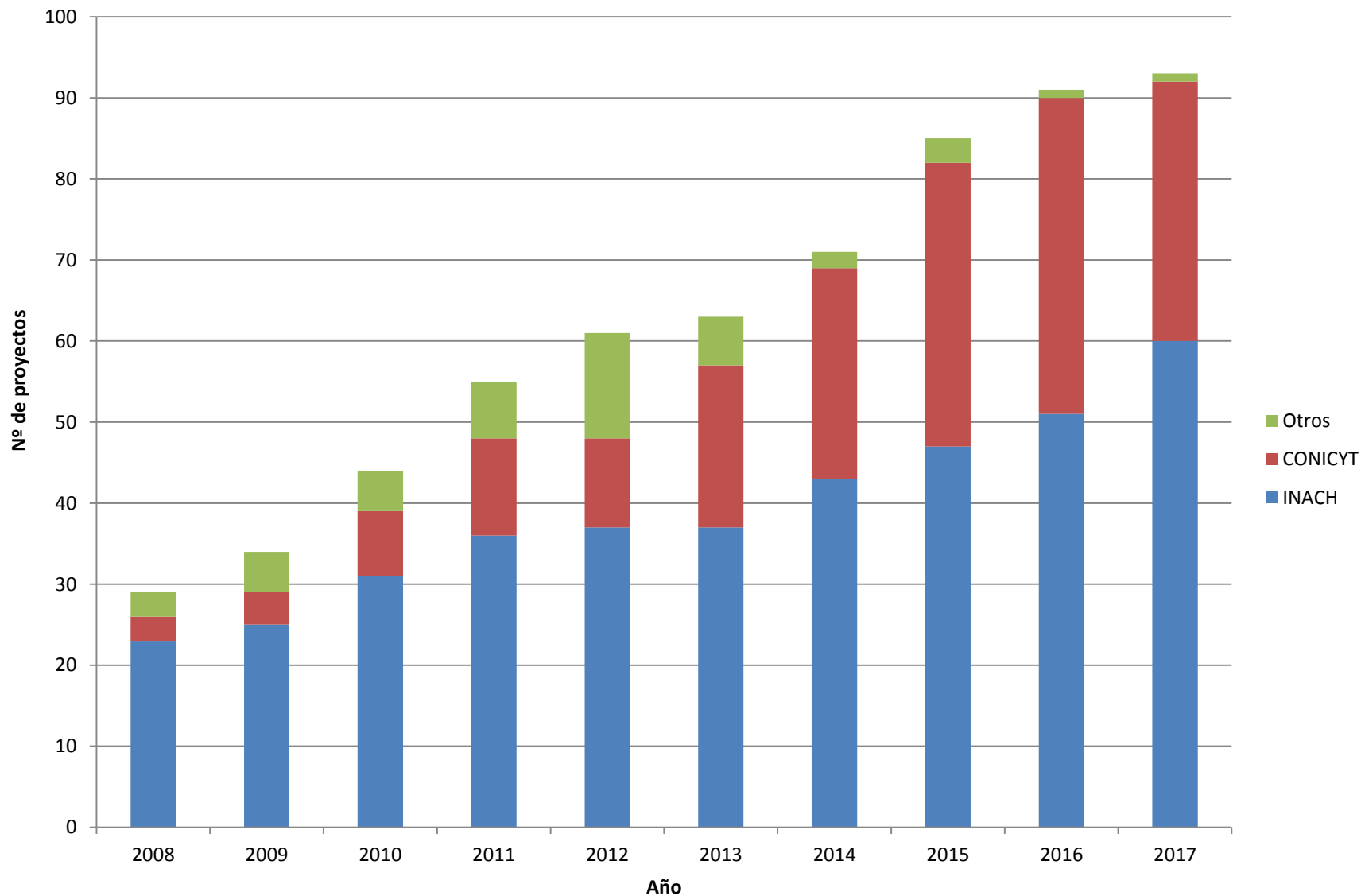
24 Universidades & Centros (96 proyectos)



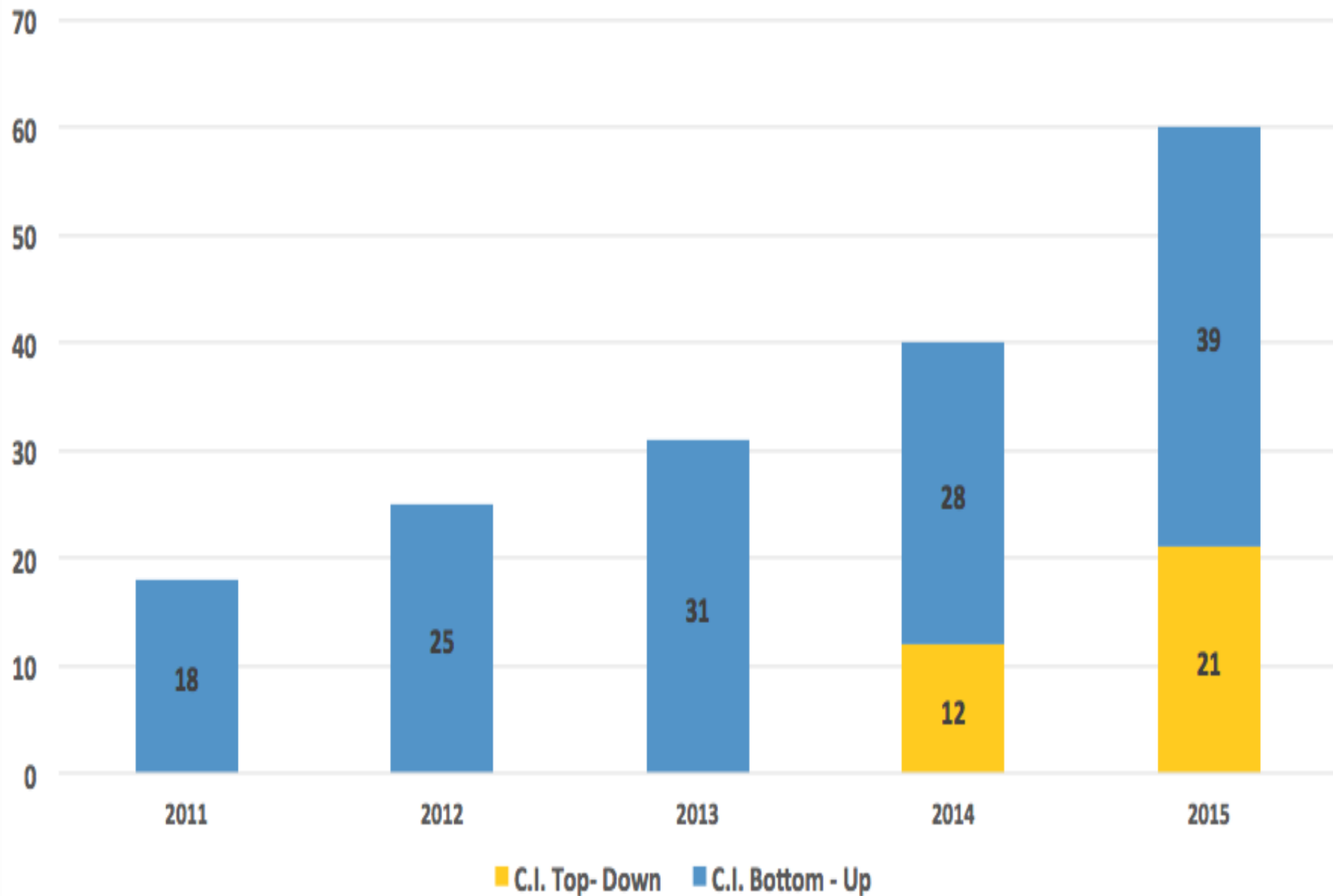
Propuestas antárticas recibidas y aprobadas por concursos INACH y CONICYT



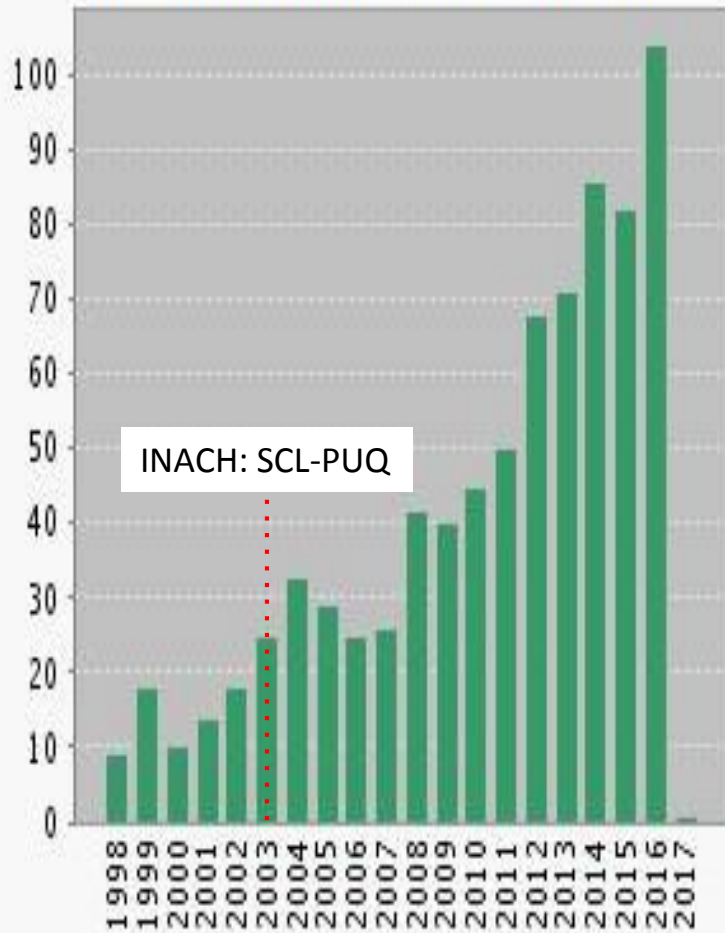
Composición de proyectos del PROCIENT, por tipo de concurso



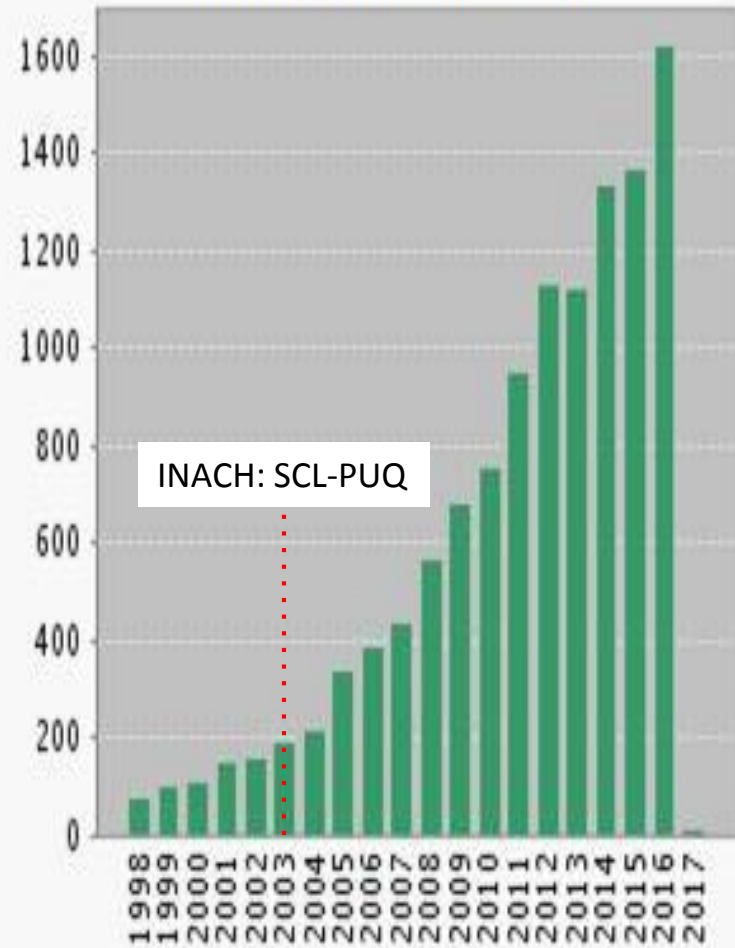
Proyectos con Colaboración Internacional (C.I.)

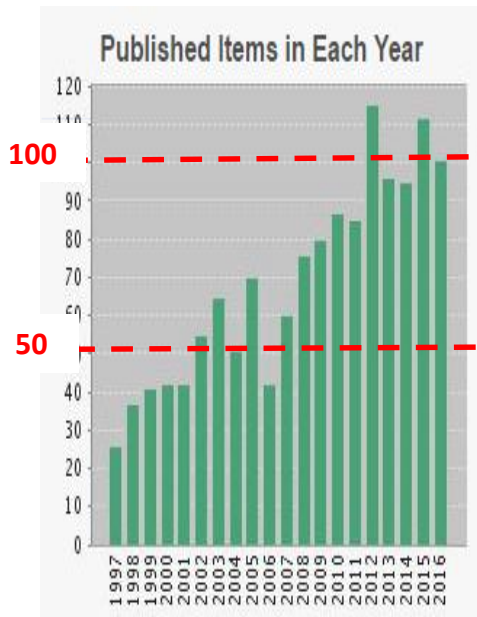


WOS articles every year

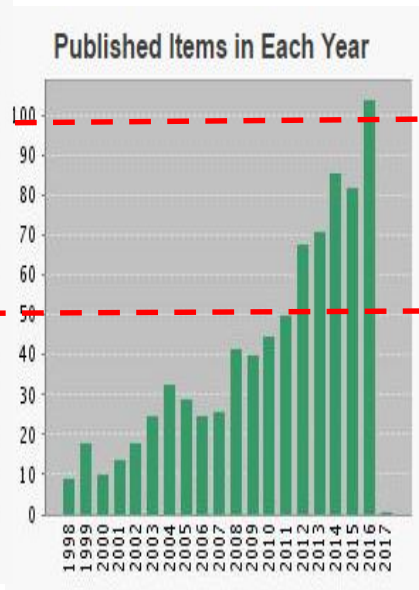


Citations per year

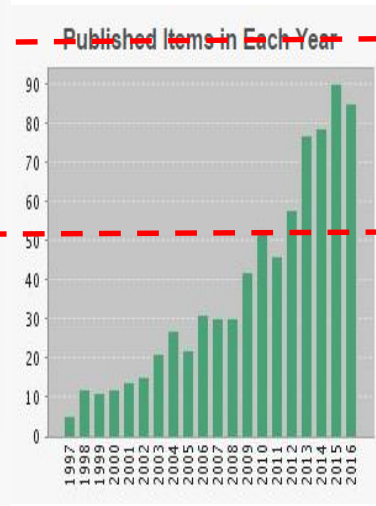




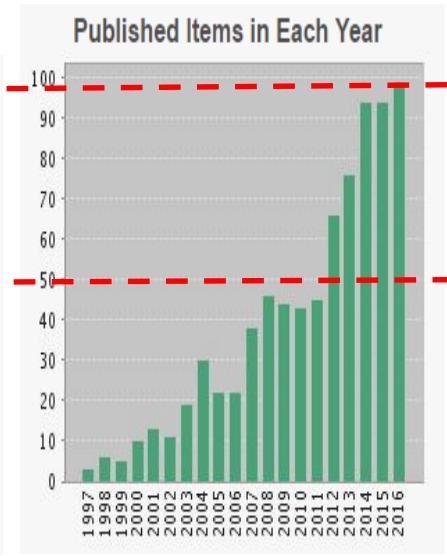
Argentina
 # papers: **1523**
 Promedio de citas **15.29**
 H-index: **62**



Chile
 #papers : **874**
 Promedio de citas: **13.73**
 H-index: **48**



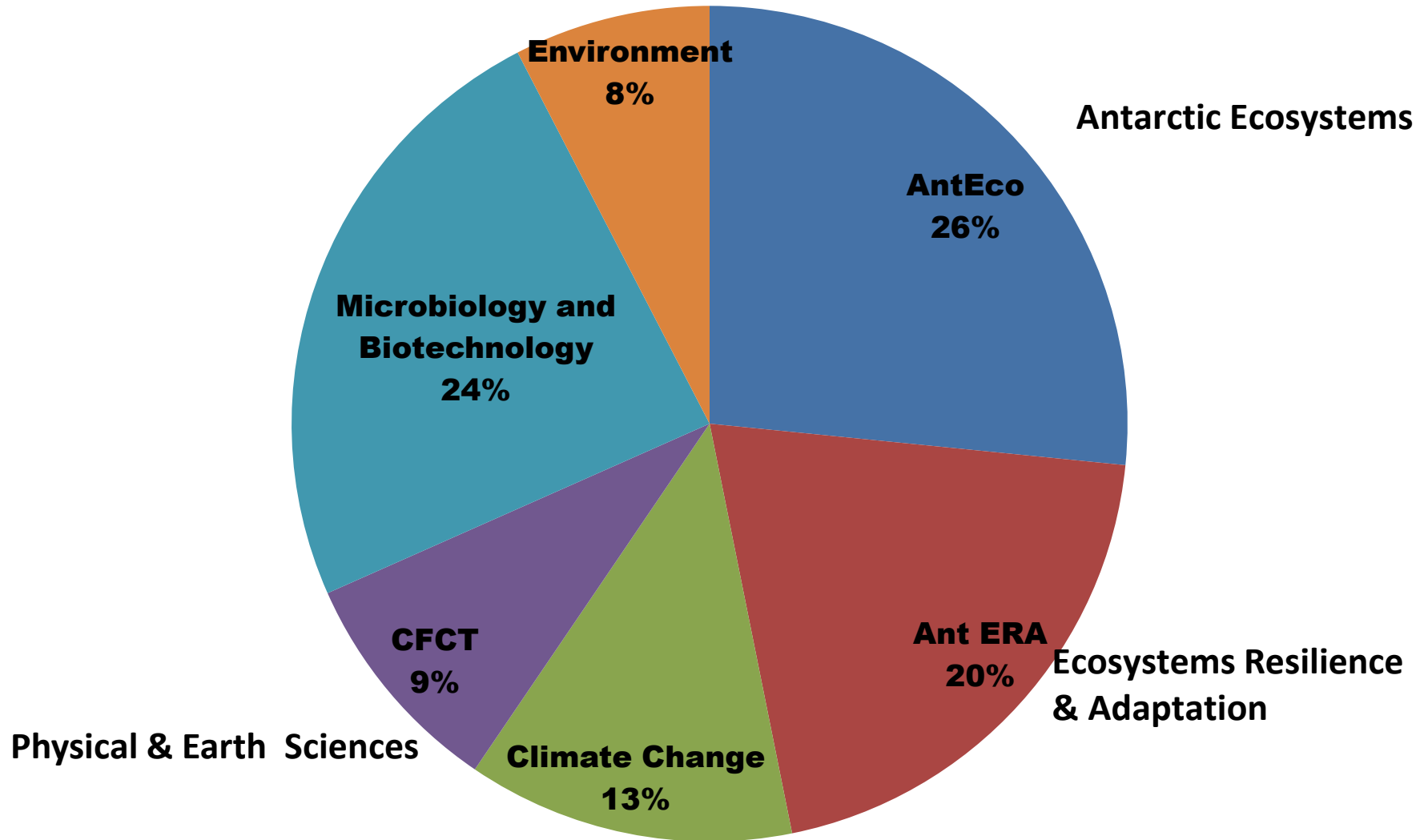
Brasil
 # papers: **804**
 Promedio de citas: **11.45**
 H-index: **44**



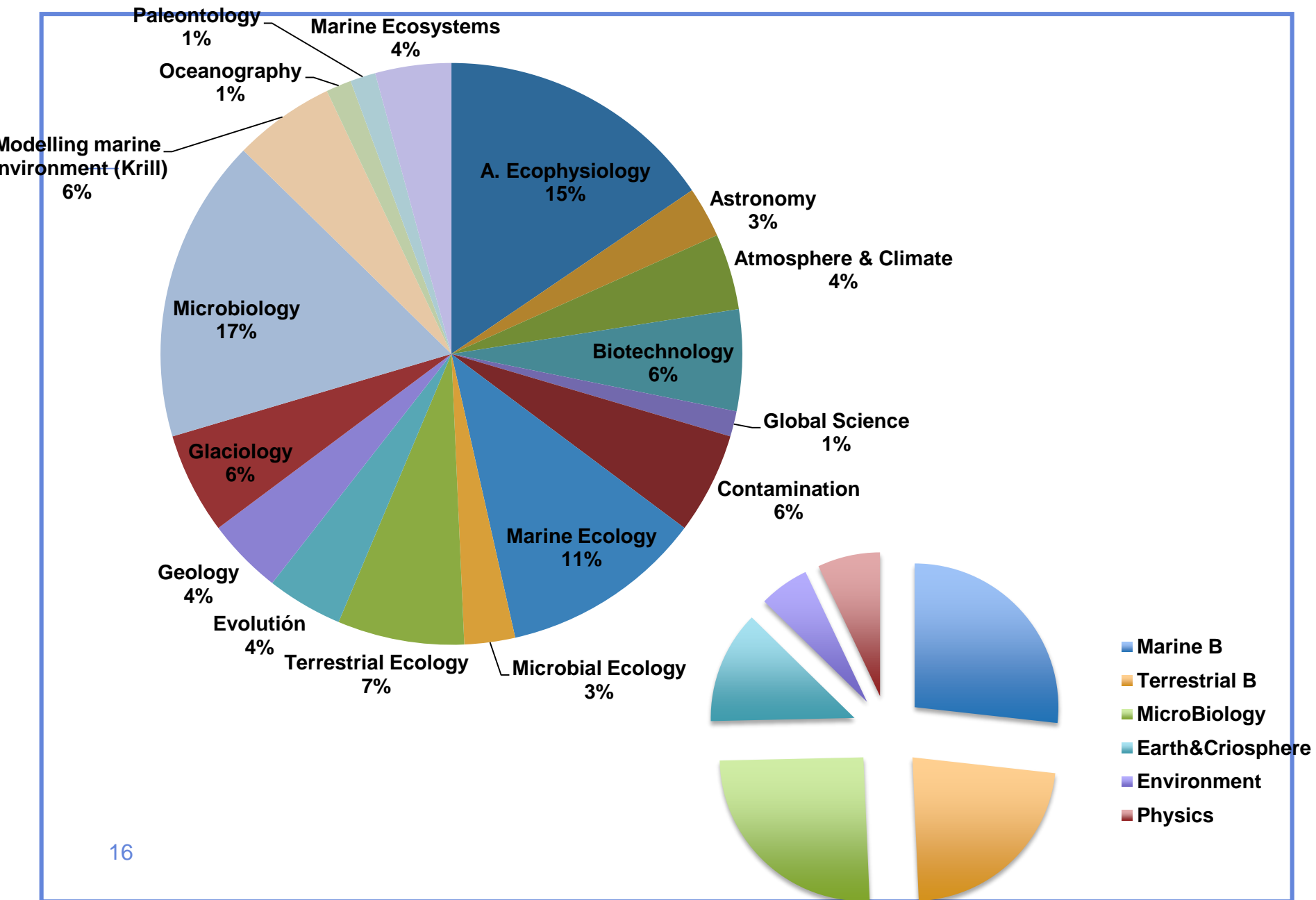
Corea
 # papers: **797**
 Promedio de citas : **10.40**
 H-index: **40**

INACH's 2017 projects (96) by research lines

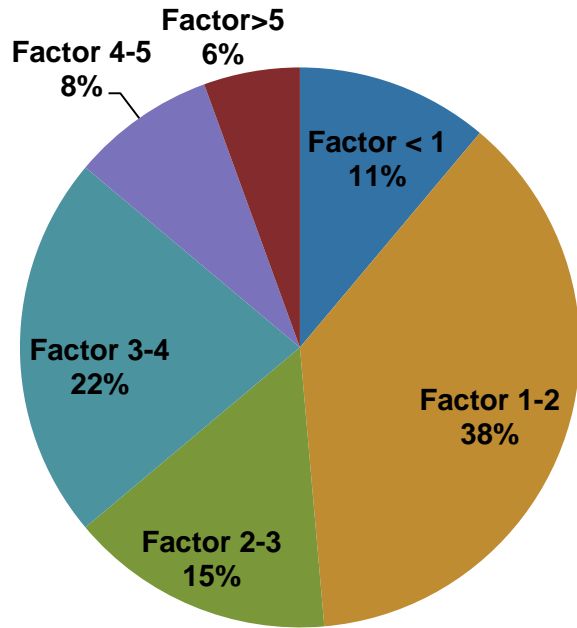
(33% projects related to Climate Change)



2016 WOS chilean antarctic articles (N=72)

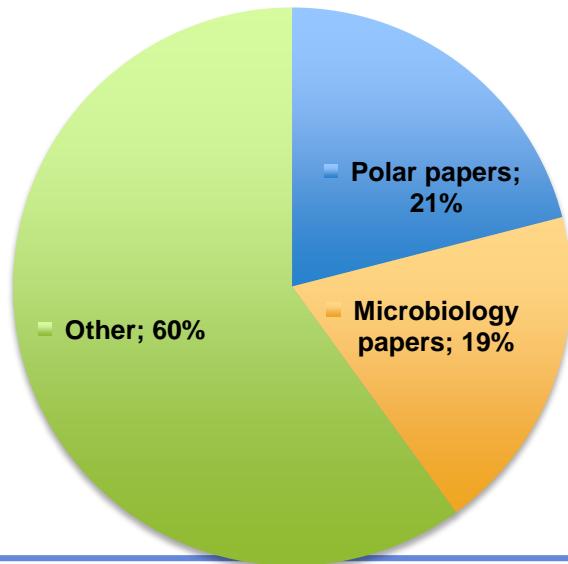


Impact Factor (IF) 2015 (n=72)



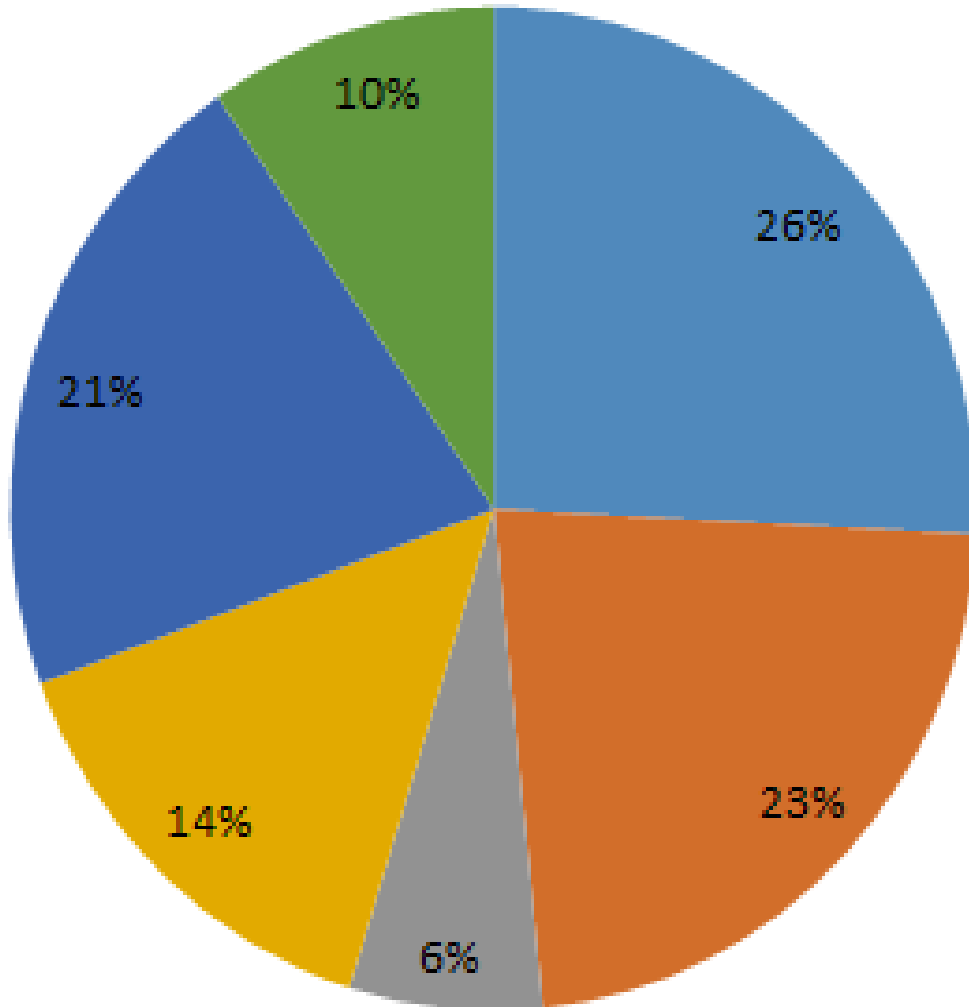
Quality
IF < 2 = 49%
2 < IF < 4 = 37%
4 < IF = 14%

Polar Science Magazines IF
 Adv. In Polar Science **0,38**,
 Polar Research **1,14**,
 Polar Science **1,5**.
 Polar Biology **1,71**,



Microb & Biotech Magazines IF
 International Microbiology **1,63**
 Research in Microbiology **2,15**
 Frontiers Microbiology **4,07**
 Appl & Environm Microbiol **4,31**

Publicaciones ISI por líneas del PROCIENT 2016



ECOSISTEMAS ANTÁRTICOS

RESILIENCIA Y ADAPTACION

CAMBIO CLIMATICO

CIENCIAS FISICAS Y GEOLOGIA

MICROBIOLOGIA/BIOTECNOLOGIA

MEDIO AMBIENTE



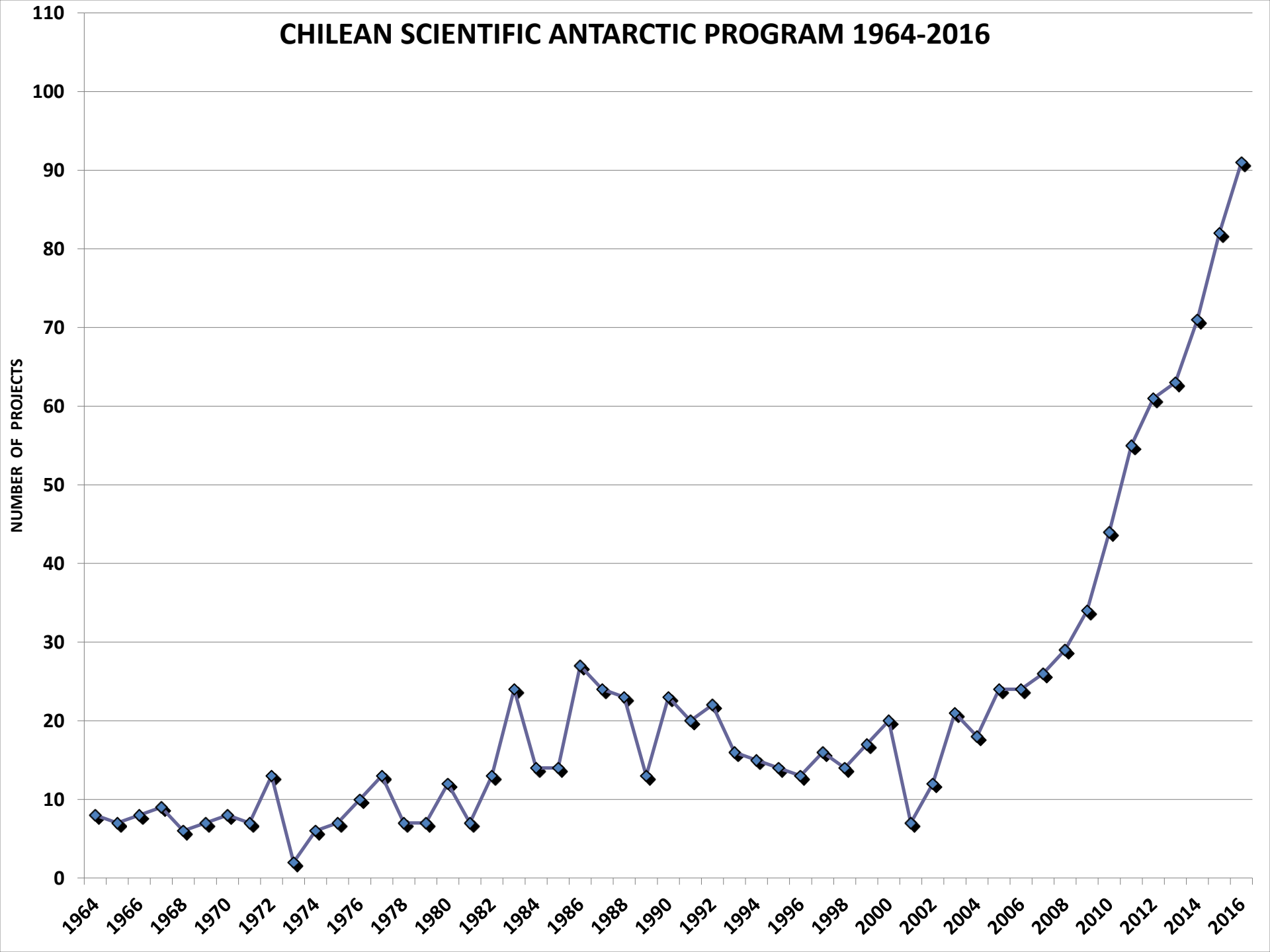
INACH
Ministerio de
Relaciones
Exteriores

Gobierno de Chile

INSTITUTO ANTÁRTICO CHILENO



CHILEAN SCIENTIFIC ANTARCTIC PROGRAM 1964-2016





Dr. Zhou Meng, Shanghai University
- China 1000 Talent Professor
- France Chair of Excellence
- NSF-EEUU Antarctica Service Medal

Dic 2015

Dr. Zhang Yuzhong
Shandong University
Professor

INACH



Changcheng

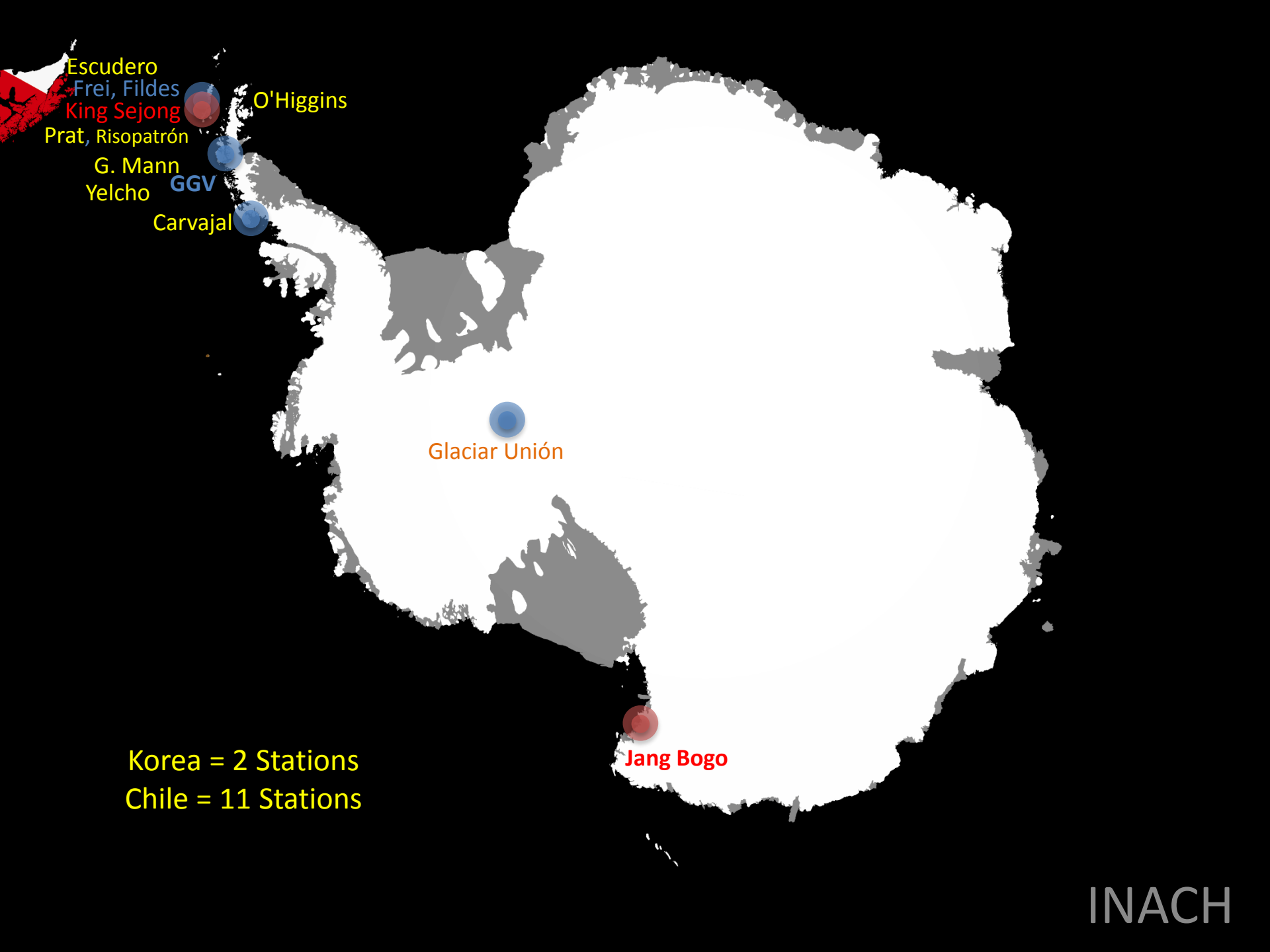
Kunlun

Taishan

Zhongshan

**“Conocer nuestras
contrapartes”**

INACH



Escudero
Frei, Fildes
King Sejong
Prat, Risopatrón
G. Mann
Yelcho
Carvajal

O'Higgins

GGV

Glaciar Unión

Jang Bogo

Korea = 2 Stations
Chile = 11 Stations

Changcheng
Escudero
Frei-Fildes

O'Higgins

Prat - Risopatrón
Guillermo Mann

Yelcho

GGV

Carvajal

**HABILITAR NUESTRAS BASES
PARA LA CIENCIA Y EL
TURISMO**

MOVING SOUTH: 2014 - NEW YELCHO STATION



2015: ISABEL, HDPE Launches







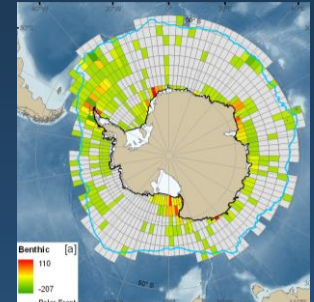


State of the Antarctic Ecosystem (AntEco)

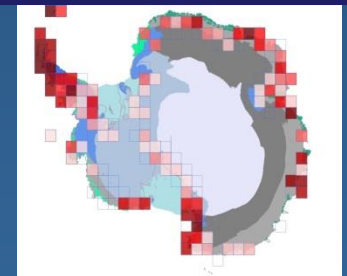
2013-2021?

‘Biological diversity is the sum of all those organisms that determine how ecosystems function, and underpins the life-support system of our planet’

- will focus on past and present patterns of biodiversity
- will provide the scientific knowledge on biodiversity, including genetic diversity, species diversity and ecosystem diversity which,
- coupled with increased knowledge of species biology, can be used for the conservation and management of Antarctic ecosystems.



**Major gaps
in our
understanding
of biodiversity**



Don Cowan <dcowan@uwc.ac.za>



Line I

THE STATE OF THE ANTARCTIC ECOSYSTEM

Associated with the Scientific Committee on Antarctic Research (SCAR) program, "State of the Antarctic Ecosystem (AntEco)."



Microevolution of penguins in Antarctica: genomic-wide SNP analysis to understand adaptation. Juliana Vianna. PUC. 2015-2018. Terreno Inach RT-12-14



Contents lists available at [ScienceDirect](#)

Molecular Phylogenetics and Evolution 2017

journal homepage: www.elsevier.com/locate/ympev



Marked phylogeographic structure of Gentoo penguin reveals an ongoing diversification process along the Southern Ocean



[Juliana A. Vianna](#)^{a,*}, [Daly Noll](#)^a, [Gisele P.M. Dantas](#)^b, [Maria Virginia Petry](#)^c, [Andrés Barbosa](#)^d, [Daniel González-Acuña](#)^e, [Céline Le Bohec](#)^{f,g,h}, [Francesco Bonadonna](#)ⁱ, [Elie Poulin](#)^j

Evolutionary history of *Colobanthus quitensis* and its associated microorganisms: implications for understanding present biogeographic patterns, adaptation to environmental change and interactions with glacial cycles. Marco Molina-Montenegro. UTALCA. International Collaboration. 2015-2018.



RESEARCH ARTICLE

Biological Interactions and Simulated Climate Change Modulates the Ecophysiological Performance of *Colobanthus quitensis* in the Antarctic Ecosystem

[Cristian Torres-Díaz](#)¹, [Jorge Gallardo-Cerda](#)¹, [Paris Lavin](#)², [Rómulo Oses](#)³, [Fernando Carrasco-Urra](#)⁴, [Cristian Atala](#)⁵, [Ian S. Acuña-Rodríguez](#)⁶, [Peter Convey](#)⁷, [Marco A. Molina-Montenegro](#)^{3,6,8,*}



Antarctic Thresholds –Ecosystem Resilience and Adaptation (AnT-ERA)

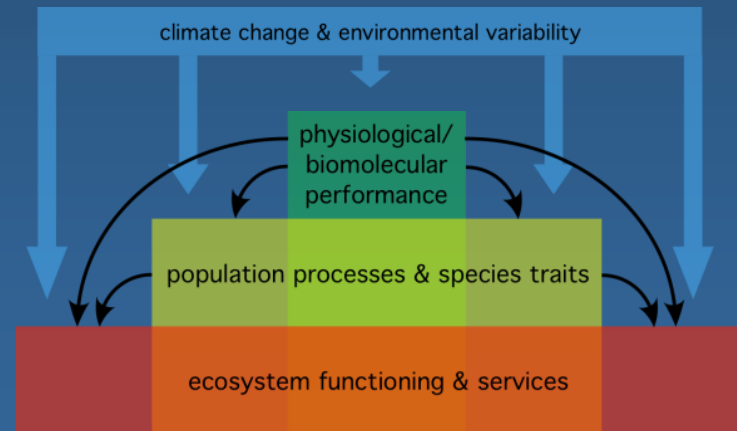


How close to the cliff are we?

To answer this question we have to:
examine biological **PROCESSES**,
define their **TOLERANCE** limits and
determine **RESISTANCE** and **RESILIENCE** to change.

Themes:

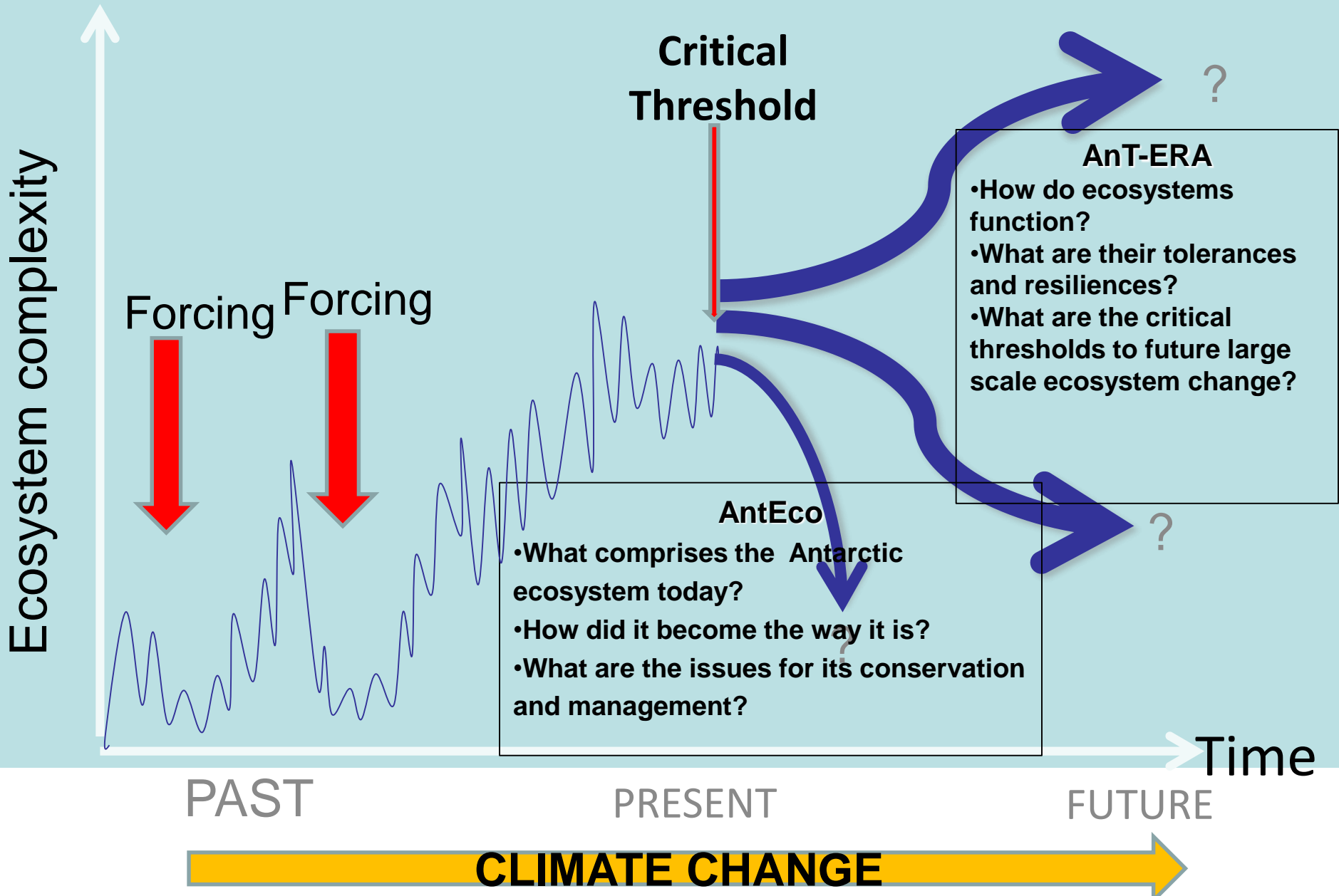
- Physiology & biomolecular performance
- Population processes & species traits
- Ecosystem functioning & services



Julian Gutt <Julian.Gutt@awi.de>



Relationship of AntEco to AnT-ERA



Line II
**ANTARCTIC THRESHOLDS:
ECOSYSTEM RESILIENCE
AND ADAPTATION**

Associated with the “Antarctic Thresholds: Ecosystem Resilience and Adaptation (AnT-ERA)” program, from the Scientific Committee on Antarctic Research (SCAR).

Aims to increase our knowledge on **BIOLOGICAL PROCESSES** at ecological time scales especially related to environmental change, to understand the current functioning of biological systems, to determine thresholds and predict upcoming ecosystem services.





Terrestrial Ecology: Frozen resistant plants...

- Mosses, lichens
- Vascular Plants
- Insects, Bacteria

How would experimental warming affect freezing tolerance of Antarctic vascular plants? **León Bravo**. UFRO. Fondecyt Regular. 2015-2018.

Effect of warming on leaf hydraulic properties of Antarctic plants. **Patricia Sáez**. UDEC. Regular Inach. 2016-2020.

Ecophysiology of Antarctic and Atacama desert lichens: freezing and deep dehydration mechanism under natural conditions and under passive warming experiments. **Angélica Casanova**. UCT. Regular Inach. 2017-2020.

Dipterans in sub-Antarctic and Antarctic regions: are they ready for the changes? **Tamara Contador**. UMAG. Regular Inach. 2016-2020.

Response of soil enzymatic and microbial activity to global temperature increase in cold ecosystems of Patagonia and Antarctica. **Angela Machuca**. UDEC. Fondecyt Regular. 2014-2017.

Metabolomic responses of the Antarctic mosses *Sanionia uncinata* and *Polytrichum alpinum* to global warming. **Gustavo Zuñiga**. USACH. Fondecyt Regular. 2014-2017.



Terrestrial Ecology on Vascular Plants and Lichens



Salt



UV radiation



Deschampsia antarctica



Colobanthus quitensis



Usnea

ORIGINAL PAPER

Contrasting nitrogen use efficiency of Antarctic vascular plants may explain their population expansion in Antarctica

Claudia Rabert^{1,3} · Marjorie Reyes-Díaz^{2,3} · Luis J. Corcuera⁴ · León A. Bravo^{1,3} · Miren Alberdi^{2,3}

ORIGINAL PAPER

Growing temperature affects seed germination of the antarctic plant *Colobanthus quitensis* (Kunth) Bartl (Caryophyllaceae)

C. Sanhueza¹ · V. Vallejos² · L. A. Cavierres^{1,3} · P. Saez² · L. A. Bravo⁴ · L. J. Corcuera¹

Casanova-Katny et al. *Revista Chilena de Historia Natural* (2016) 89:13
DOI 10.1186/s40693-016-0061-y

Revista Chilena de
Historia Natural

RESEARCH

Open Access

Reproductive output of mosses under experimental warming on Fildes Peninsula, King George Island, maritime Antarctica



A. Casanova-Katny^{1,2*}, G. A. Torres-Mellado² and S. M. Eppley³



Marine Ecology

- Macroalgae and marine invertebrates
Ecophysiology
- Interactions in extreme environments

Shifts in marine Antarctic microbial community structure and function in response to deglaciation and sea ice melting accelerated by climate change. **Beatriz Diez**. International Cooperation. 2014-2017.

Biochemical and molecular responses disclose mechanisms of Antarctic macroalgae to thrive under Climate Change. **Claudio Saez**. UPLA. Regular Inach. 2017-2020

Applying evolutionary principles to infer climate adaptation in marine species: using a genomic approach. **Juan Diego Gaitán**. UACH. Regular Inach. 2014-2017.

Assessing the utility of Antarctic sponges for studying global climate change: individual to community level responses. **César Cárdenas**. INACH. Fondecyt. 2015-2018.

Stress tolerance of early life cycle stages of Antarctic-Subantarctic disjunct seaweeds: reproduction phase related physiological and molecular responses. **Nelso Navarro**. UMAG. Fondecyt Iniciacion. 2016-2018.

Global Change Impacts in the Western Antarctic Peninsula: Role of Environmental Variability and Food Availability on *Laternula elliptica* to ocean acidification, warming and micro-plastics. **Marcos Lardies**. UAI. Regular Inach.

A multi-disciplinary approach to understand the impact of ice loss and deglaciation on Antarctic coastal benthic ecosystems. **Antonio Brante**. UCSC. International Cooperation. 2015-2018

Climate change impact on macroalgae physiology



Iván Gomez. UACH-IDEAL



Desmarestia anceps

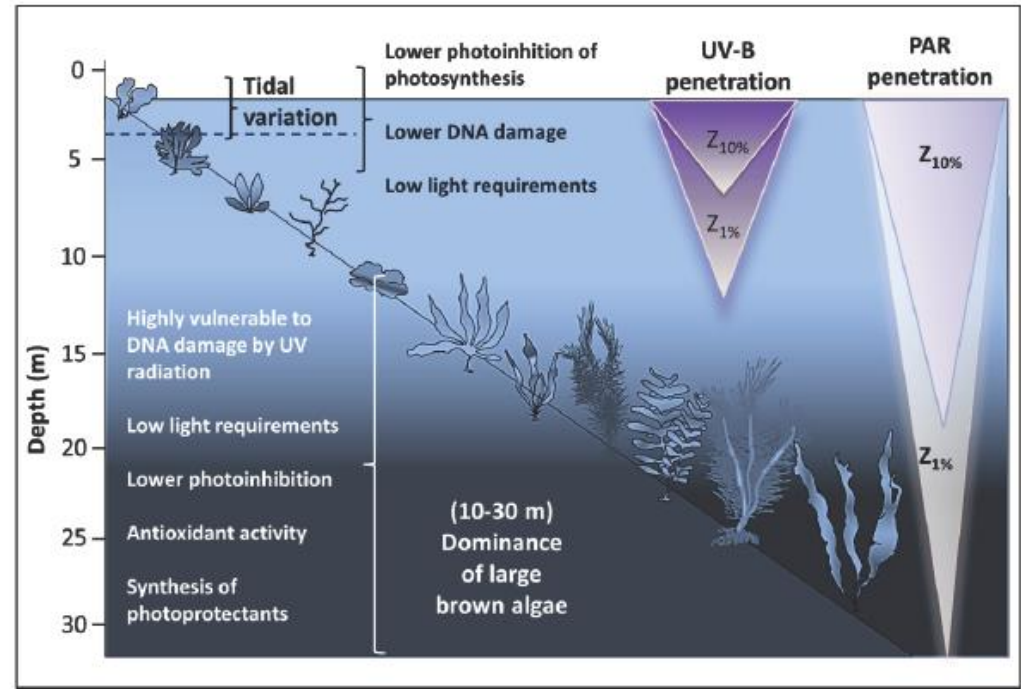


Fig. 3. Synopsis of the main light escenarios and photobiological responses of seaweeds in the context of vertical zonation Fildes Bay.

Huovinen & Gómez. 2013. Polar Biol., 36:1319–1332

Ecophysiology of Antarctic snow algae: adaptation mechanisms to a changing polar environment. Ivan Gomez. UACH. Fondecyt Regular. 2016-2019.

Rivas et al. *Revista Chilena de Historia Natural* (2016) 89:7
DOI 10.1186/s40693-016-0050-1

Revista Chilena de
Historia Natural

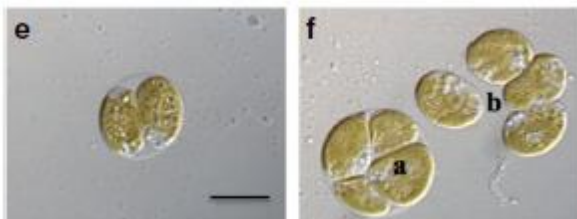
RESEARCH

Open Access

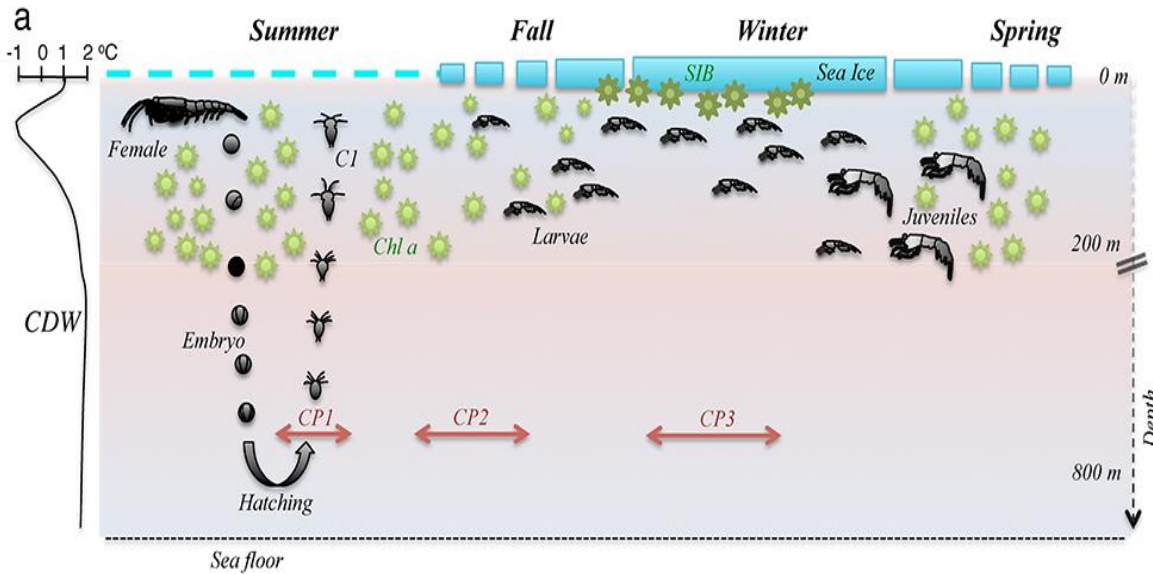
Photosynthetic UV stress tolerance of the Antarctic snow alga *Chlorella* sp. modified by enhanced temperature?



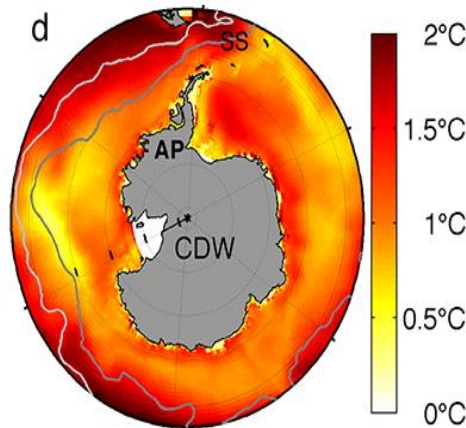
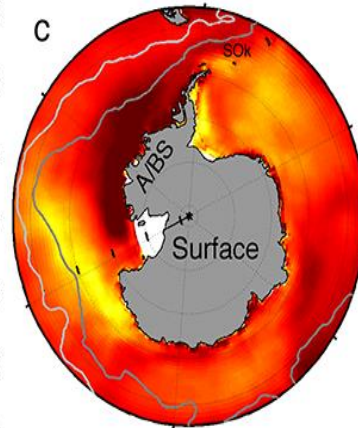
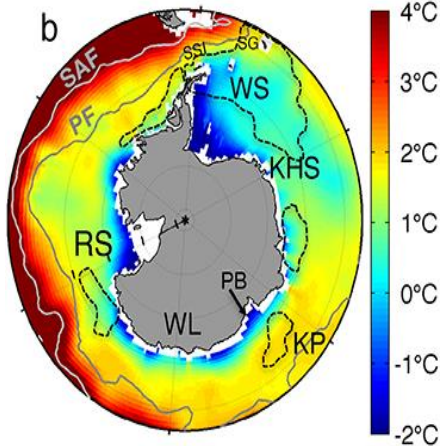
C. Rivas^{1,2*}, N. Navarro^{1,3}, P. Huovinen^{1,4} and L. Gómez^{1,4}



Projected changes of Antarctic krill habitat by the end of the 21st century



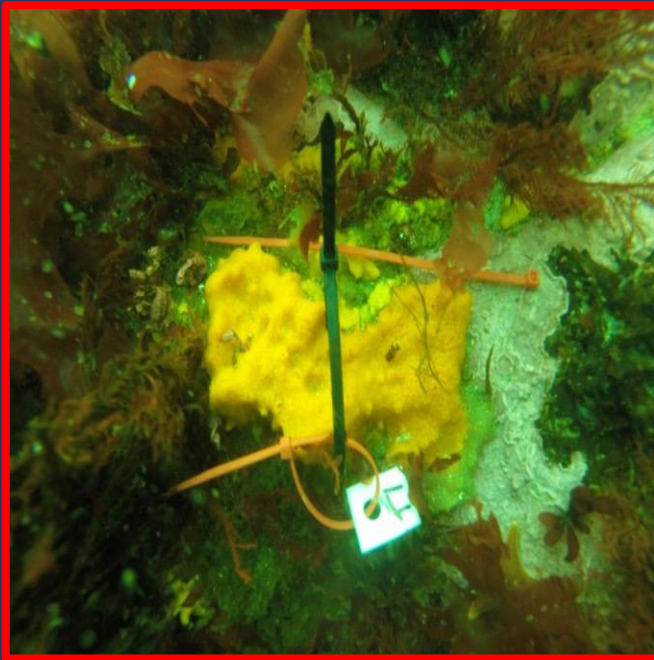
“Physical controls of biological hot spots along the Antarctic Peninsula continental shelf: future status and current climate trends.” Andrea Piñones. Fondecyt Postdoctorado. UACH-IDEAL. 2014-2017.



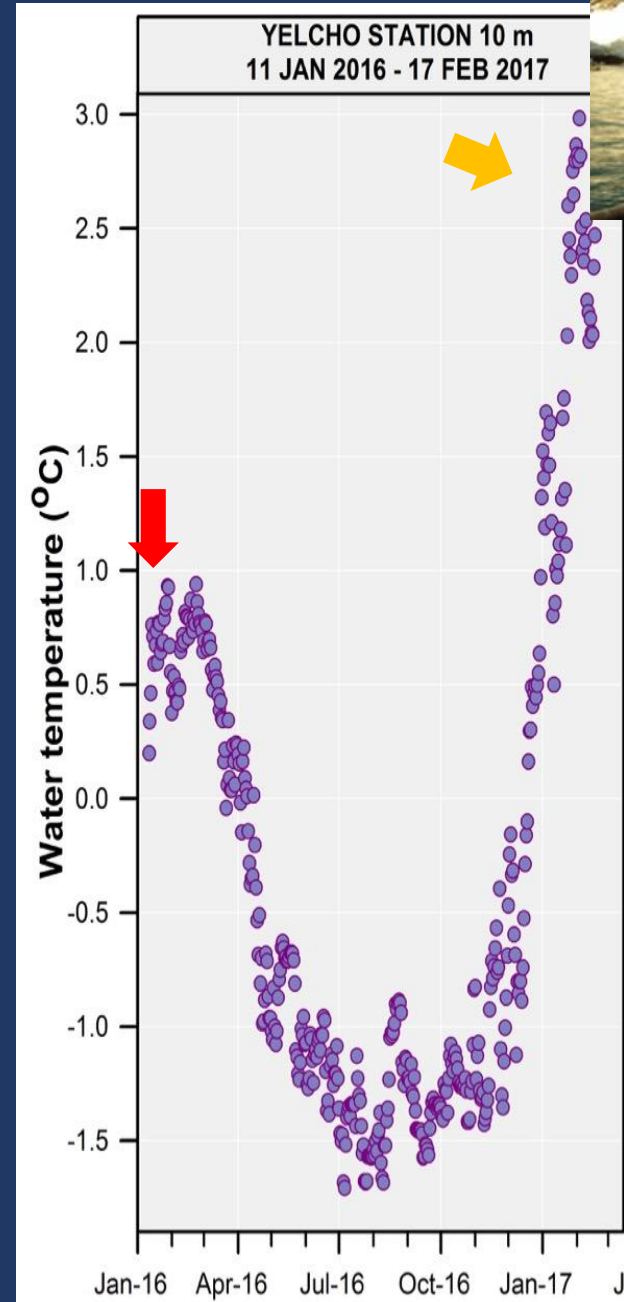
Piñones, A., & Fedorov, A.V. 2016. Projected changes of Antarctic krill habitat by the end of the 21st century, *Geophys. Res. Lett.*, 43, 8580–8589, doi:10.1002/2016GL069656

Assessing the effect of the environment on sponge-associated bacteria

2016
Jan
27th



2017
Feb
14th



Line 3. Climate Change in Antarctica

Ice dynamics in the past

This subline aims to improve our understanding of the dynamics of ice during past events of global warming.

Response and influence of Earth in the evolution of the cryosphere

This subline aims to improve our understanding of the Earth response to Tectonic and cryospheric forcing



Influence of the solar activity on the polar environment. **Alessandro Damiani**. USACH. Fondecyt Regular. 2014-2017

Respuesta del sistema climático del hemisferio sur al agotamiento del ozono estratosférico. **Alessandro Damiani**. USACH. Fondecyt Regular. 2017-2020

Reflectivity of Antarctica. **Raul Cordero**. USACH. Fondecyt regular. 2015-2018.

Ground-based Measurements of the Radiance Distribution in the Antarctic Peninsula. **Raul Cordero**. USACH. Regular terreno Inach. 2015-2018

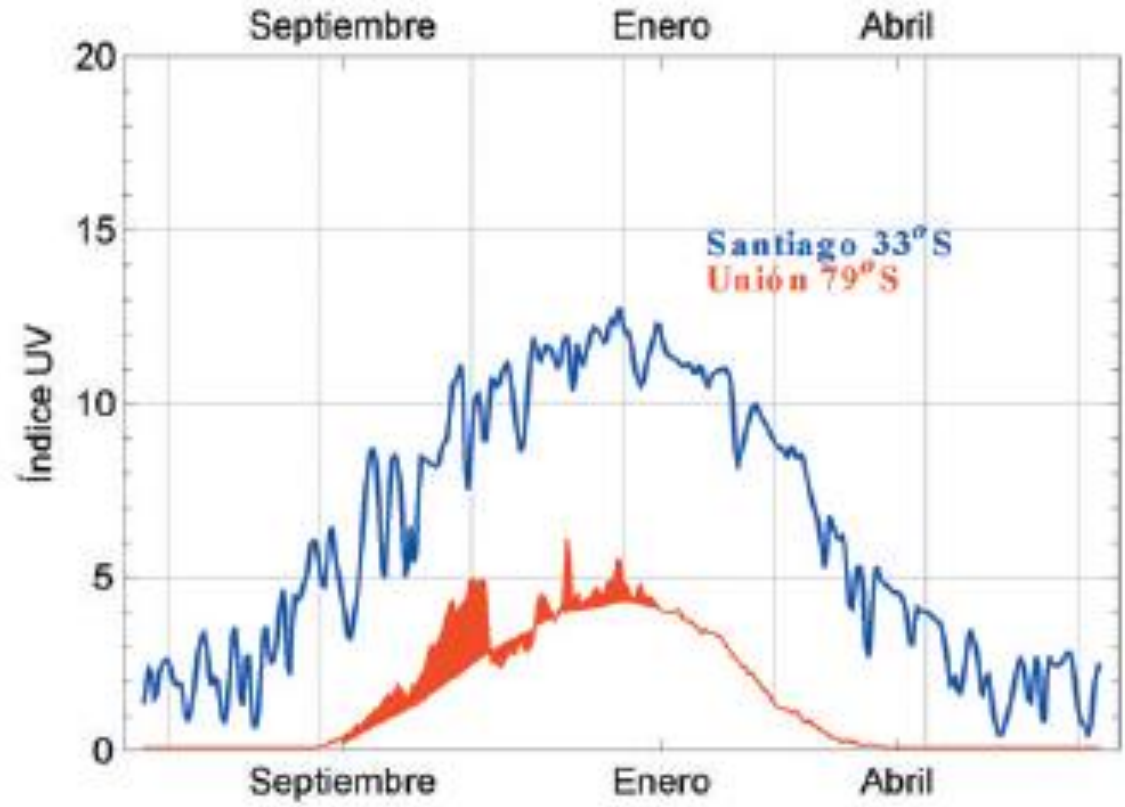
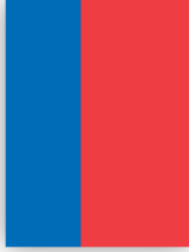
Calving and mass balance studied by remote sensing, in-situ methods and modelling at King George Island (CAMB-KGI). **Gino Casassa**. UMAG. Regular Terreno Inach. 2017-2020

Characterization of methane cycling in Antarctic and sub-Antarctic lakes. **Maria Soledad Astorga**. UMAG. Regular terreno. Inach. 2015-2018.

Surface temperature anomalies over the Antarctic region: the role of ENSO in the last decades. **Cristian Mattar**. UCHILE. 2016-2019.

Climate change nowadays

Improve regional predictions from key atmospheric, ocean and cryosphere elements and understand how physical and biological systems will respond.



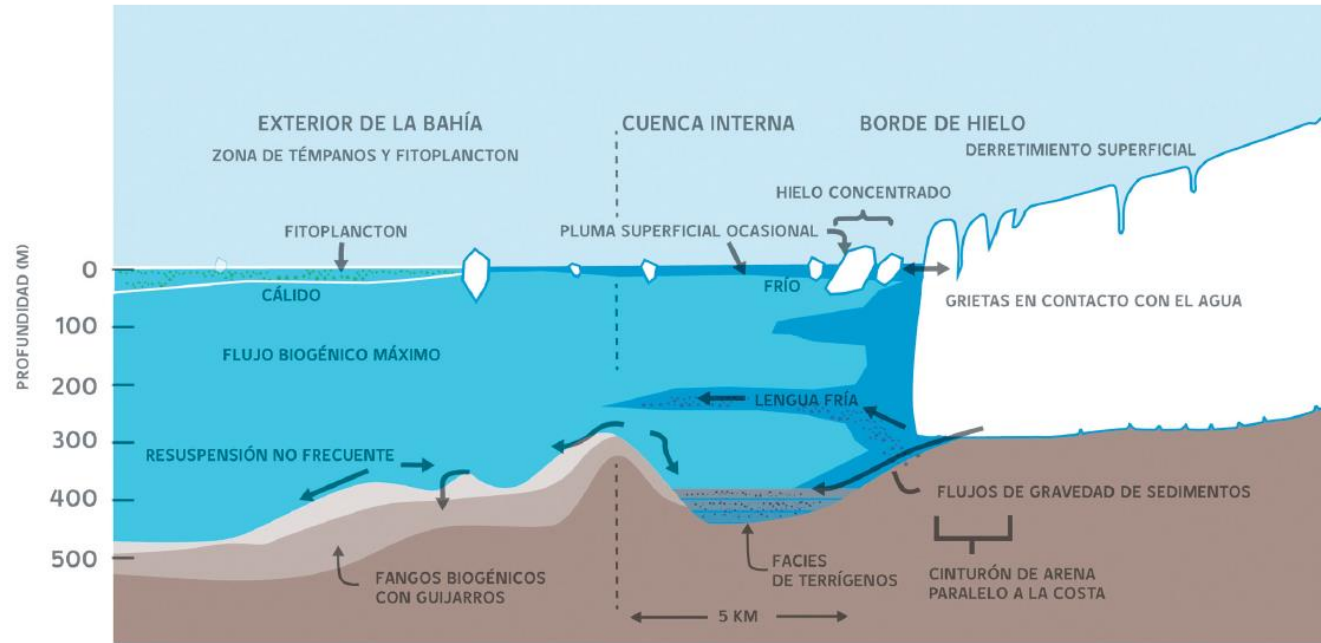


Figura 1. Modelo de procesos sedimentarios principales para un ambiente glaciomarino de la península Antártica (modificado de Domack, 1990).

- ✓ Seismic facies variability and sedimentation processes in small bays and fjords of the Danco Coast, Antarctic Peninsula (2012-2015) PI: Cristián Rodrigo (UNAB).



Penny Rowe. NorthWest Research Associates & USACH, Chile

Research interests: The interaction of clouds and trace gases with infrared radiation, particularly in Polar regions. Regional effects of black carbon in snow. Ocean-atmosphere interactions across the Polar Front in the Southern Ocean. Scanning electron microscopy of ice crystals. Molecular dynamics calculations of ice.

Characterization of Low Clouds over the Antarctic Peninsula and the West Antarctic Ice Sheet (WAIS)



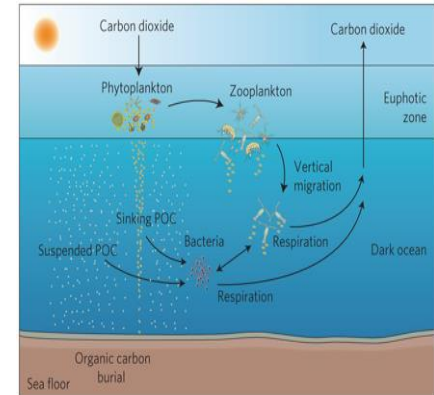


IDEAL

Research Center
Dynamics of High Latitude
Marine Ecosystems

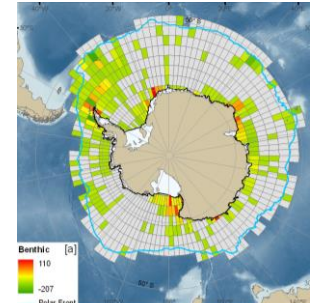
Research Lines

- Marine productivity
- Adaptation of the marine species
- Plankton
- Benthos
- Socio-economic System
- Modeling

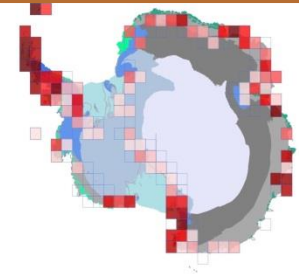


State of the Antarctic Ecosystem (AntEco)

‘Biological diversity is the sum of all those organisms that determine how ecosystems function, and underpins the life-support system of our planet’



Major gaps
in our
understanding
of biodiversity



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Line I

THE STATE OF THE ANTARCTIC ECOSYSTEM

Associated with the Scientific Committee on Antarctic Research (SCAR) program, "State of the Antarctic Ecosystem (AntEco)."



Microevolution of penguins in Antarctica: genomic-wide SNP analysis to understand adaptation. Juliana Vianna. PUC. 2015-2018. Terreno Inach RT-12-14



Contents lists available at [ScienceDirect](#)

Molecular Phylogenetics and Evolution 2017

journal homepage: www.elsevier.com/locate/ympev



Marked phylogeographic structure of Gentoo penguin reveals an ongoing diversification process along the Southern Ocean



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Evolutionary history of *Colobanthus quitensis* and its associated microorganisms: implications for understanding present biogeographic patterns, adaptation to environmental change and interactions with glacial cycles. Marco Molina-Montenegro. UTALCA. International Collaboration. 2015-2018.



RESEARCH ARTICLE

Biological Interactions and Simulated Climate Change Modulates the Ecophysiological Performance of *Colobanthus quitensis* in the Antarctic Ecosystem

[Cristian Torres-Díaz](#)¹, [Jorge Gallardo-Cerda](#)¹, [Paris Lavin](#)², [Rómulo Oses](#)³, [Fernando Carrasco-Urra](#)⁴, [Cristian Atala](#)⁵, [Ian S. Acuña-Rodríguez](#)⁶, [Peter Convey](#)⁷, [Marco A. Molina-Montenegro](#)^{3,6,8,*}

