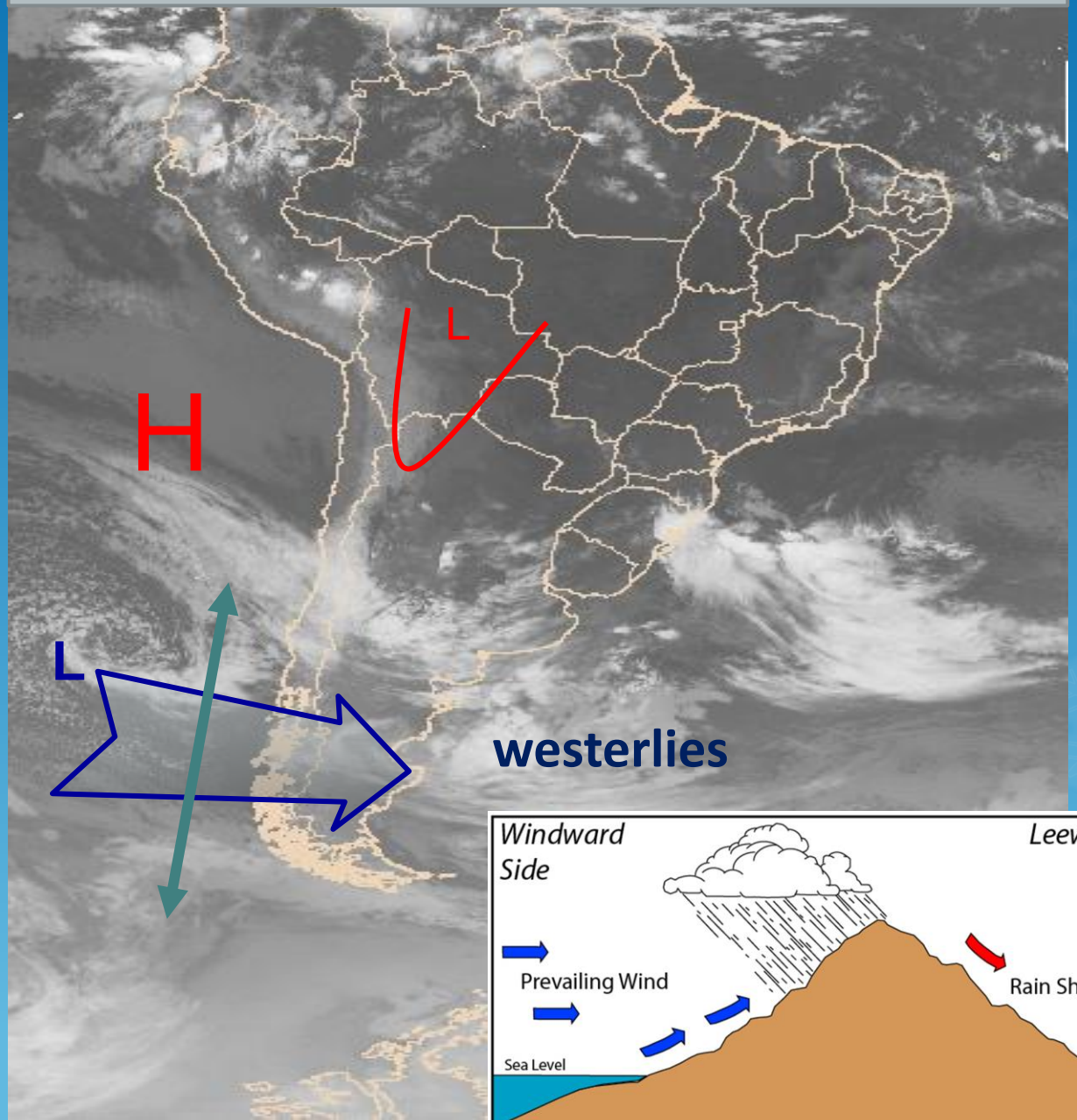
Global Change in southern-austral region of Chile and its impact on future

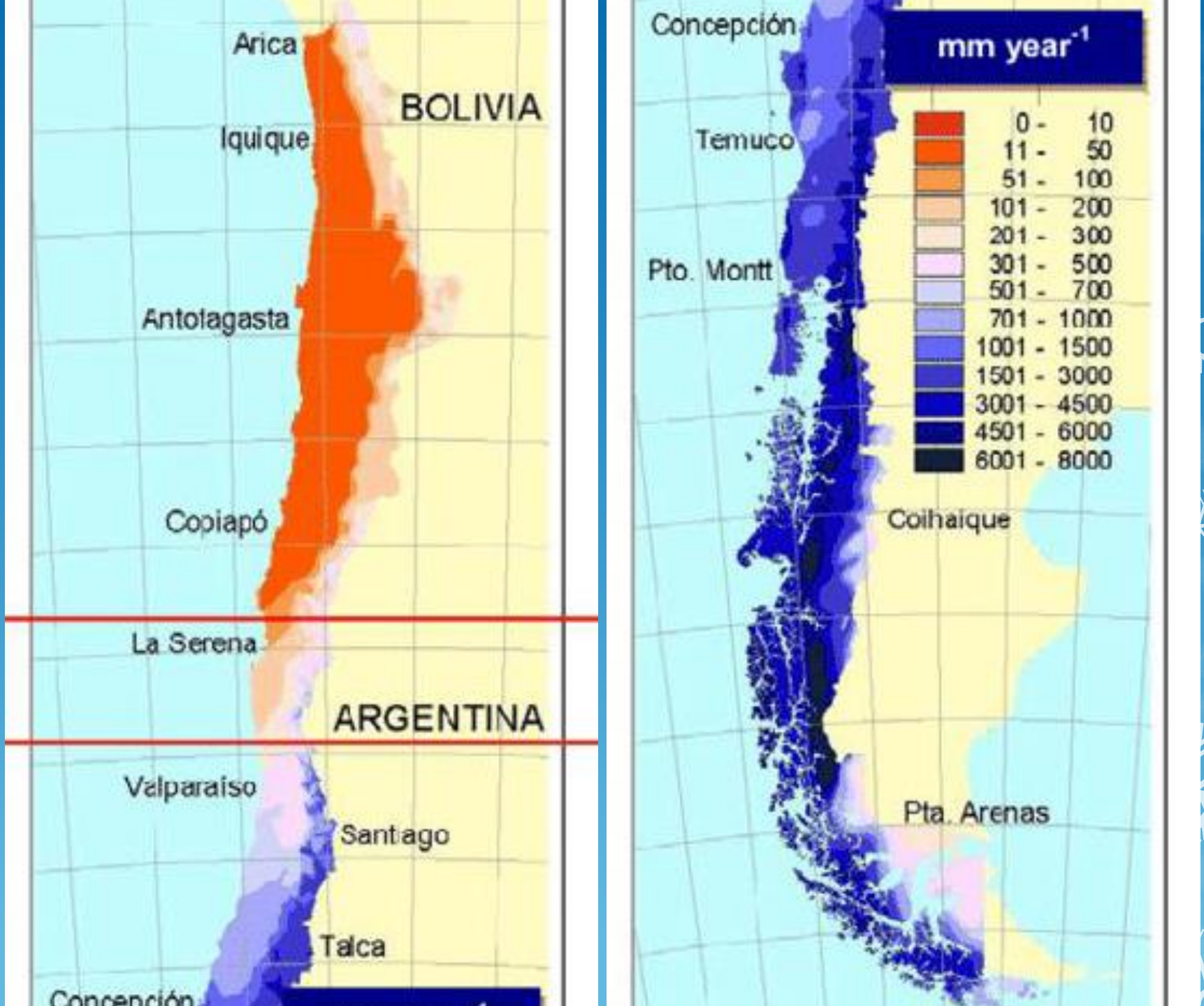
Jorge Carrasco Cerda
Centro de Investigación Gaia Antártica
Universidad de Magallanes

An overview about the climate

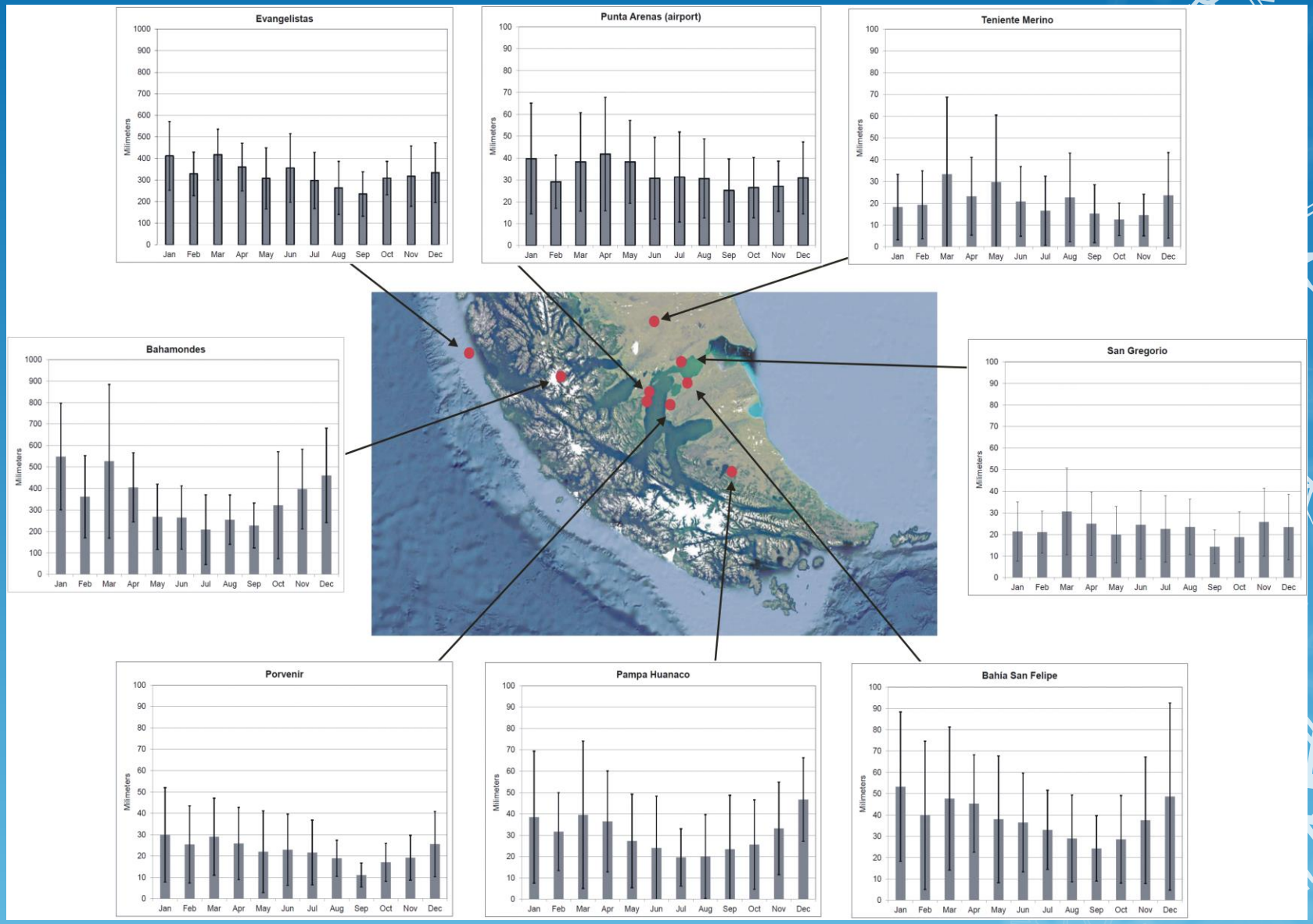
in southern- austral region

Atmospheric patterns defining the climate

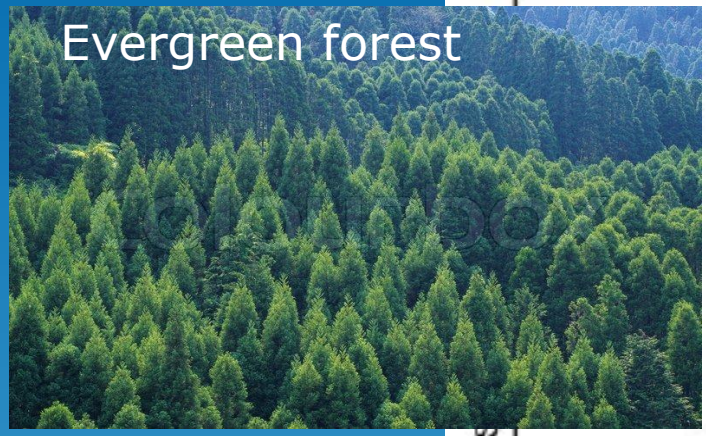


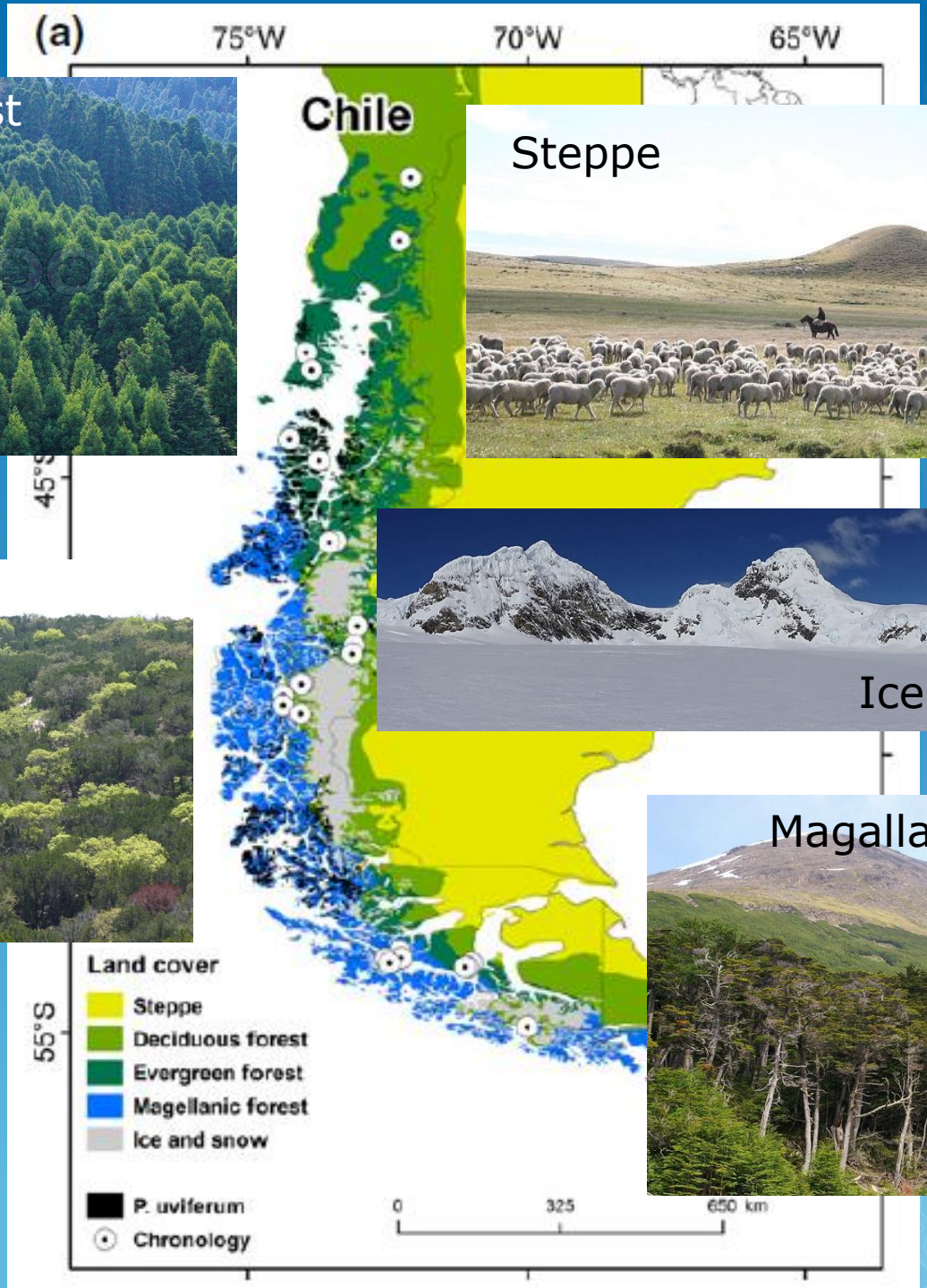

Arica
BOLIVIA
Iquique
Antofagasta
Copiapó
La Serena
ARGENTINA
Valparaíso
Santiago
Talca
Concepción
Temuco
Pto. Montt
Coihaique
Pta. Arenas
mm year-1
0 - 10
11 - 50
51 - 100
101 - 200
201 - 300
301 - 500
501 - 700
701 - 1000
1001 - 1500
1501 - 3000
3001 - 4500
4501 - 6000
6001 - 8000

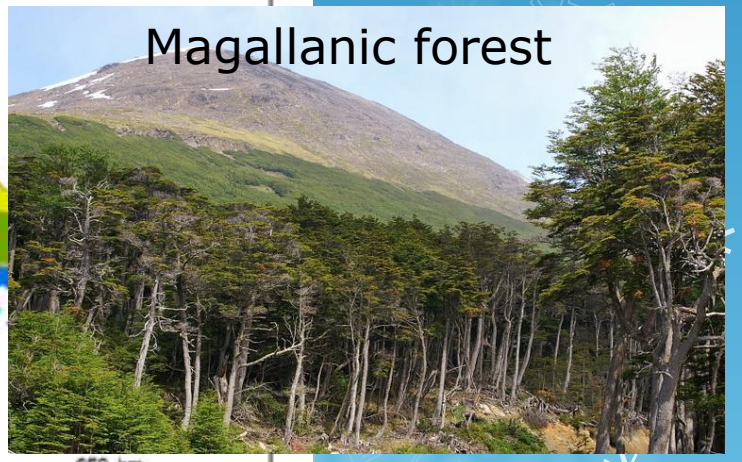
Precipitation



Aguirre et al., 2018, Frontiers



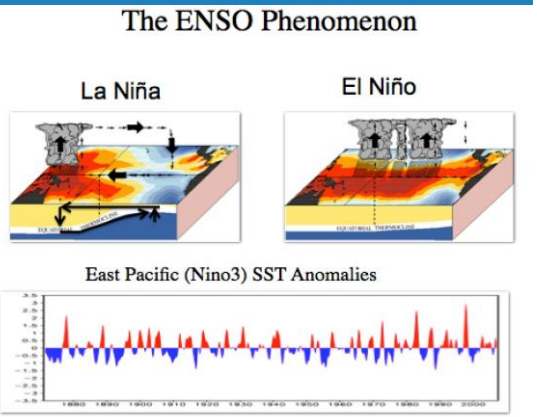




Holz et al. 2018,
J. Biogeography

Mechanisms of Climate variability

El Niño Southern Oscillation



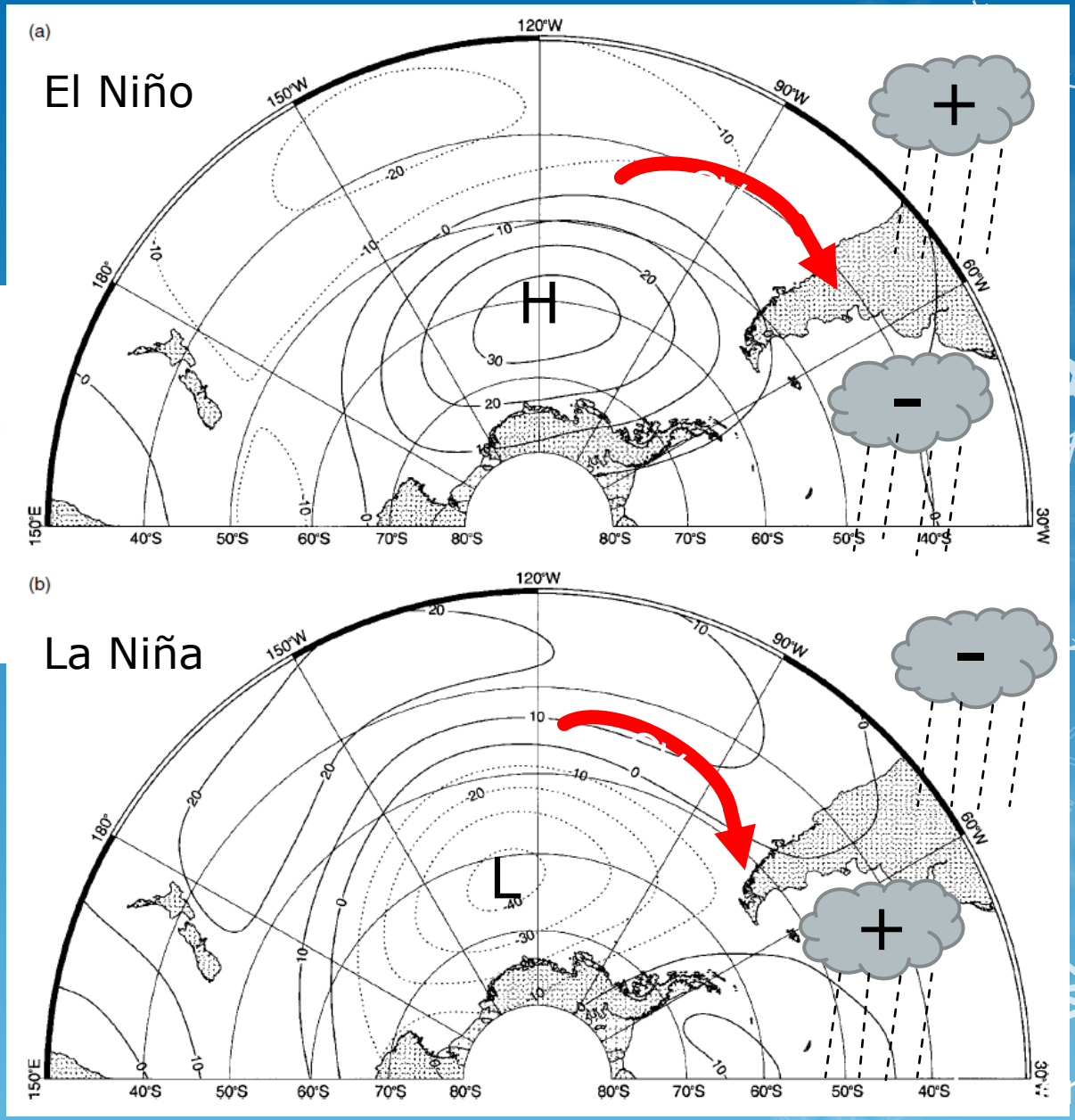
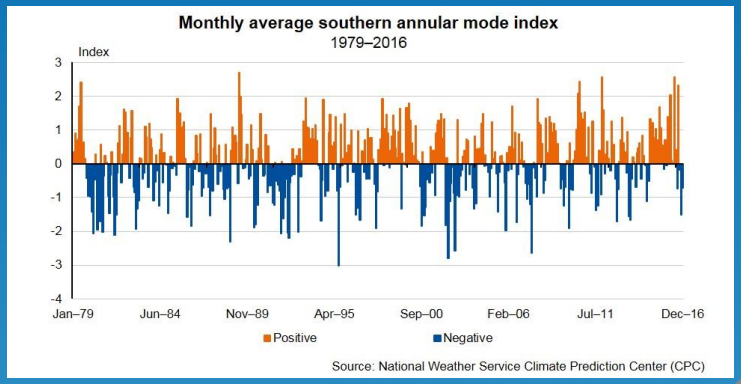
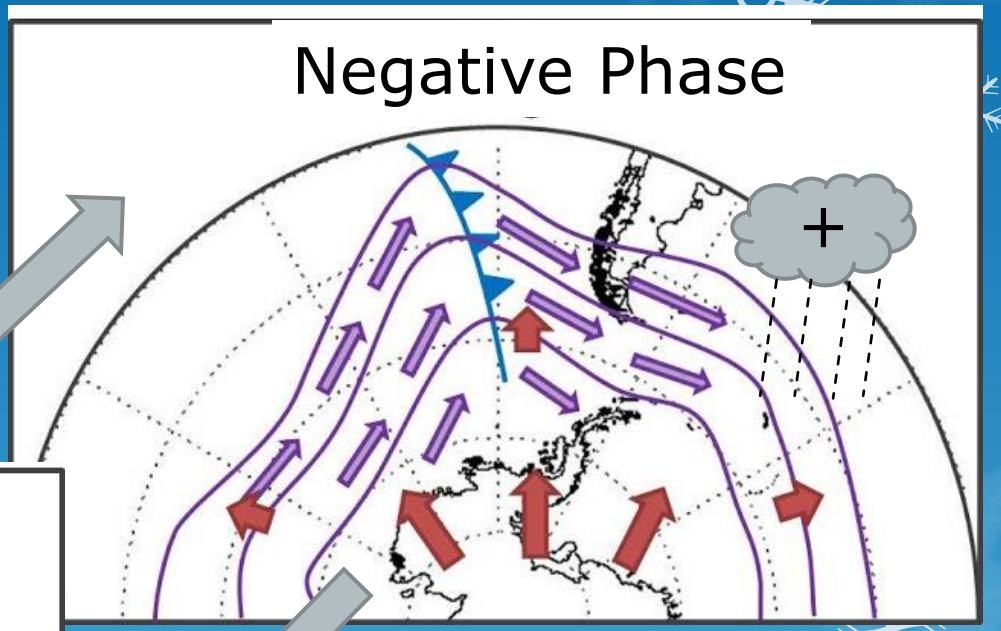
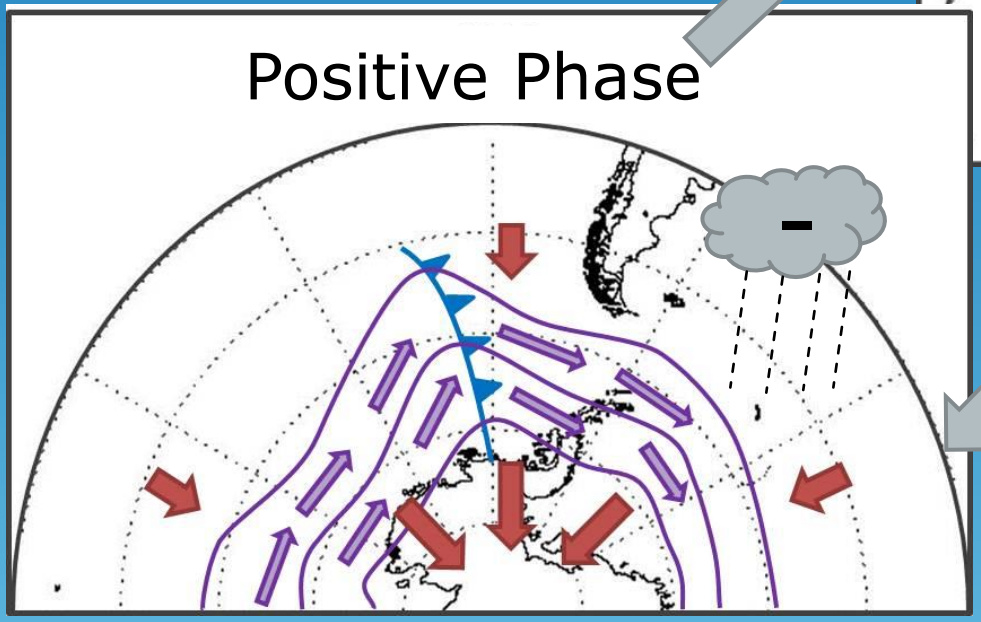


Figure 3. Winter-season (June–August) 500 hPa height anomalies across the South Pacific during (a) eight El Niño and (b) six La Niña cases in the period 1968–99. The figures were derived from NCEP–NCAR reanalysis data

Oscillation Antarctica / Antarctica Anular Mode







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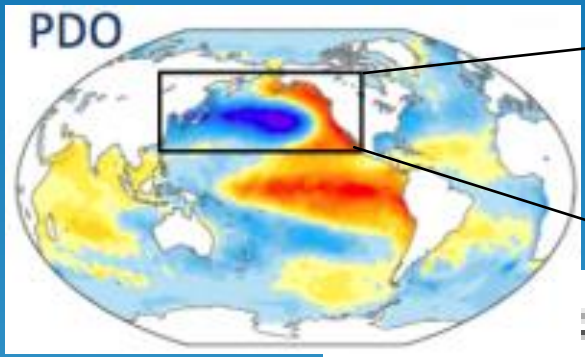
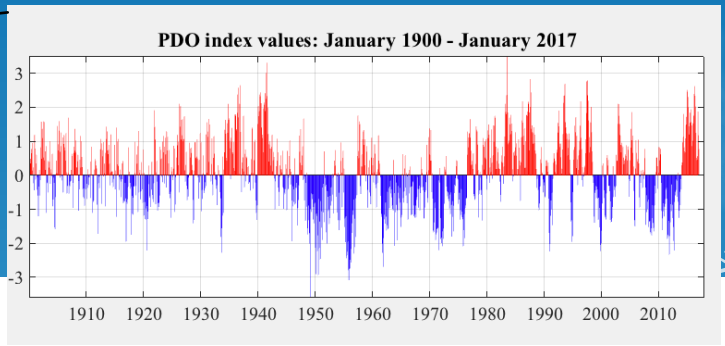
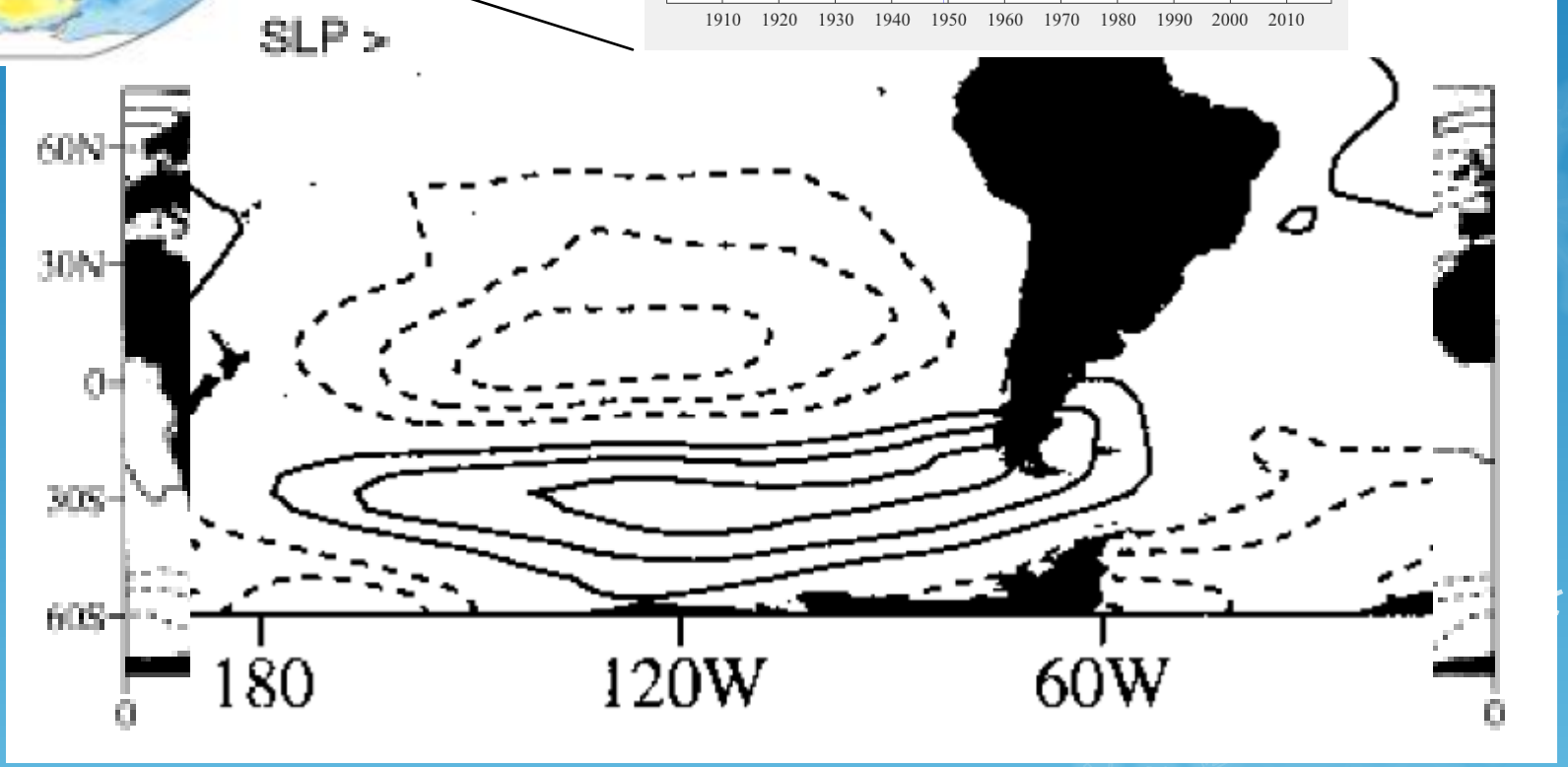
Schematic representation. Red arrows indicate the southward desplacement of the westerlies, near to the Antarctic continent.

Pacific Decadal Oscillation



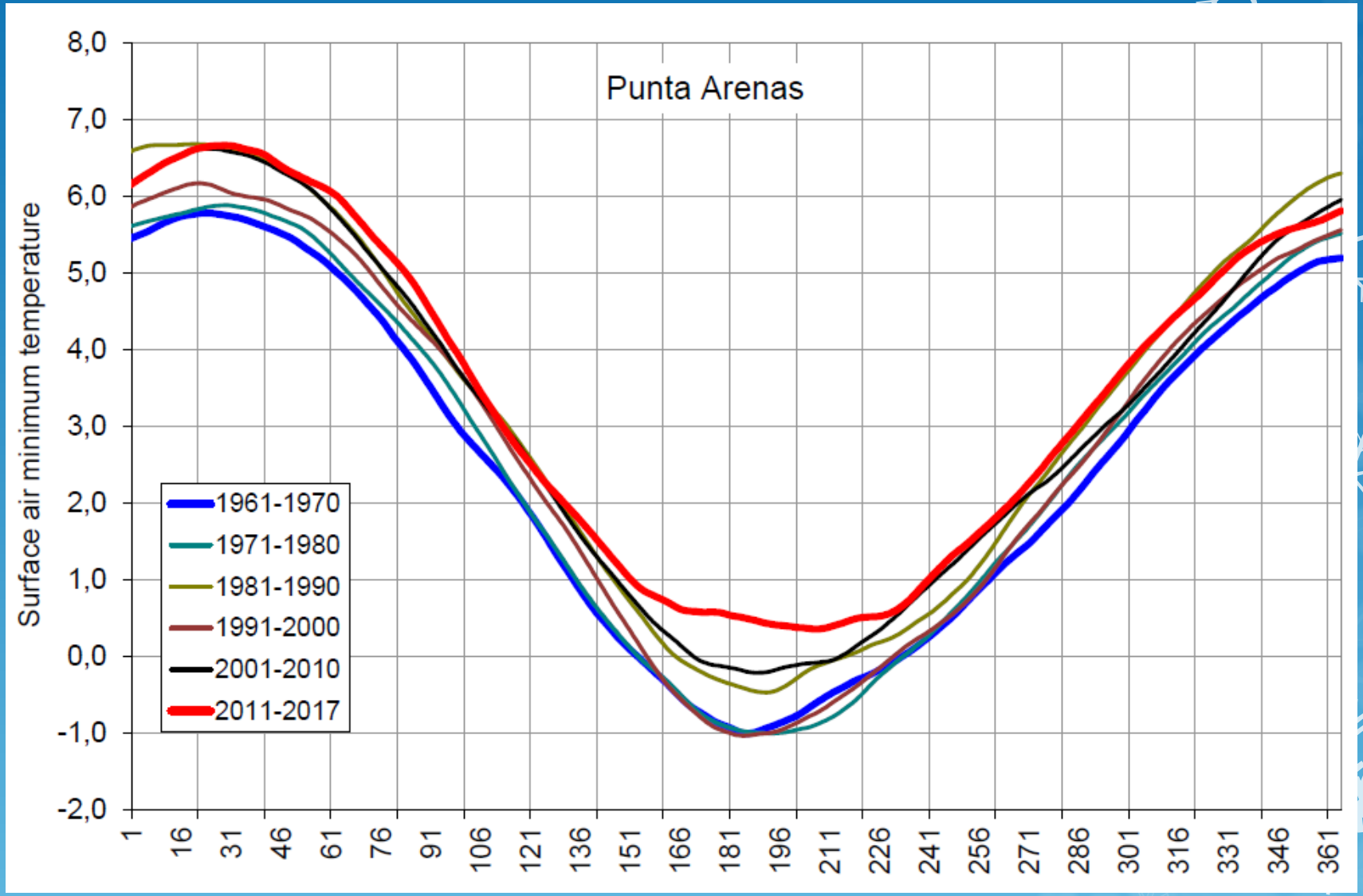




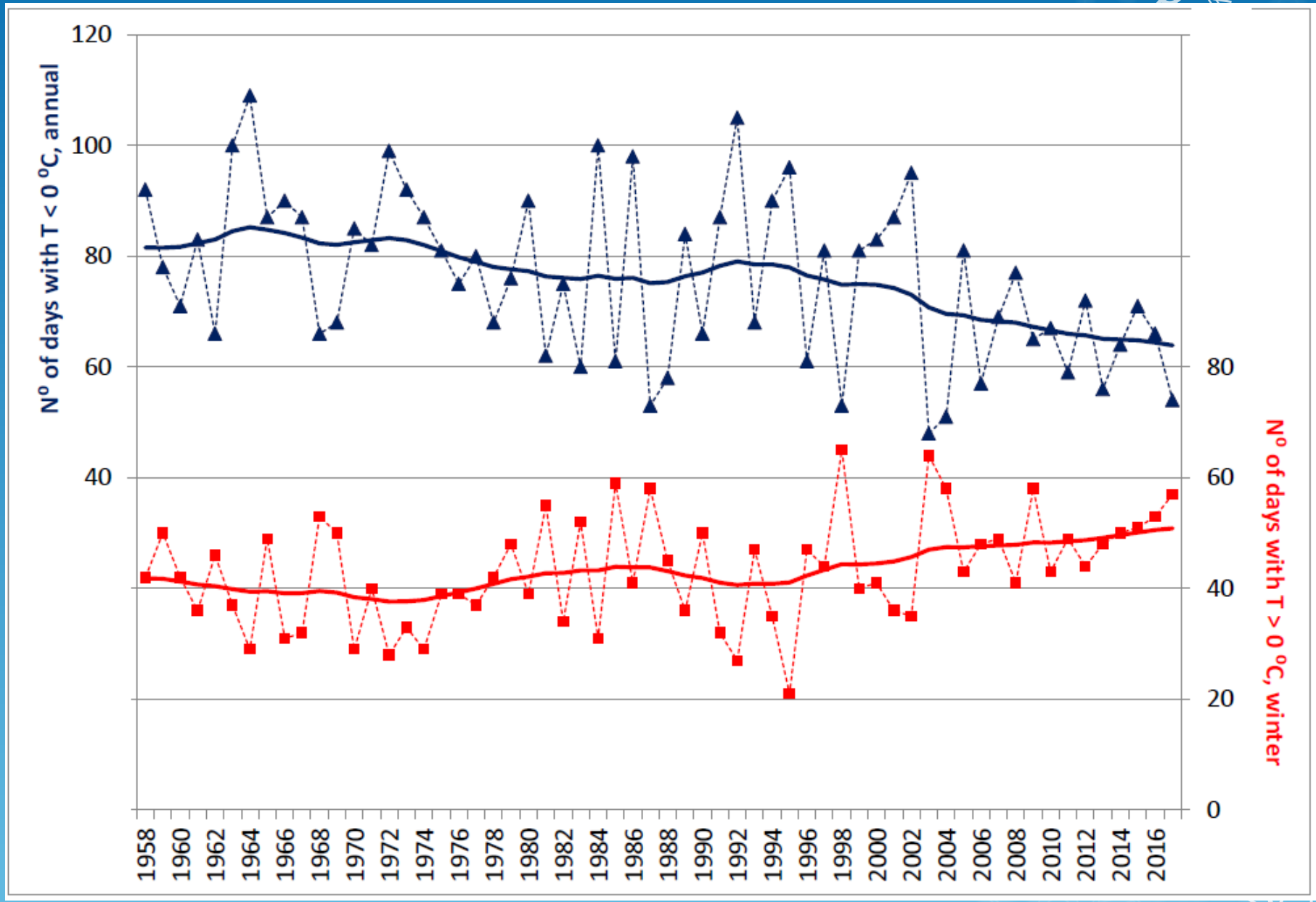
Garreaud and Batisti 1999

Recent changes in some atmospheric Parameters in the austral region

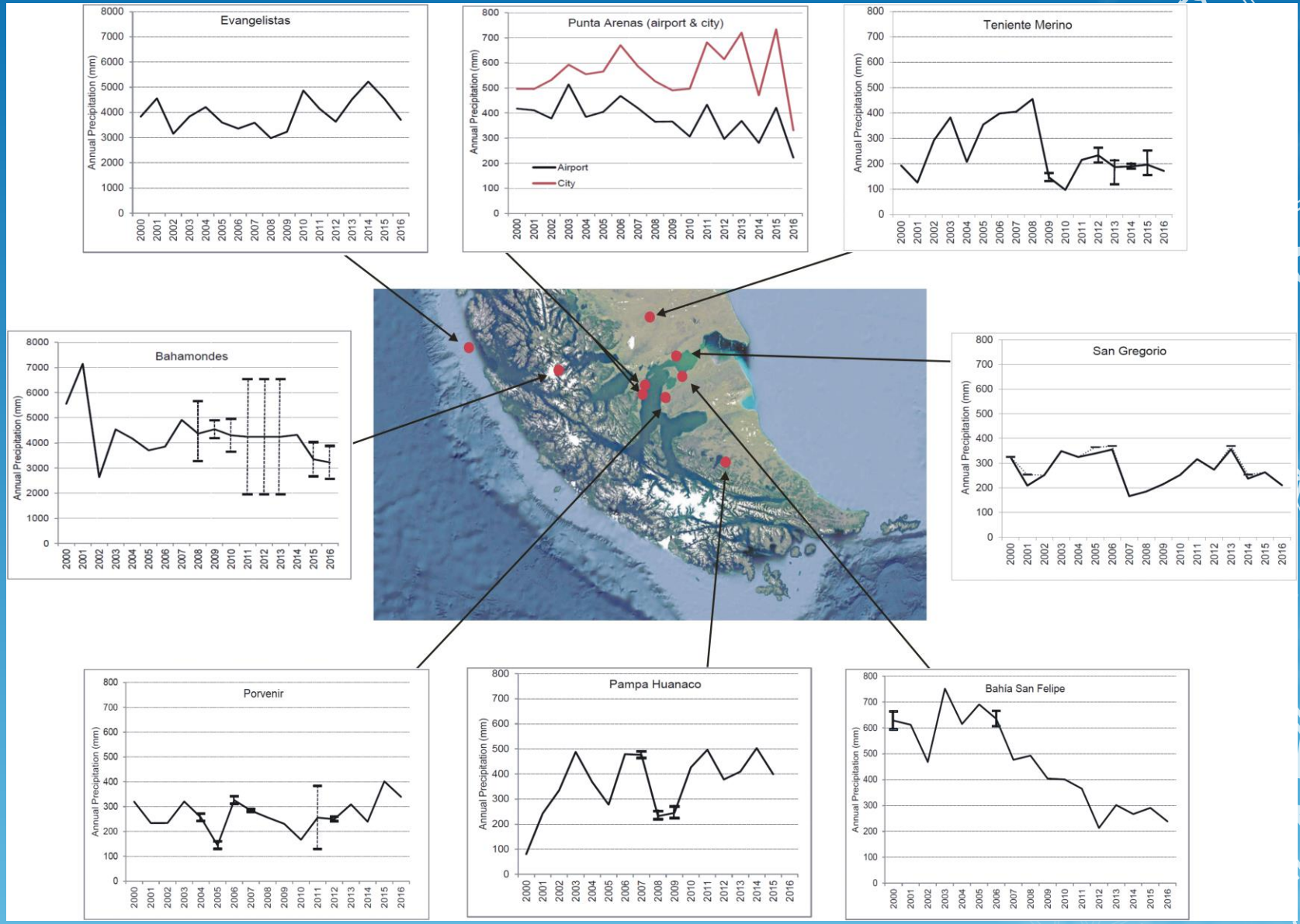
Minimum Air TemperaturePunta Arenas



Minimum Air TemperaturePunta Arenas

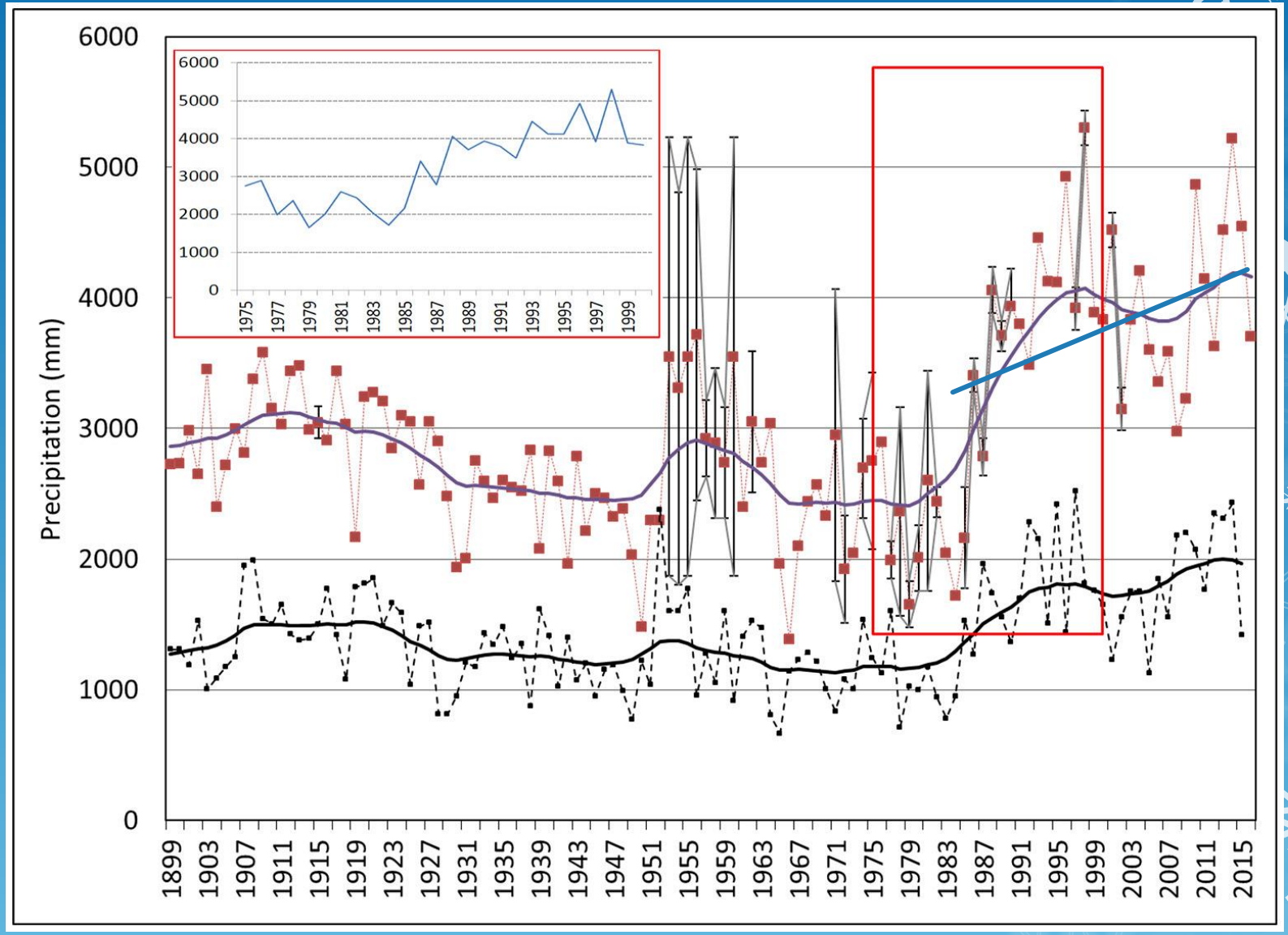


Precipitation



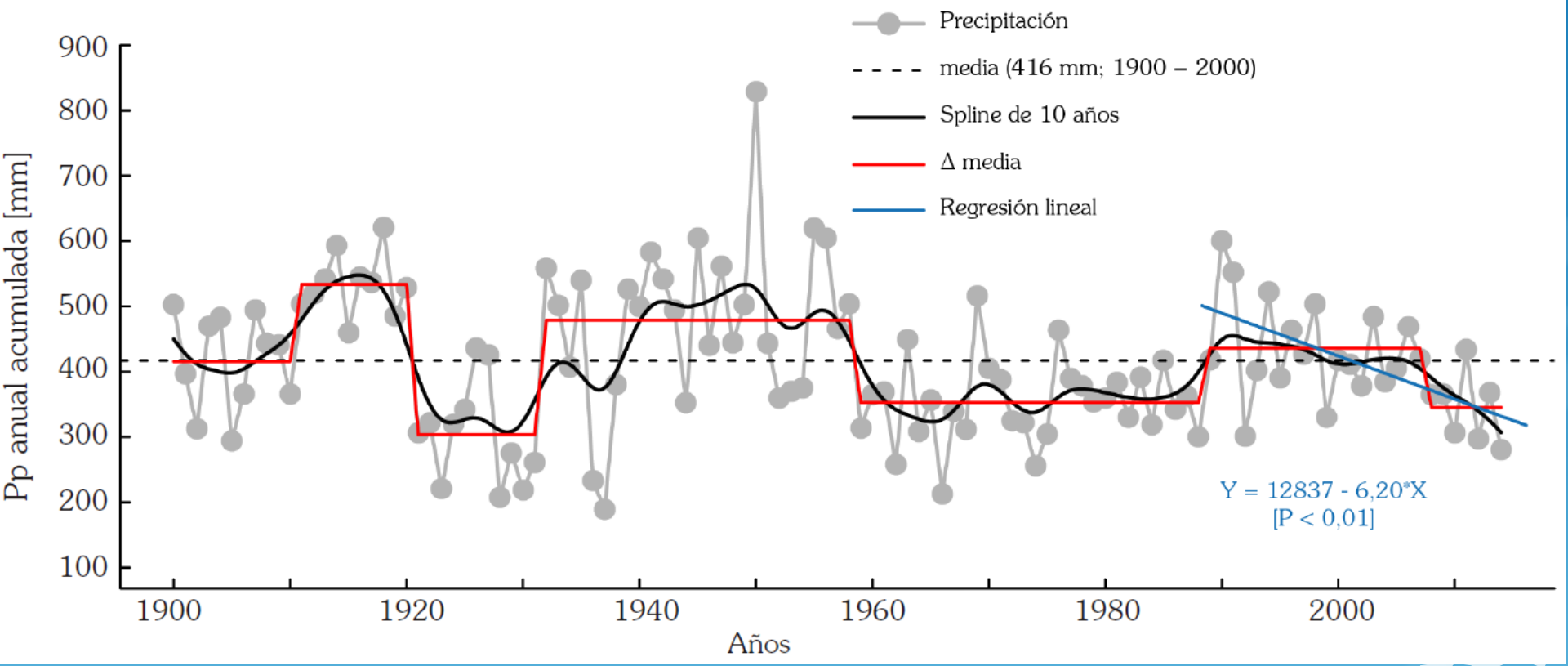
Aguirre et al., 2018, Frontier

Precipitation

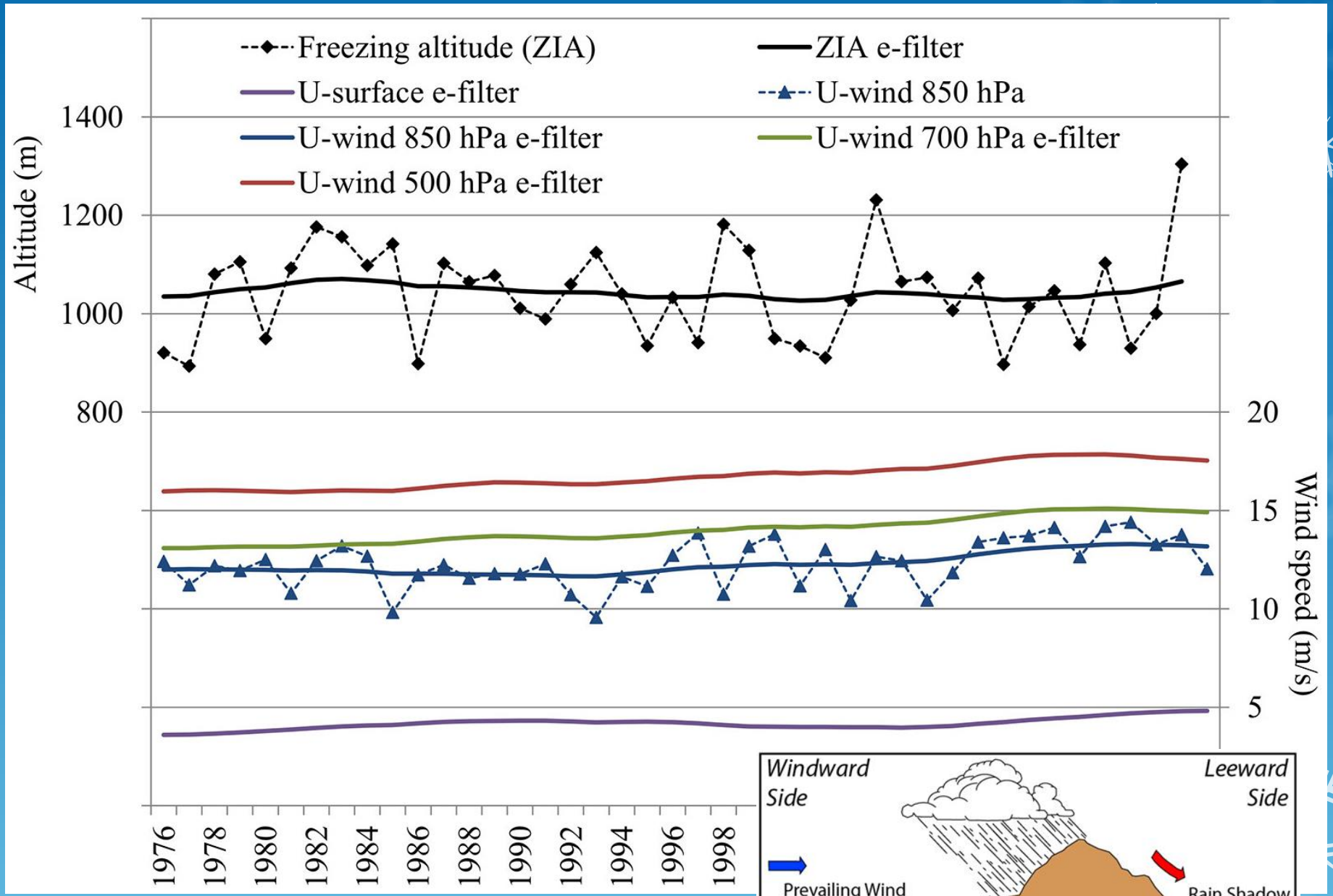


Aguirre et al., 2018, Frontiers

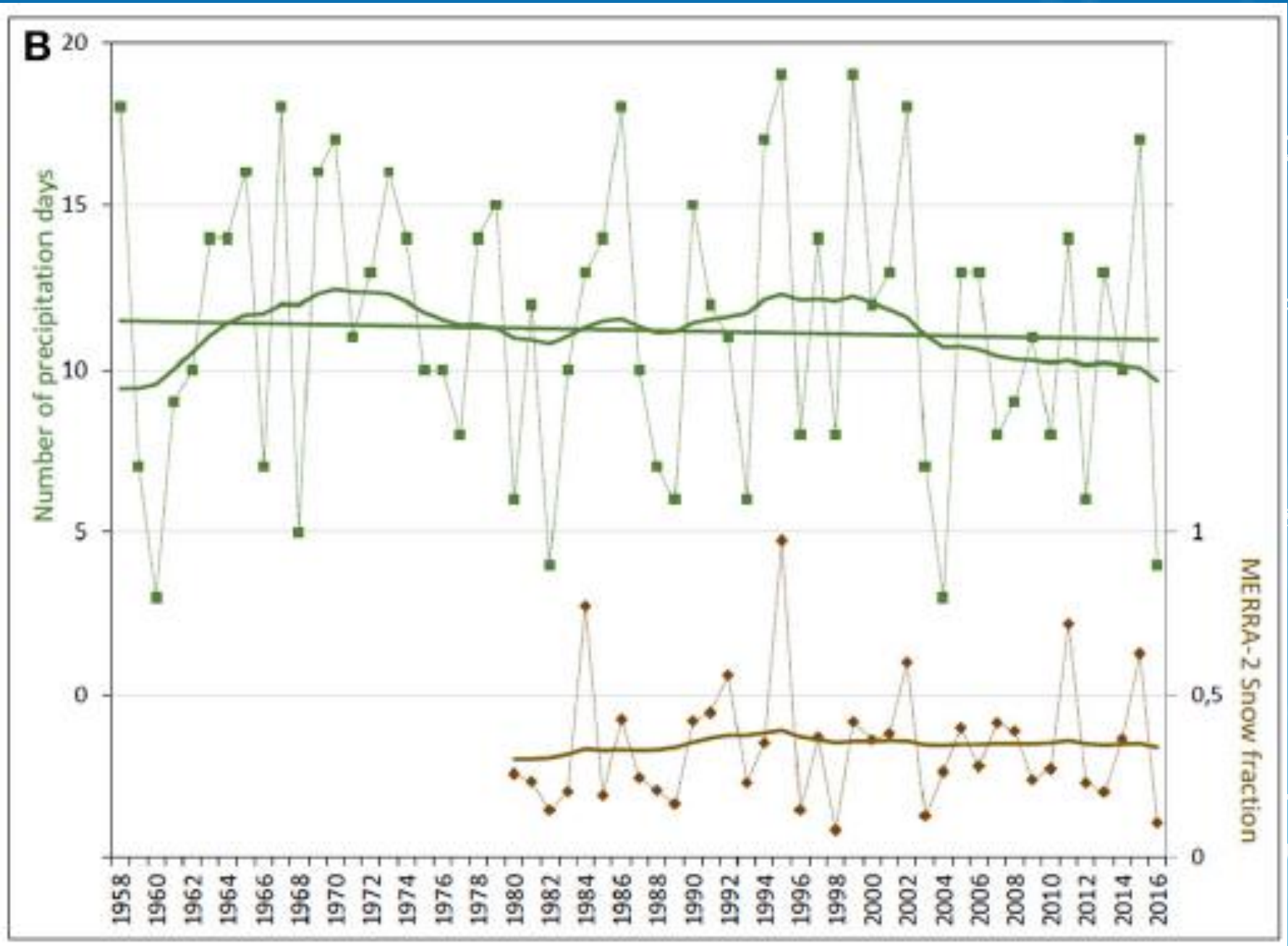
Precipitation



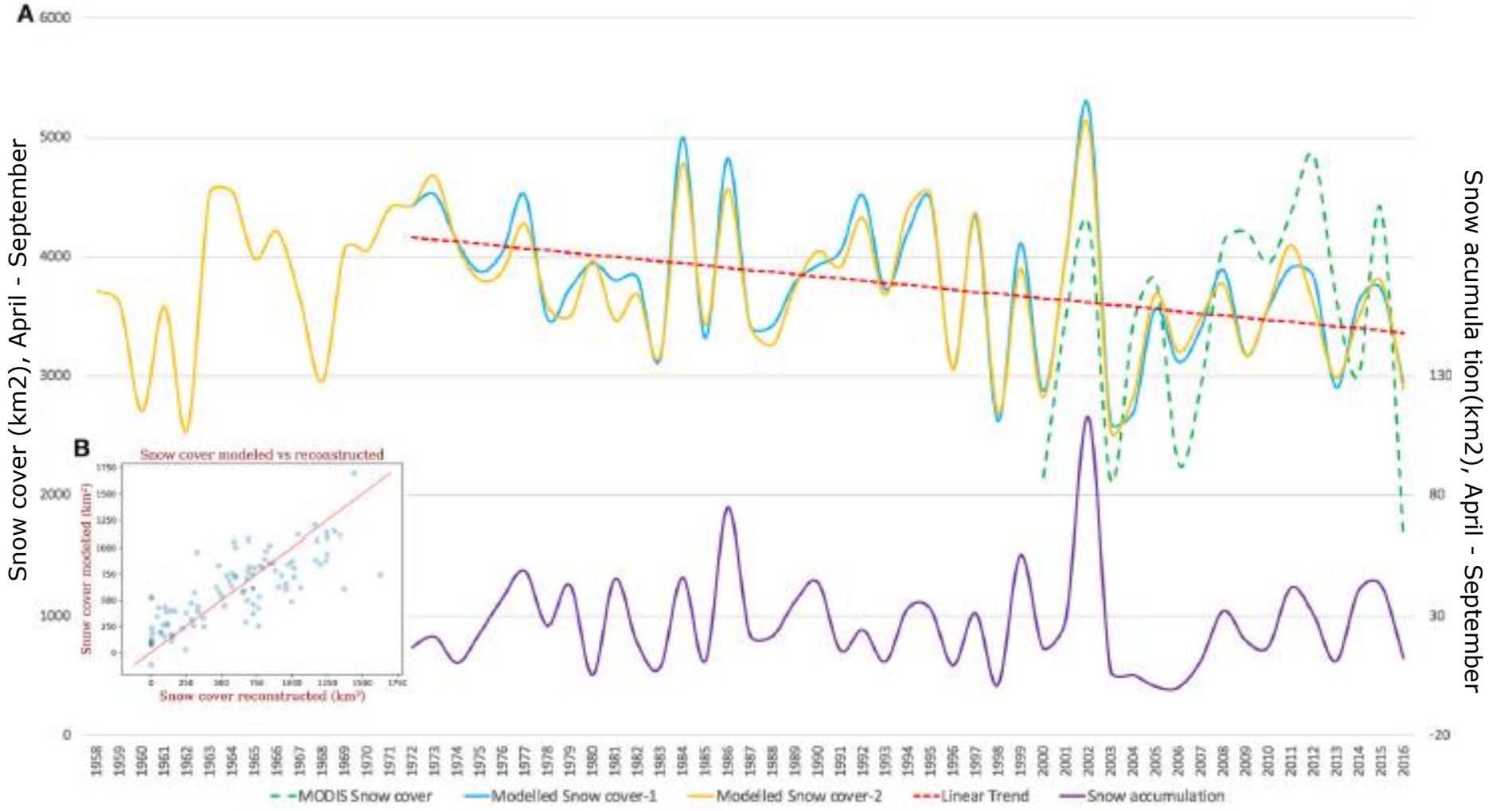
Gónzales-Reyes et al. Ann Ins. Pat. 2017



Aguirre et al., 2018, Frontiers

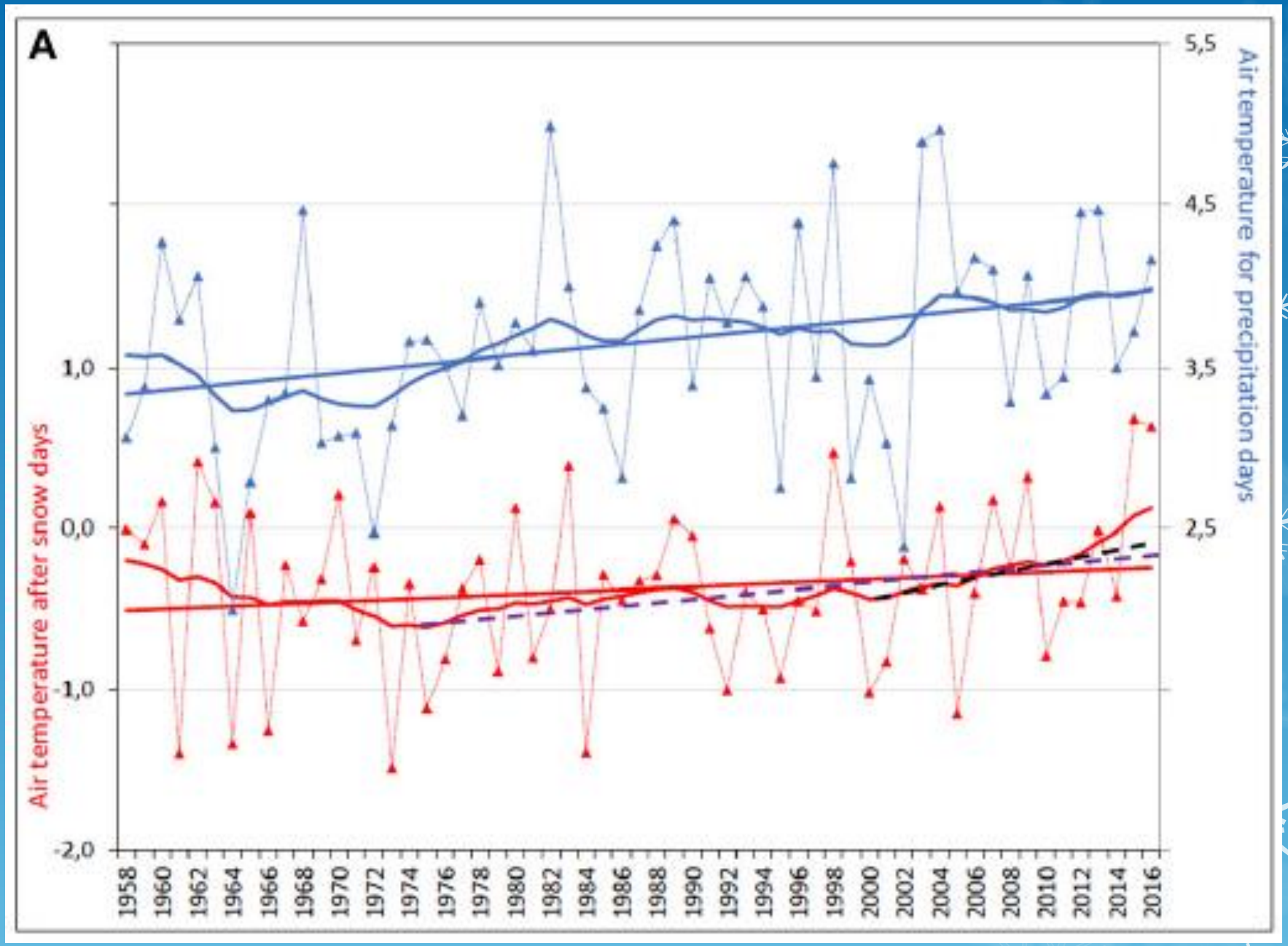


Aguirre et al., 2018, Frontiers



Snow cover changes in Brunswick Peninsula

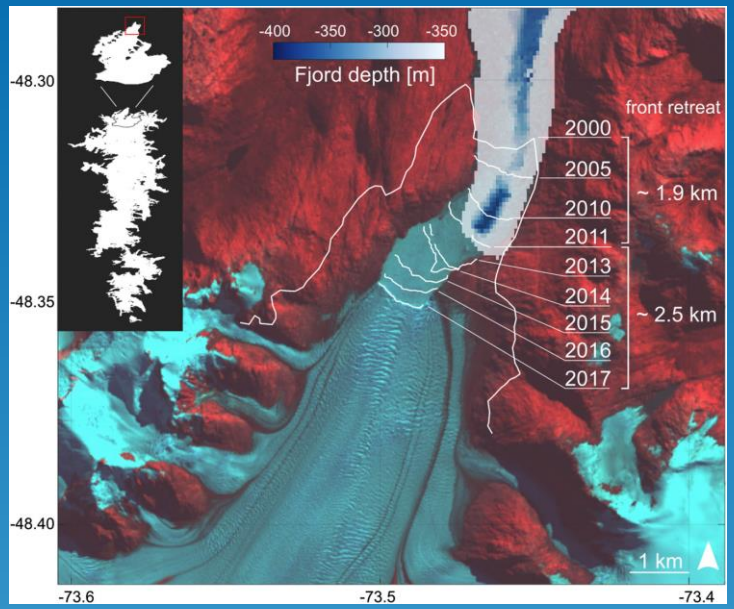
Aguirre et al., 2018, Frontier



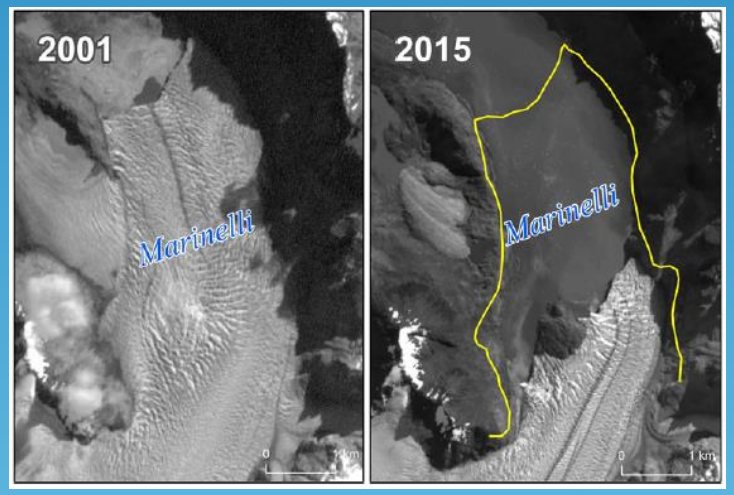
Aguirre et al., 2018, Frontier

Cryospheric impacts

Foresta et al. 2018, Rem Sen Env.

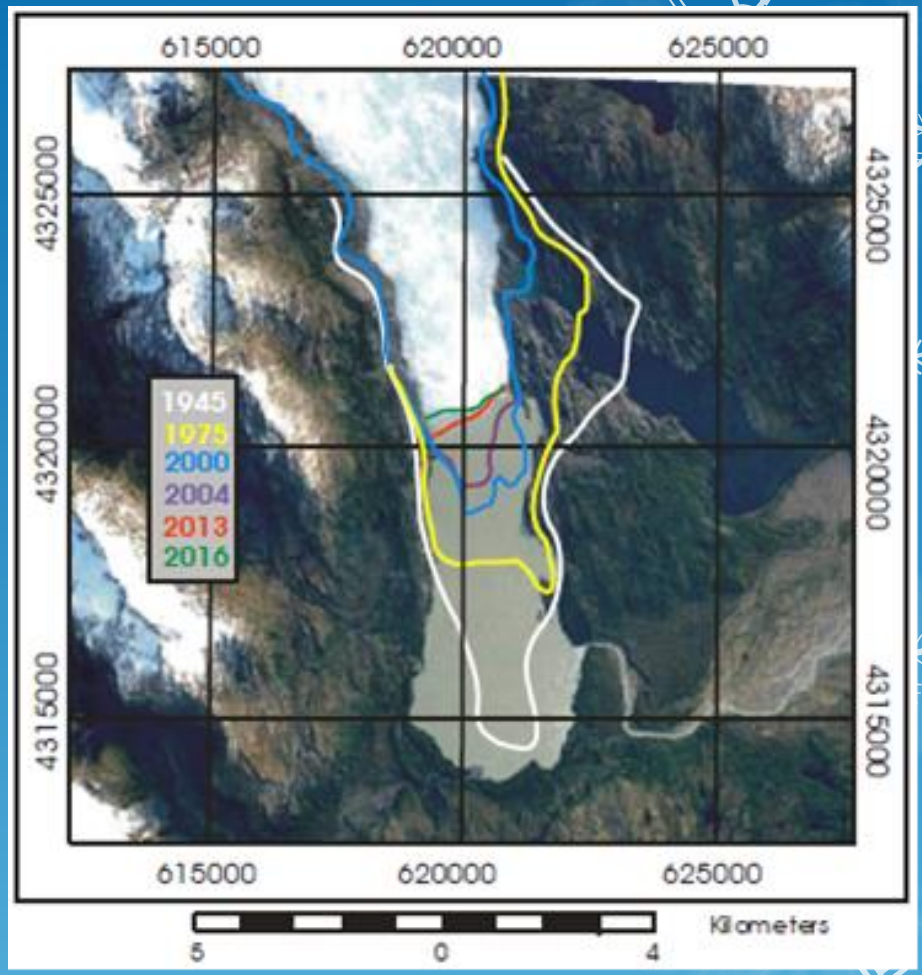


Jorge Montt glacier SPI (-4.5 km2 2000-2017)



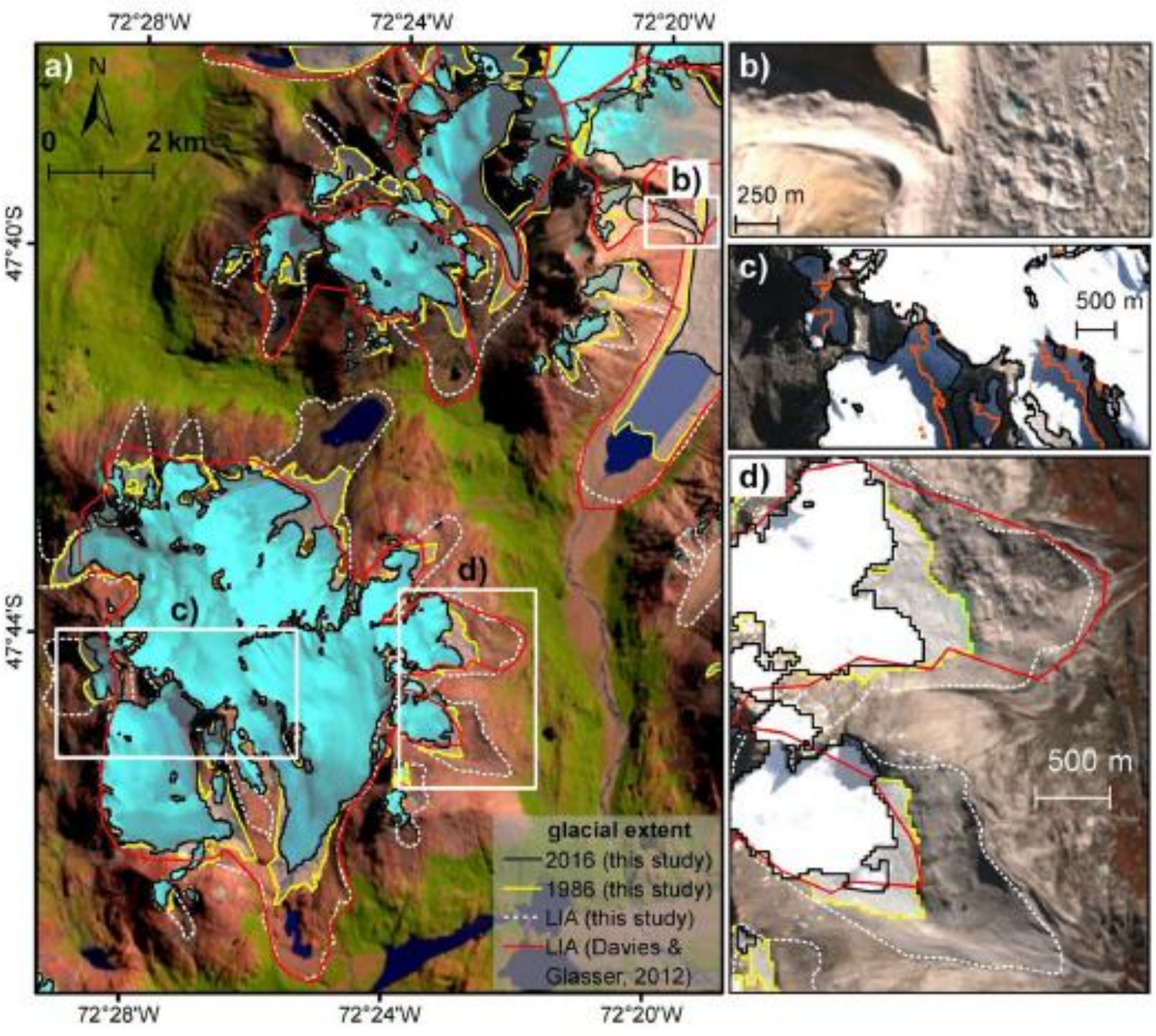
Marinelli glacier Cordillera Darwin (-7.0 km2 2001-2015)

Tyndall Gl.



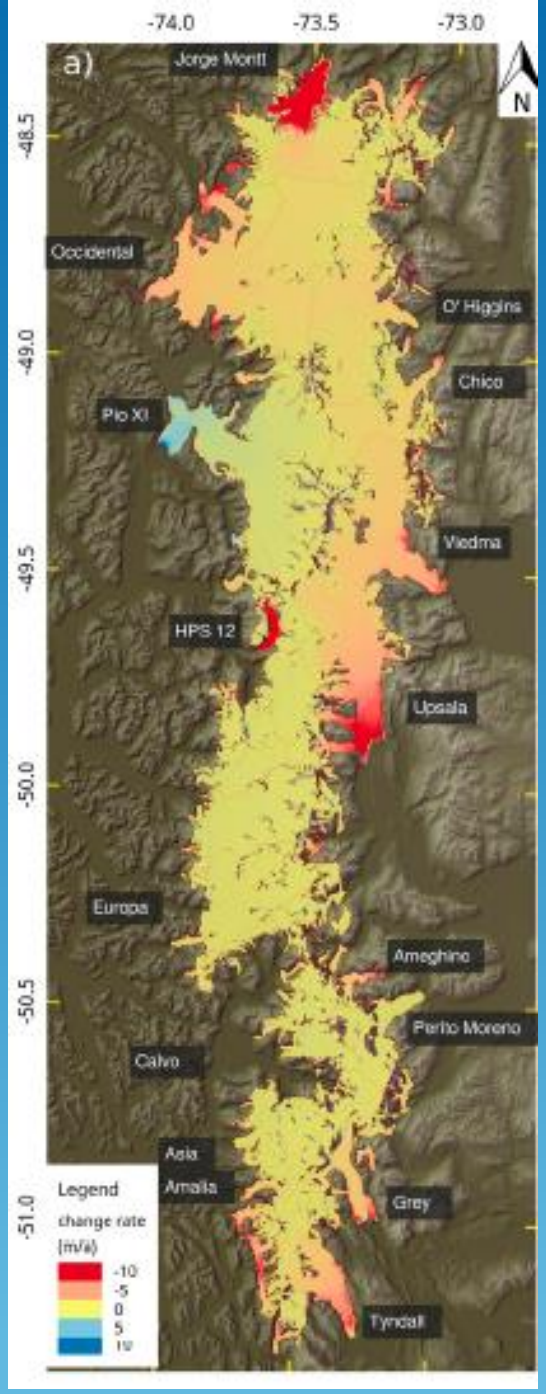
Barcaza et al 2017, Ann Glaciol)

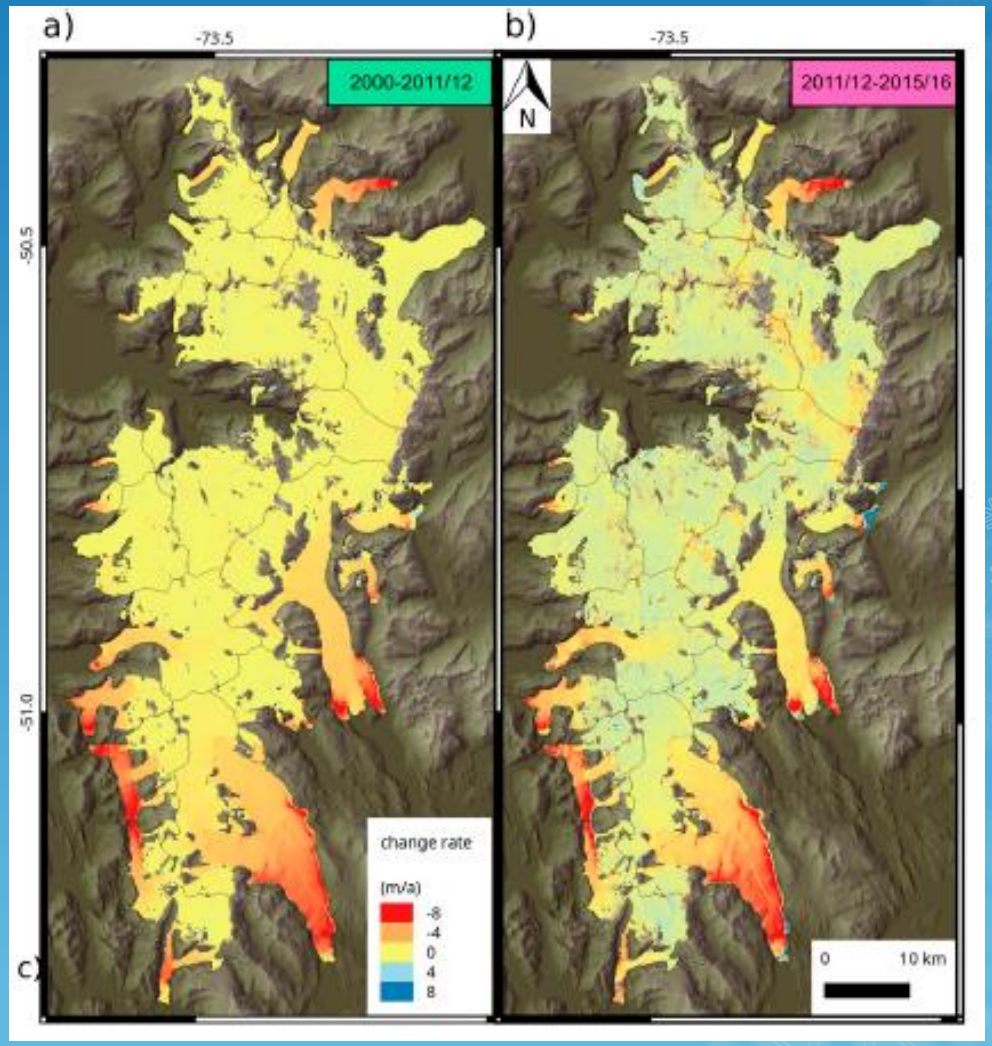
Meier et al 2018, Frontier



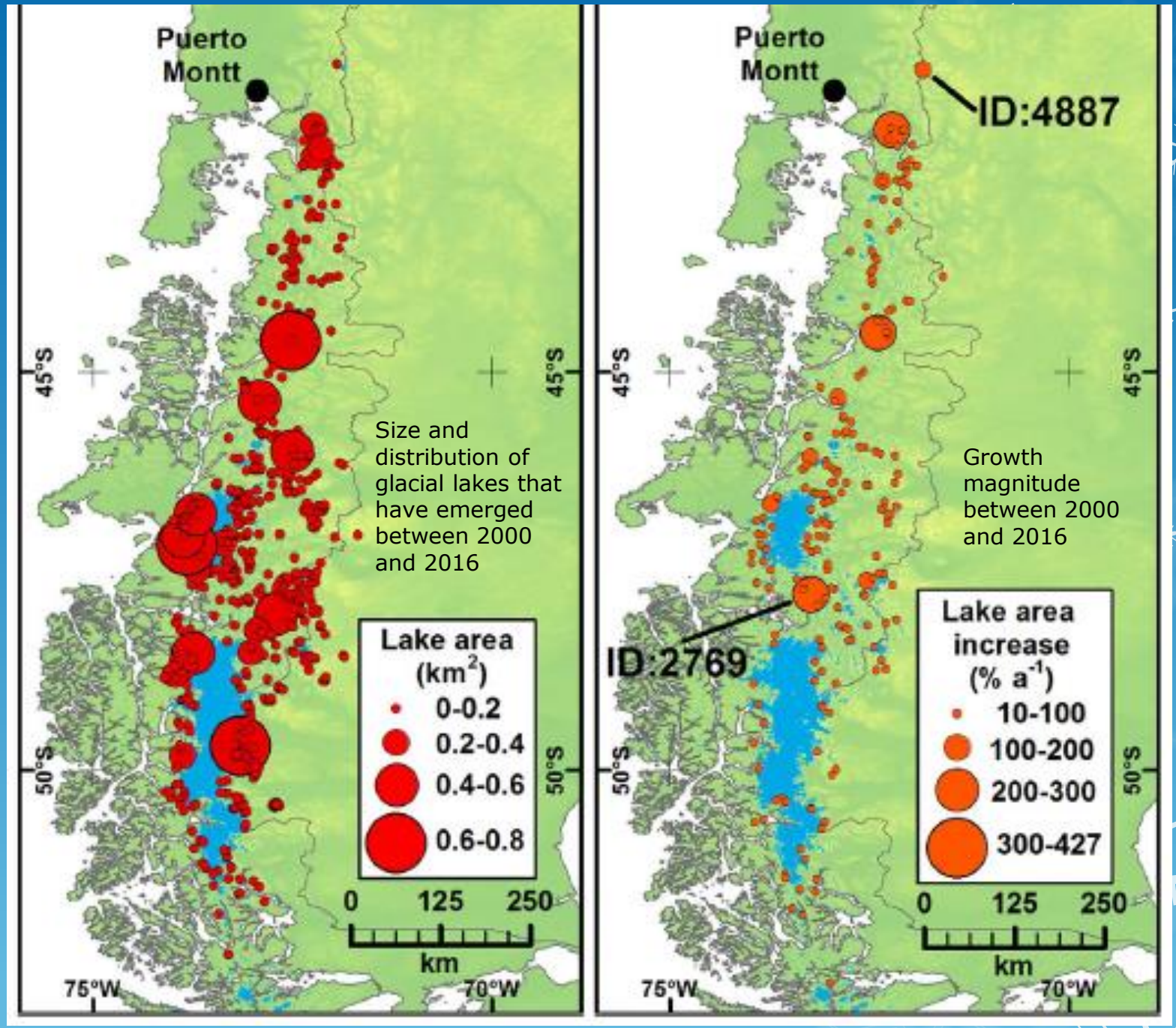
Malz et al 2018, Remote Sensing

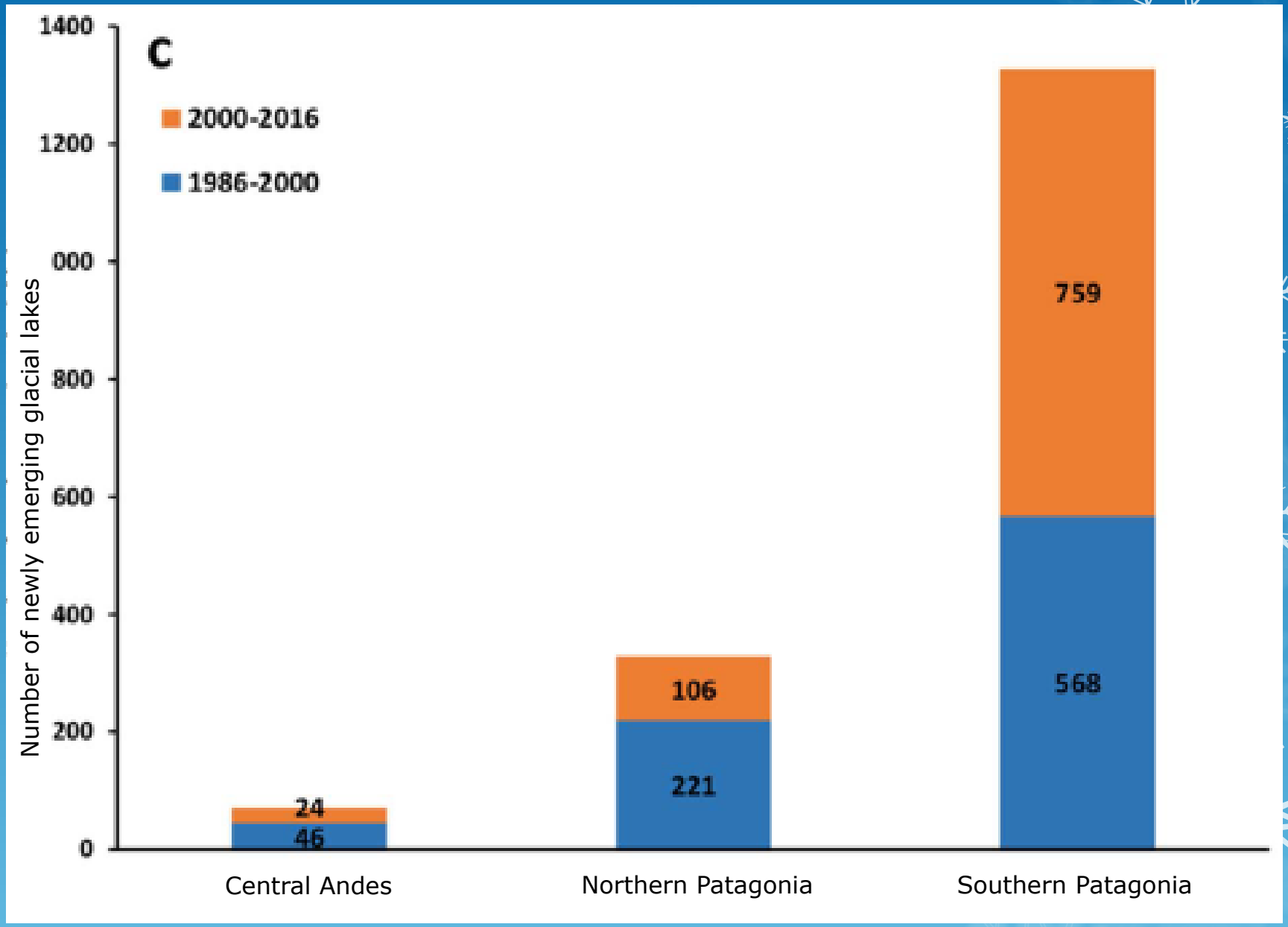
Elevation changes maps of the SPI, pixel-based assessment 2000-2015/16





Wilson et al 2018, Global and Planetary Change





Wilson et al 2018, Global and Planetary Change

LAKE CACHET 2 SHOWING HIGH WATER LEVEL

GLOFs:

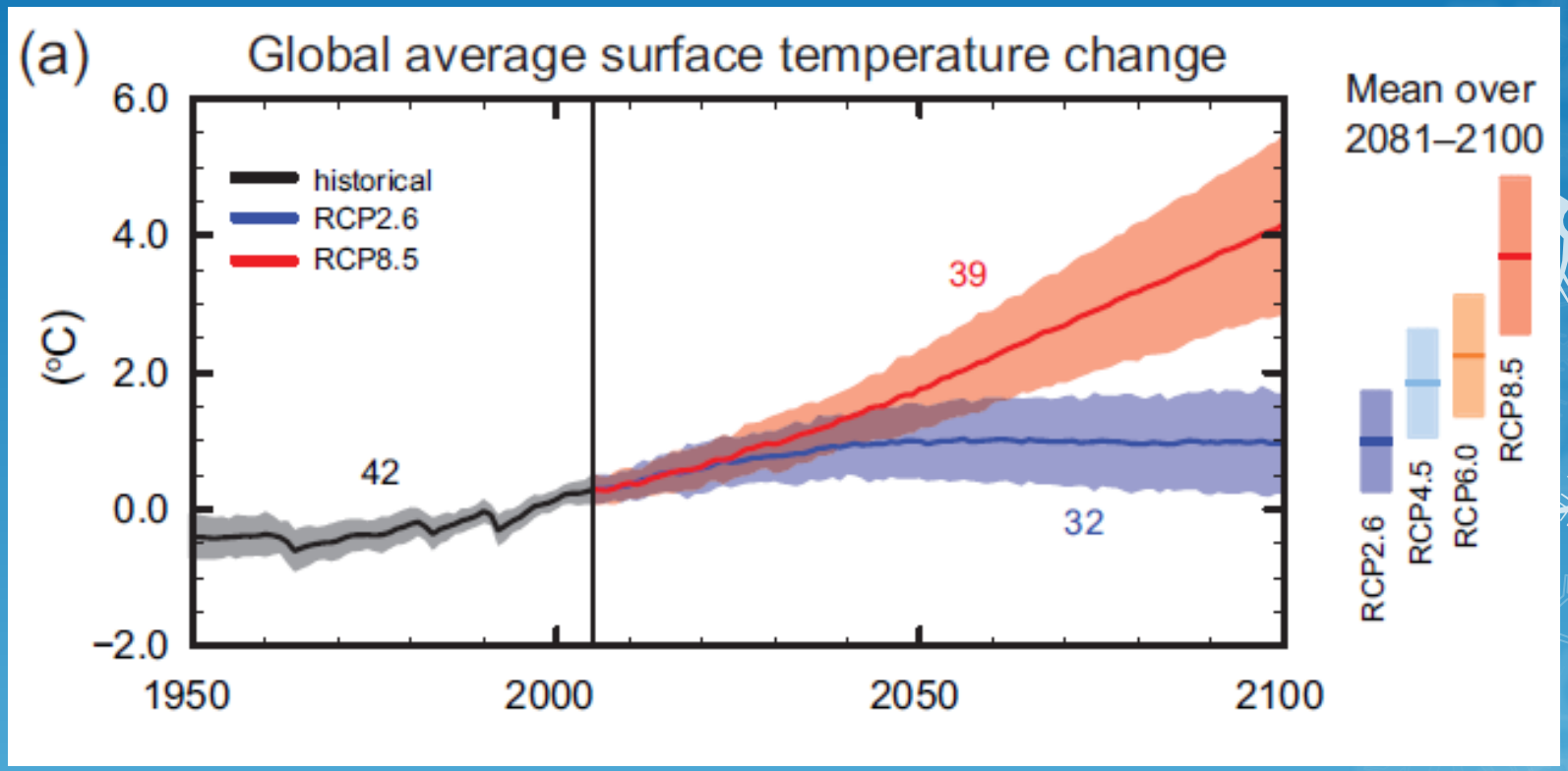
Glacial
Lake
Outburst
Floods

Glacial Lake Outburst Floods (GLOFs)

HET 2 COMPLETELY EMPTY

- Increase air temperature
- Precipitation liquid vs snow

Future projections in the Austral region


(a)
Global average surface temperature change
6.0
4.0
2.0
0.0
−2.0
(°C)
historical
RCP2.6
RCP8.5
42
39
32
1950
2000
2050
2100
Mean over
2081–2100
RCP2.6
RCP4.5
RCP6.0
RCP8.5


ipcc
CLIMATE CHANGE 2013

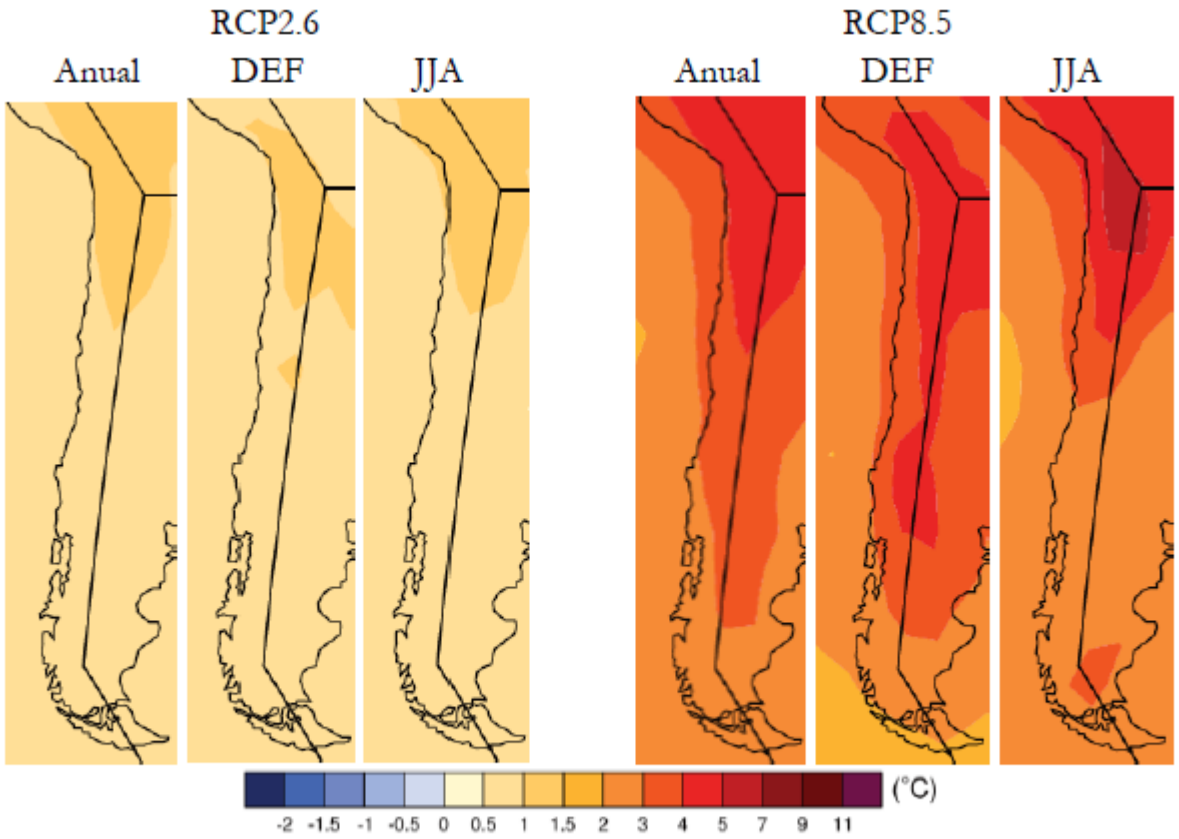


Figura 3.9. Reproducción parcial de las predicciones del cambio de temperatura del aire esperable para fines del siglo 21 (2081-2100) para los escenarios RCP2.6 y RCp8.5. (IPCC, 2013a; 2013b).

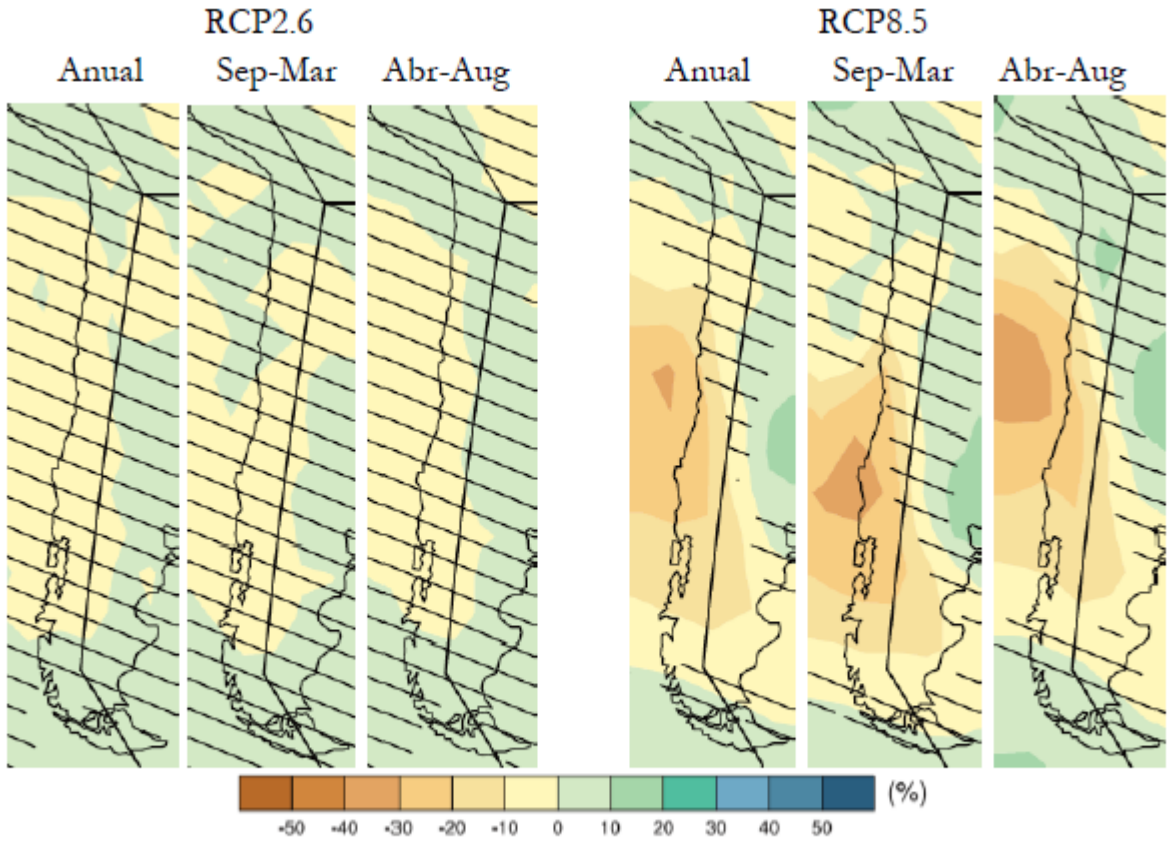
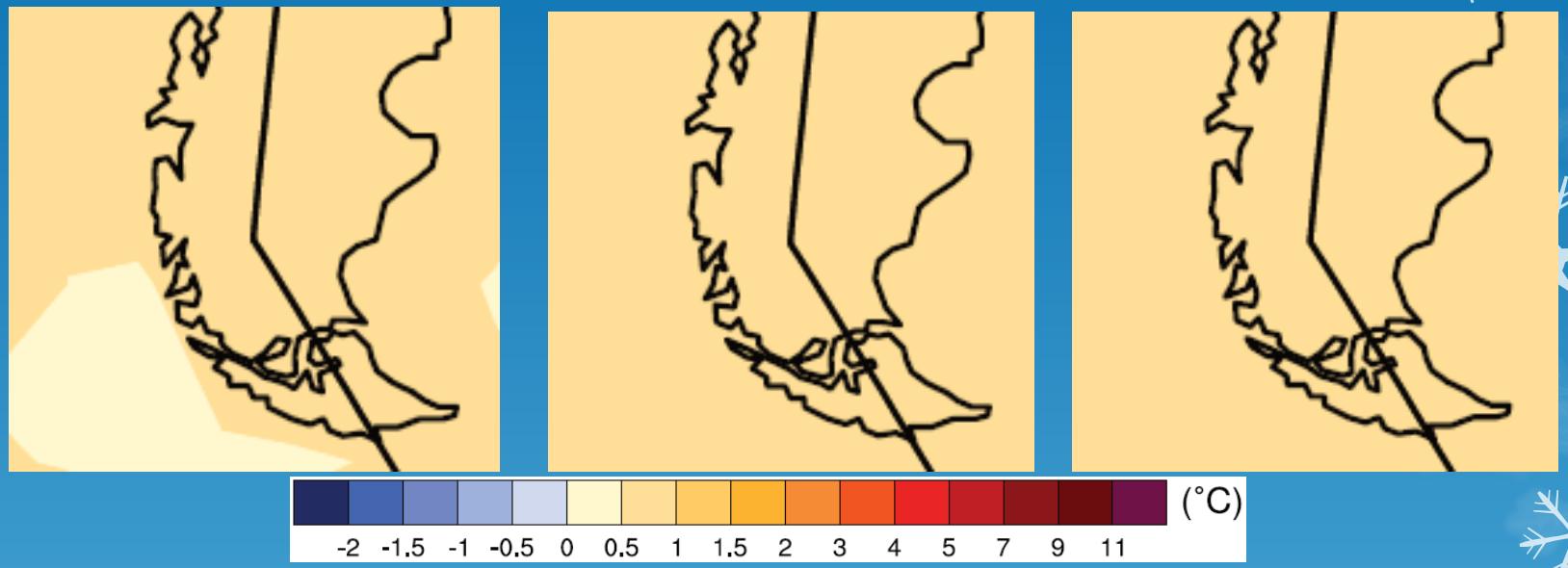
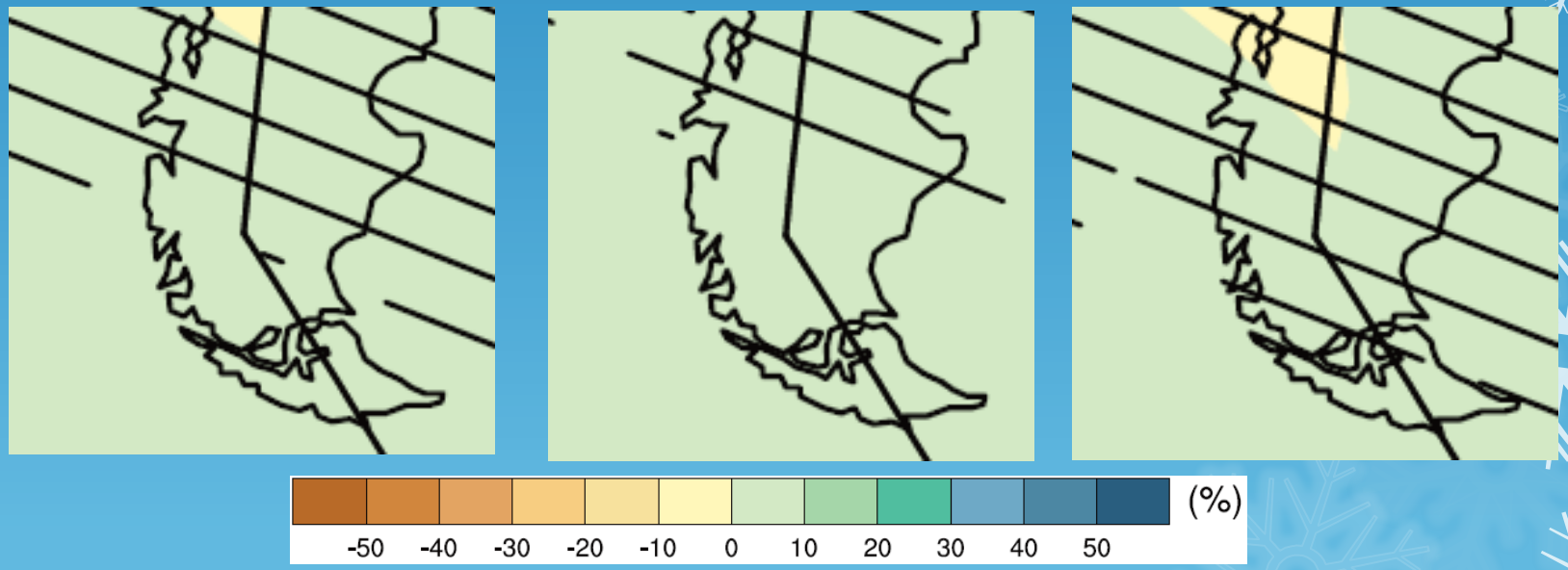


Figura3.10. Reproducción parcial de las predicciones del cambio de la precipitación esperable para fines del siglo 21 (2081-2100) para los escenarios RCP2.6 y RCp8.5. (IPCC, 2013a; 2013b).

Scenario RPC 2.6

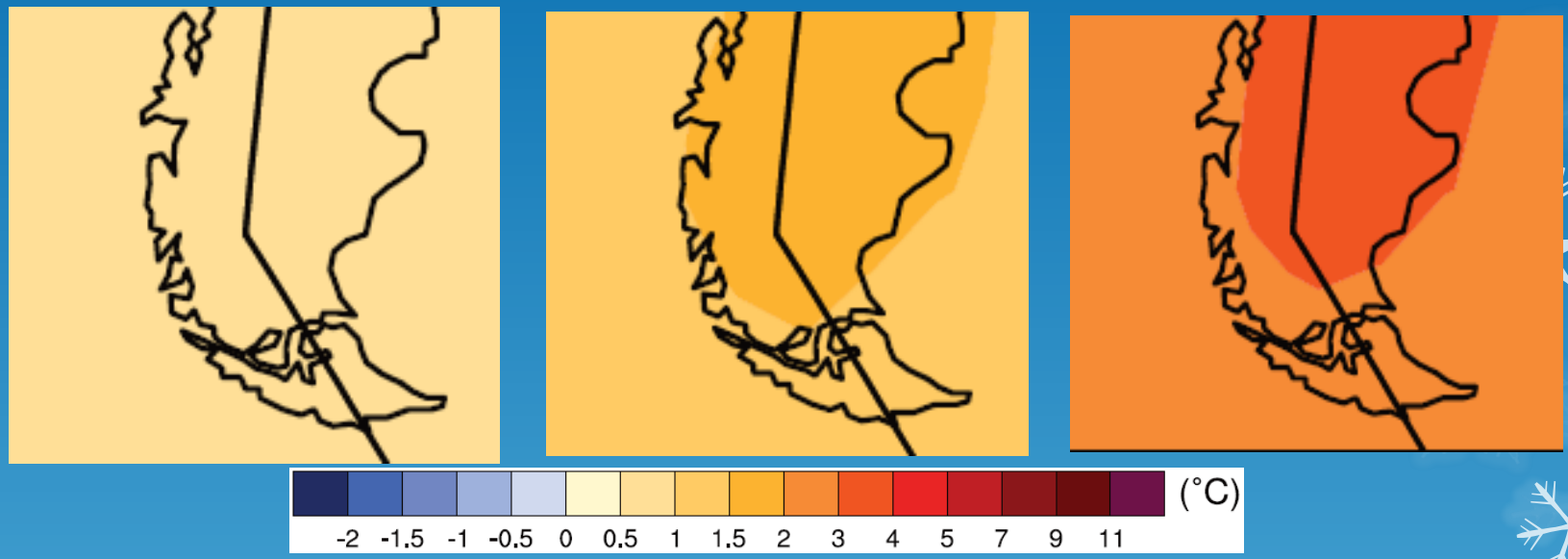
2016-2035 2046-2065 2081-2100

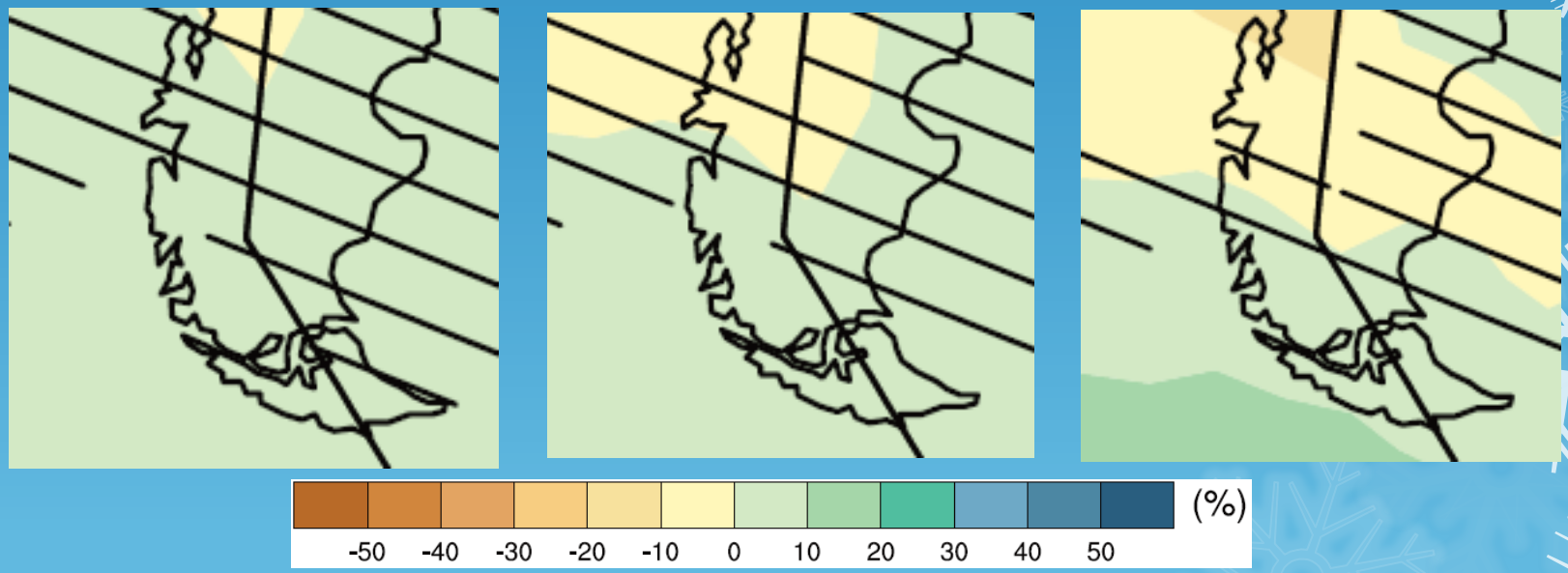




Scenario RPC 8.5

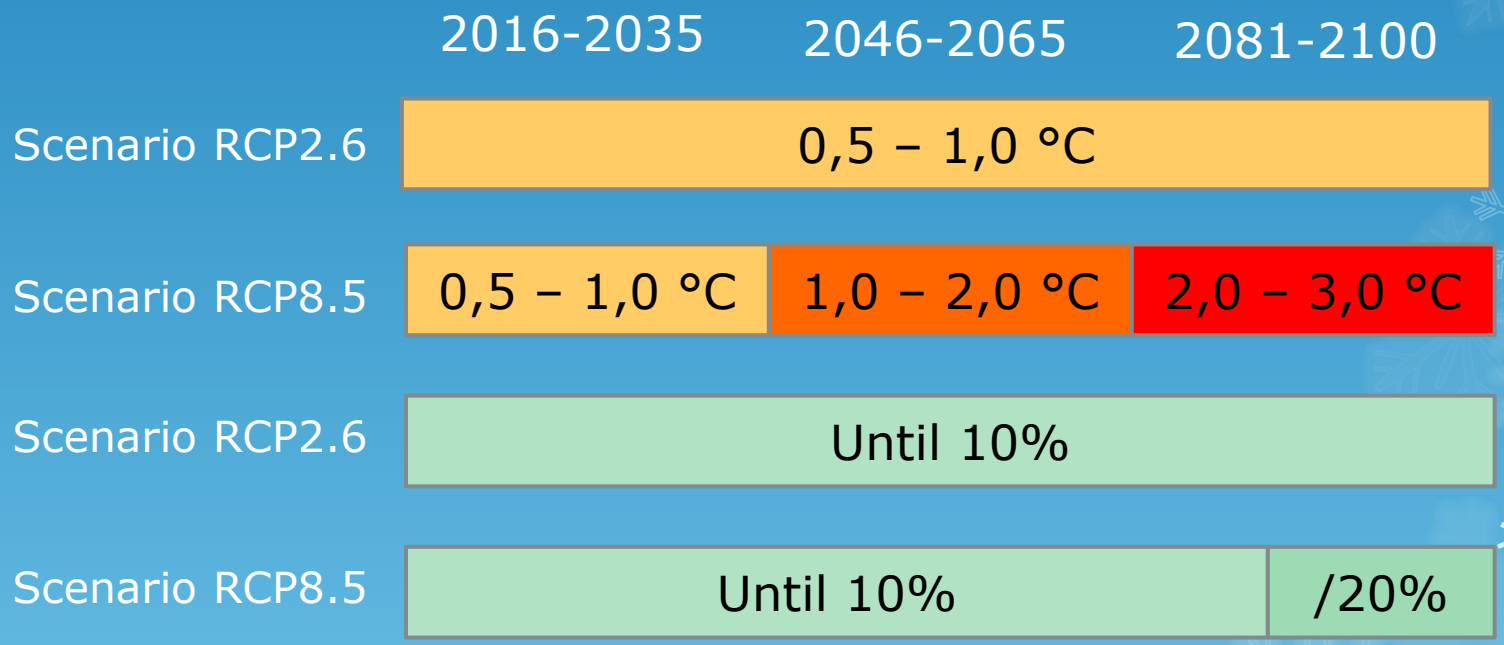
2016-2035 2046-2065 2081-2100



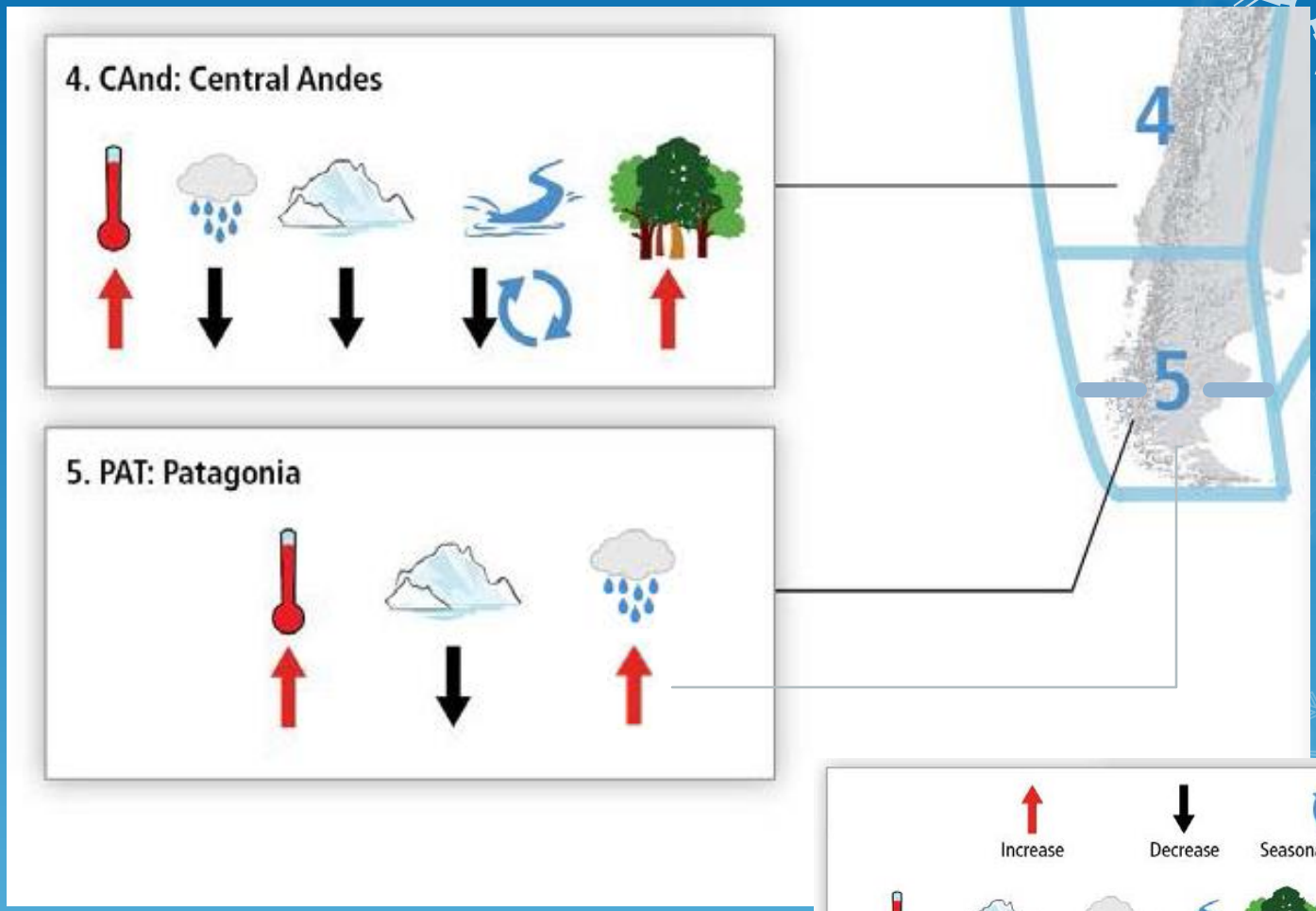


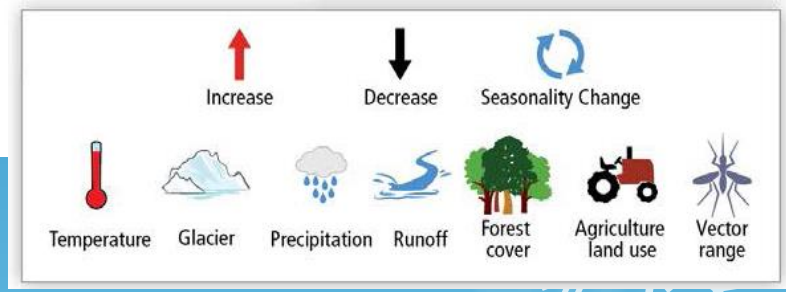
Summary and conclusions

There will be an increase in air temperatura and precipitation in the southern-austral región. Depending of the scenario and the projected period, changes will be:



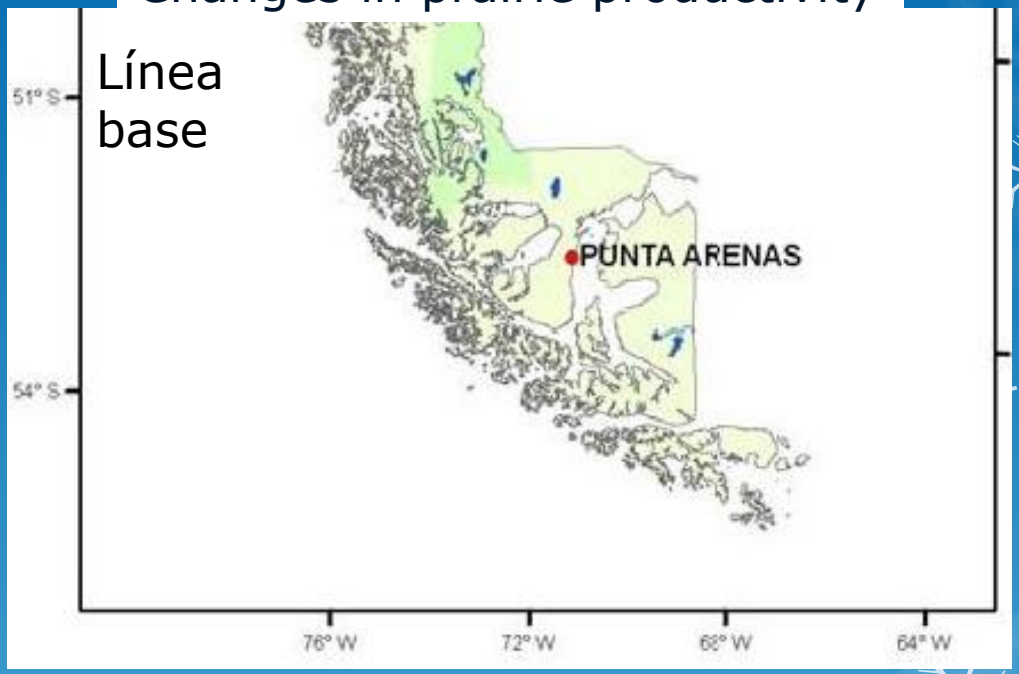
IPCC WGII AR5 Chapter 27

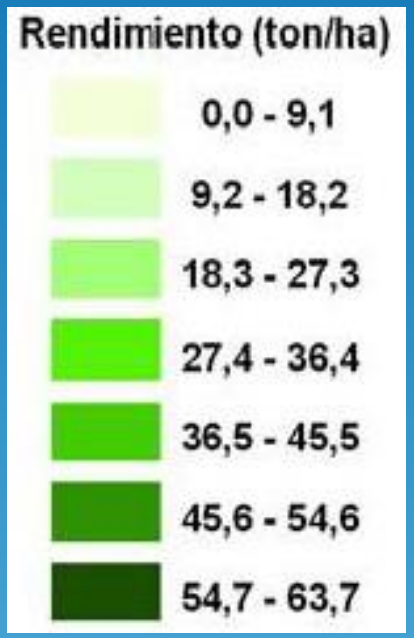


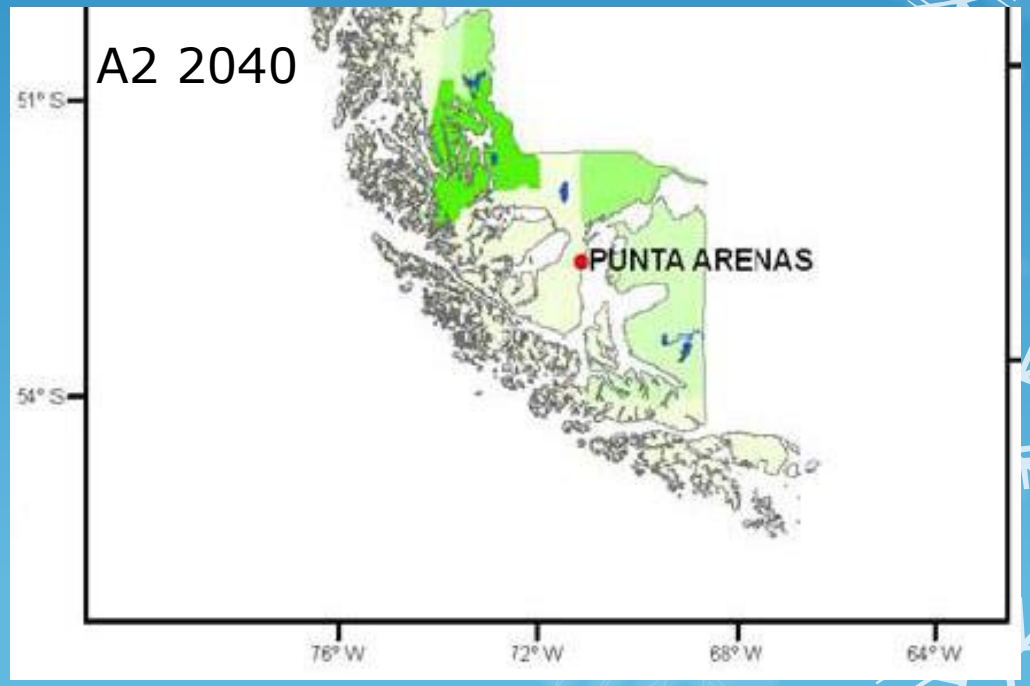


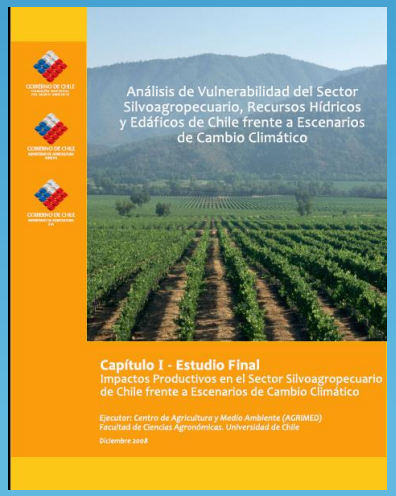
Implication on ecosystems

Changes in prairie productivity



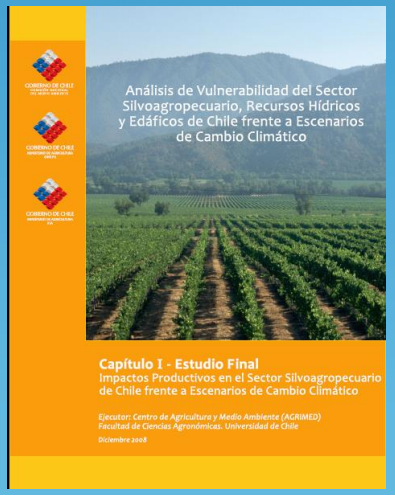






Fernando Santibañez

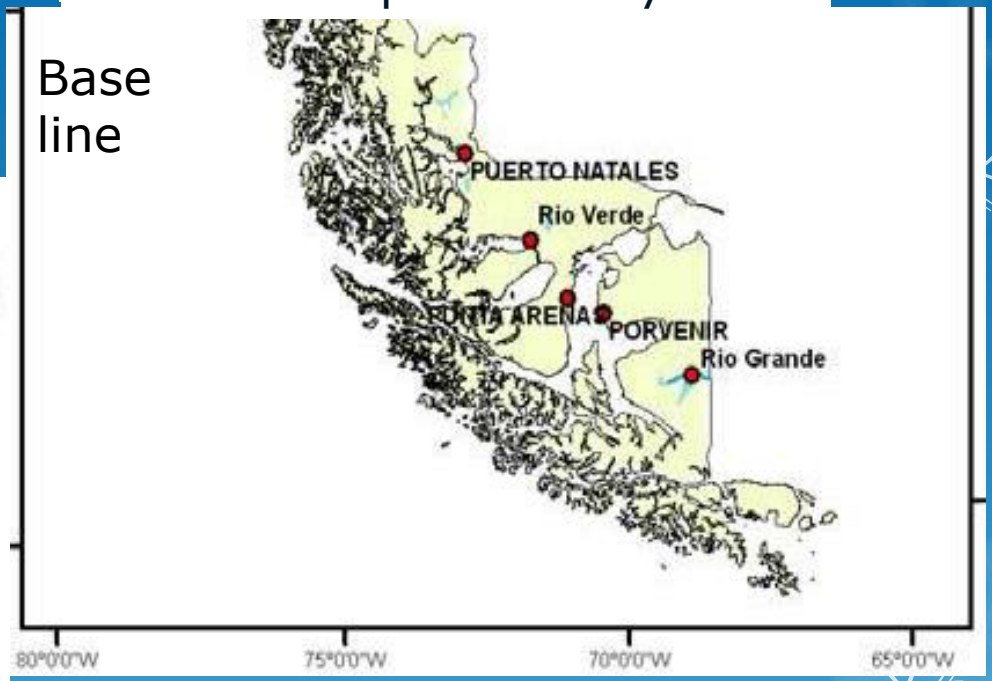
Implication on ecosystems



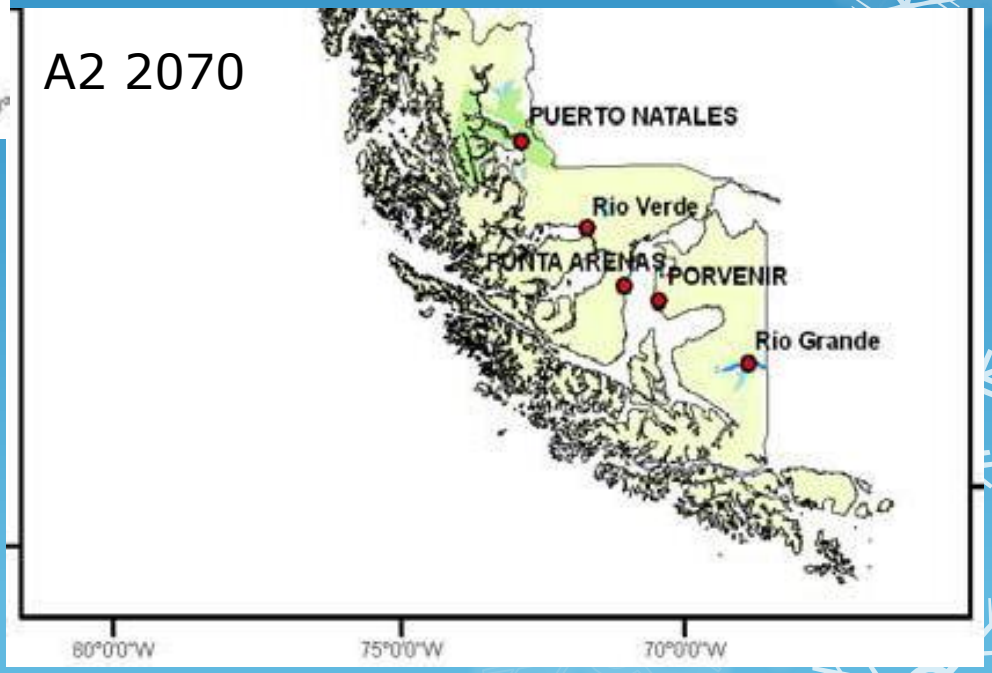
Fernando Santibañez

Beam productivity

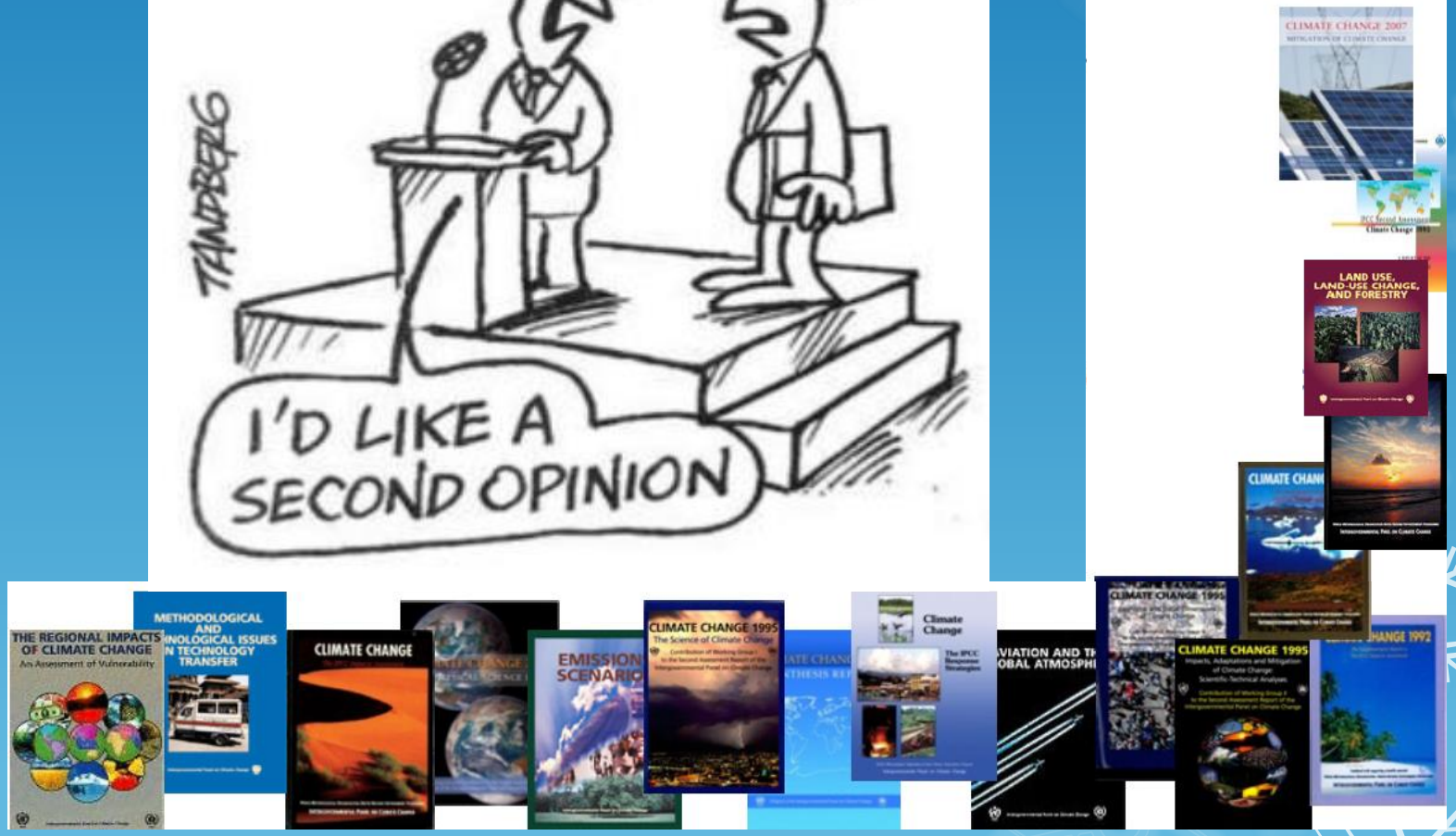
Base line



A2 2070




2500 SCIENTISTS SAY WE'VE CAUSED GLOBAL WARMING
I'D LIKE A SECOND OPINION
TAMBERG


CLIMATE CHANGE 2007
LAND USE, LAND-USE CHANGE, AND FORESTRY
THE REGIONAL IMPACTS OF CLIMATE CHANGE
An Assessment of Vulnerability
METHODOLOGICAL AND TECHNOLOGICAL ISSUES IN TECHNOLOGY TRANSFER
CLIMATE CHANGE
EMISSION SCENARIO
CLIMATE CHANGE 1995
The Science of Climate Change
Climate Change
CLIMATE CHANGE 1995
CLIMATE CHANGE 1992

Gracias