IMPACTOS DE LOS CAMBIOS EN EL CLIMA SOBRE LA PRODUCCIÓN DE MIEL Y LAS PRÁCTICAS DE LOS APICULTORES EN CHILE

Martina Gajardo, Ariel Muñoz, , Jonathan Barichivich, Karin Klock, Eugenia Gayo, Francisco Fonturbel, Matías Olea, Camilo Veas

QUÉ PASA Medioambiente Clima ...

Balance Hídrico Nacional revela dramática situación: proyecta escasez de agua de hasta 50% y alza de temperatura de hasta 2,5°C

Actualización de este balance, liderado por académicos de la Universidad de Chile, retrata el complejo escenario local, el que aparentemente no mejorará en las próximas décadas.

Carlos Montes **4 ENE 2021** 3:52 PM

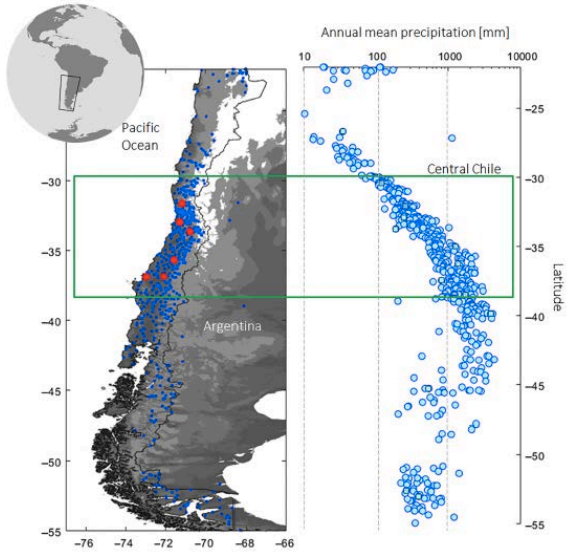

FIGURE 1 Geographic and climate features of Central Chile. (a) Topographic map (dark grey: Terrain elevation <500 m asl; light grey: 500–3,000 m asl; white: > 3,000 m asl). Blue dots are rain gauges stations operated by DMC/DGA. Red circles are the location of the six stations used to define the regional precipitation index. Stations that provide records for Figure 4 are also indicated. (b) Station-based annual mean rainfall (1980–2010) according to latitude [Colour figure can be viewed at wileyonlinelibrary.com]

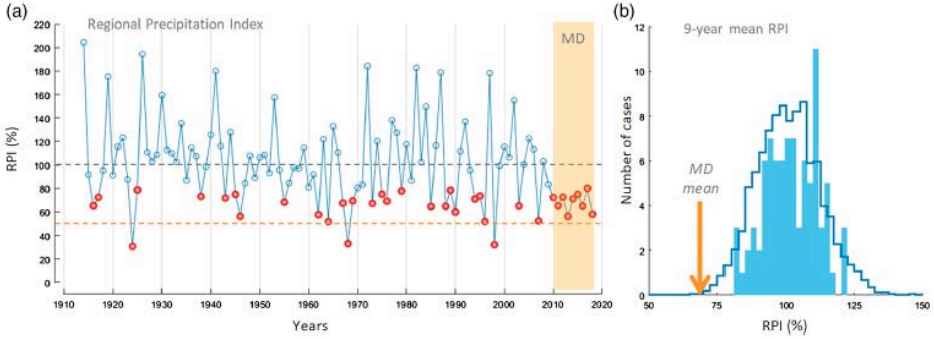

FIGURE 2 (a) Annual series of Central Chile regional precipitation index (RPI). Droughts, defined as years with RPI < 80%, are identified by the red circles. (b) Histogram of 9-year average of RPI for the period 1915–2009. The light blue bars show the observed frequency, considering a 9-year sliding window throughout the 1915–2009 record. The blue thick line is the distribution obtained from 5,000 randomly selected 9 years from the historical period. The orange arrow indicates the RPI averaged during the MD (2010–2018) [Colour figure can be viewed at wileyonlinelibrary.com]

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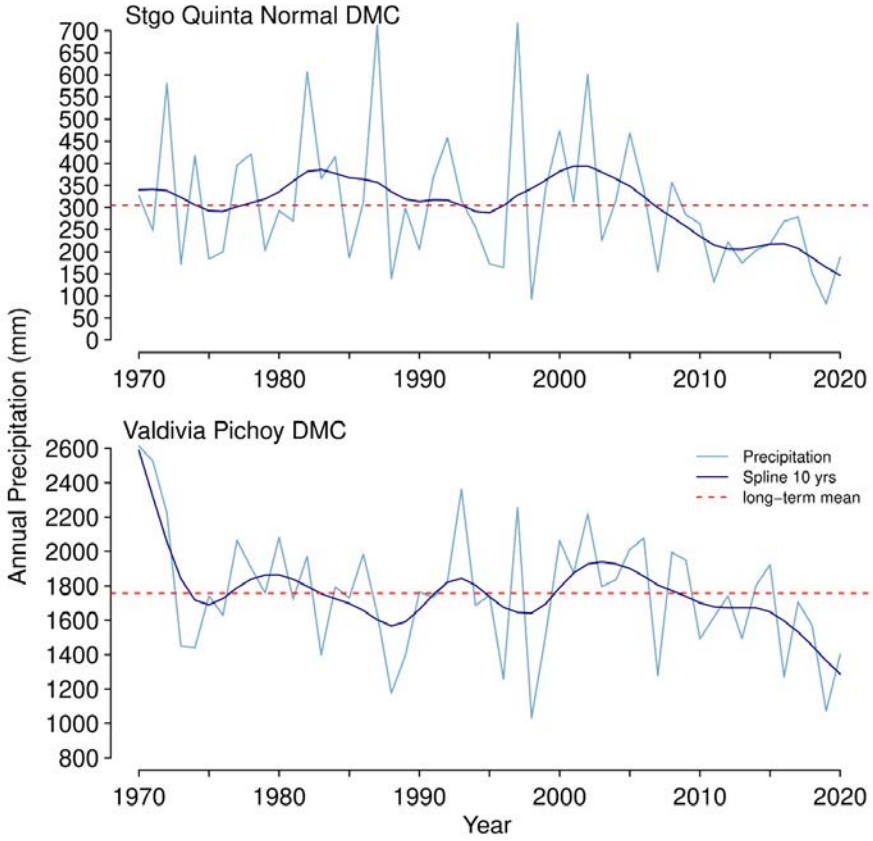
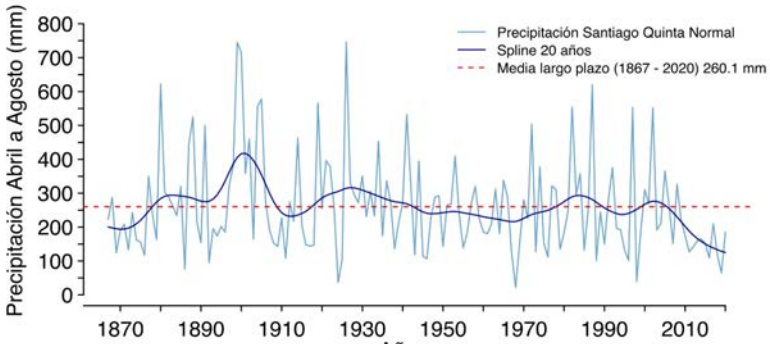
RESEARCH ARTICLE

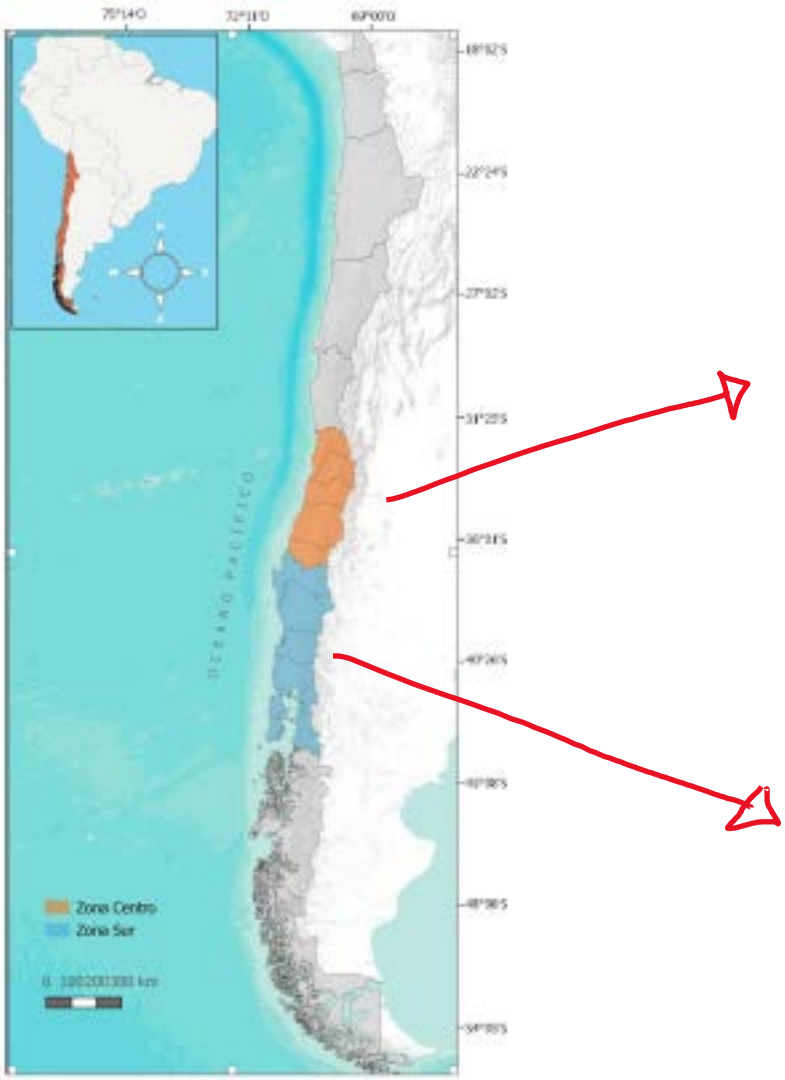
International Journal of Climatology | RMetS

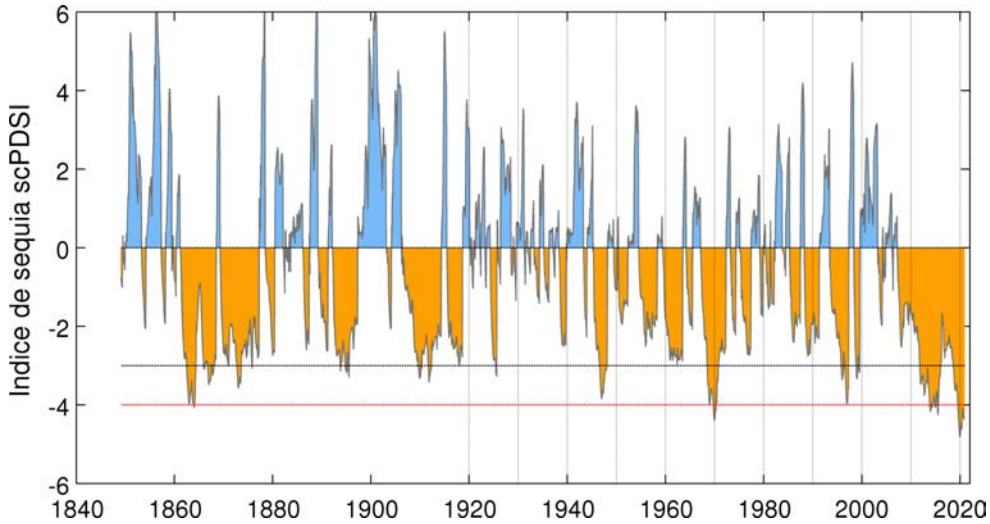
The Central Chile Mega Drought (2010–2018): A climate dynamics perspective

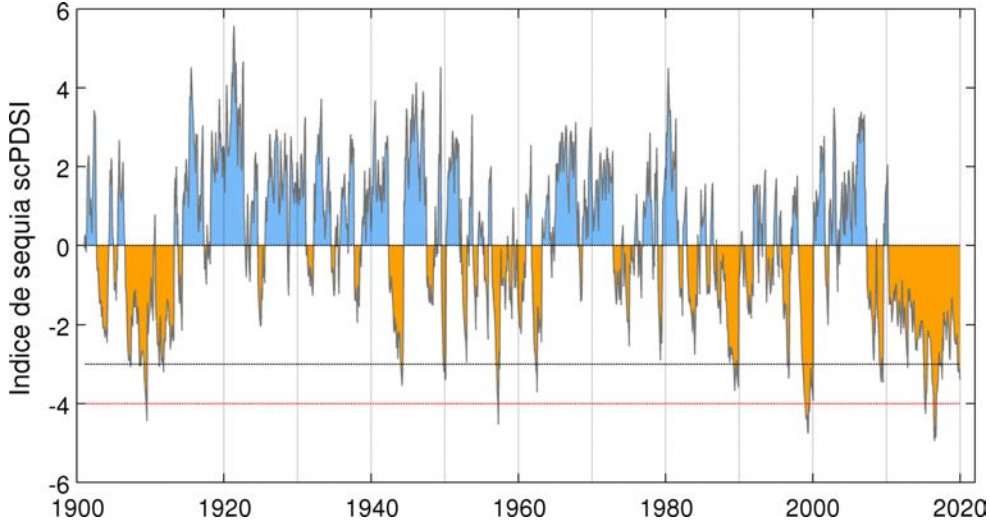
René D. Garreaud[1,2] | Juan P. Boisier[2] | Roberto Rondanelli[1,2] | Aldo Montecinos[3,4] | Hector H. Sepúlveda[3] | Daniel Veloso-Aguila[3]

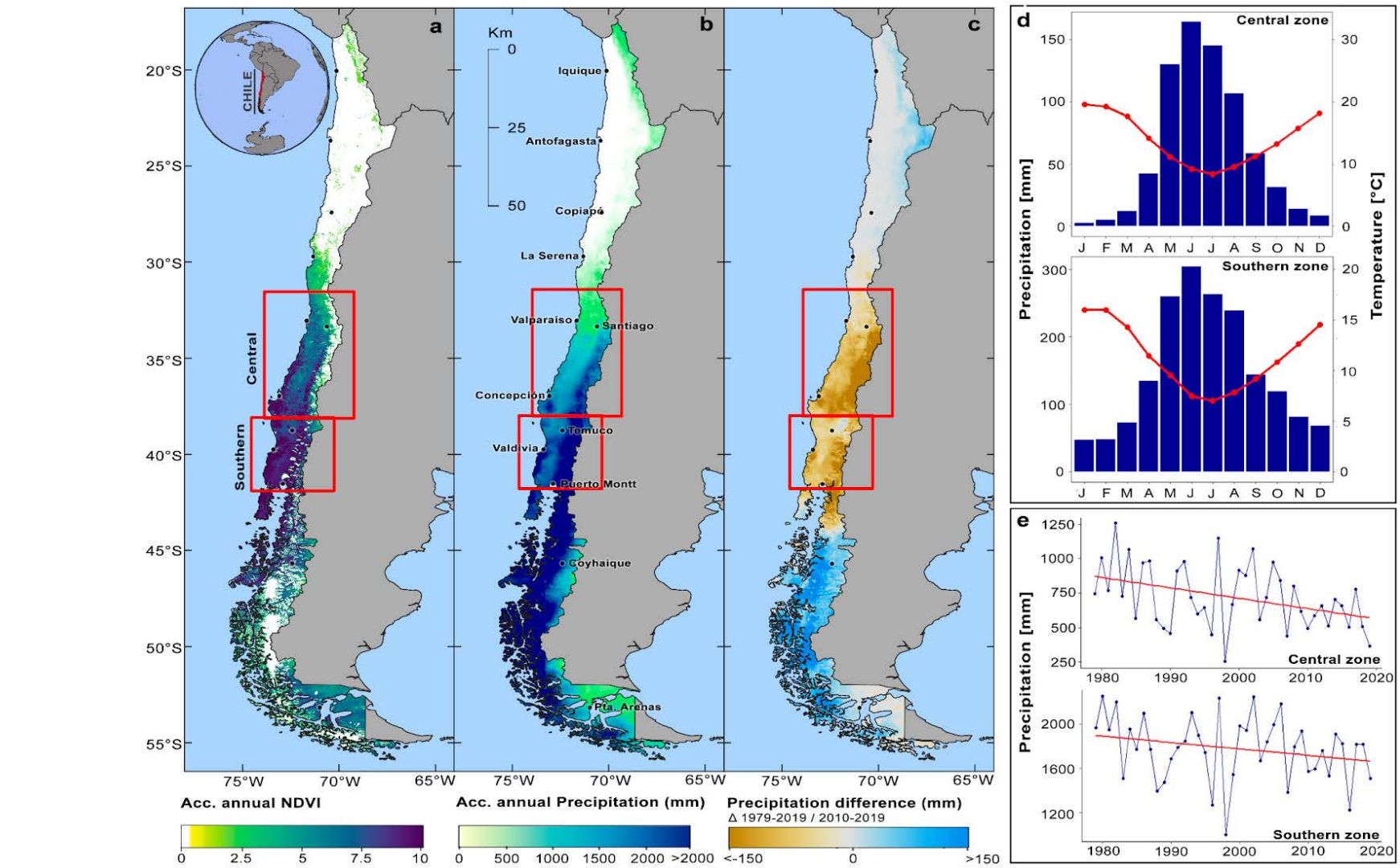

Stgo Quinta Normal DMC
Valdivia Pichoy DMC
Annual Precipitation (mm)
Year
Precipitation
Spline 10 yrs
long−term mean


Precipitación Abril a Agosto (mm)
Precipitación Santiago Quinta Normal
Spline 20 años
Media largo plazo (1867 - 2020) 260.1 mm


Zona Centro
Zona Sur


Indice de sequia scPDSI
6
4
2
0
-2
-4
-6
1840
1860
1880
1900
1920
1940
1960
1980
2000
2020


Indice de sequia scPDSI
6
4
2
0
-2
-4
-6
1900
1920
1940
1960
1980
2000
2020


a
b
c
d
e
CHILE
Km
0
25
50
Iquique
Antofagasta
Copiapó
La Serena
Valparaíso
Santiago
Concepción
Temuco
Valdivia
Puerto Montt
Coyhaique
Pta. Arenas
Central
Southern
20°S
25°S
30°S
35°S
40°S
45°S
50°S
55°S
75°W
70°W
65°W
Acc. annual NDVI
0
2.5
5
7.5
10
Acc. annual Precipitation (mm)
0
500
1000
1500
2000
>2000
Precipitation difference (mm)
Δ 1979-2019 / 2010-2019
<-150
0
>150
Central zone
Southern zone
Precipitation [mm]
Temperature [°C]
J F M A M J J A S O N D
1980
1990
2000
2010
2020

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Ecological Indicators

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

Forest browning trends in response to drought in a highly threatened mediterranean landscape of South America

Alejandro Miranda[a,b,c,*], Antonio Lara[c,d], Adison Altamirano[a,e], Carlos Di Bella[f,g], Mauro E. González[c,d], Jesus Julio Camarero[h]

Agua y Extremos | Cambio de uso de suelo | Megasequía

Análisis: Pérdida del verdor en el bosque de la zona central de Chile | (CR)2

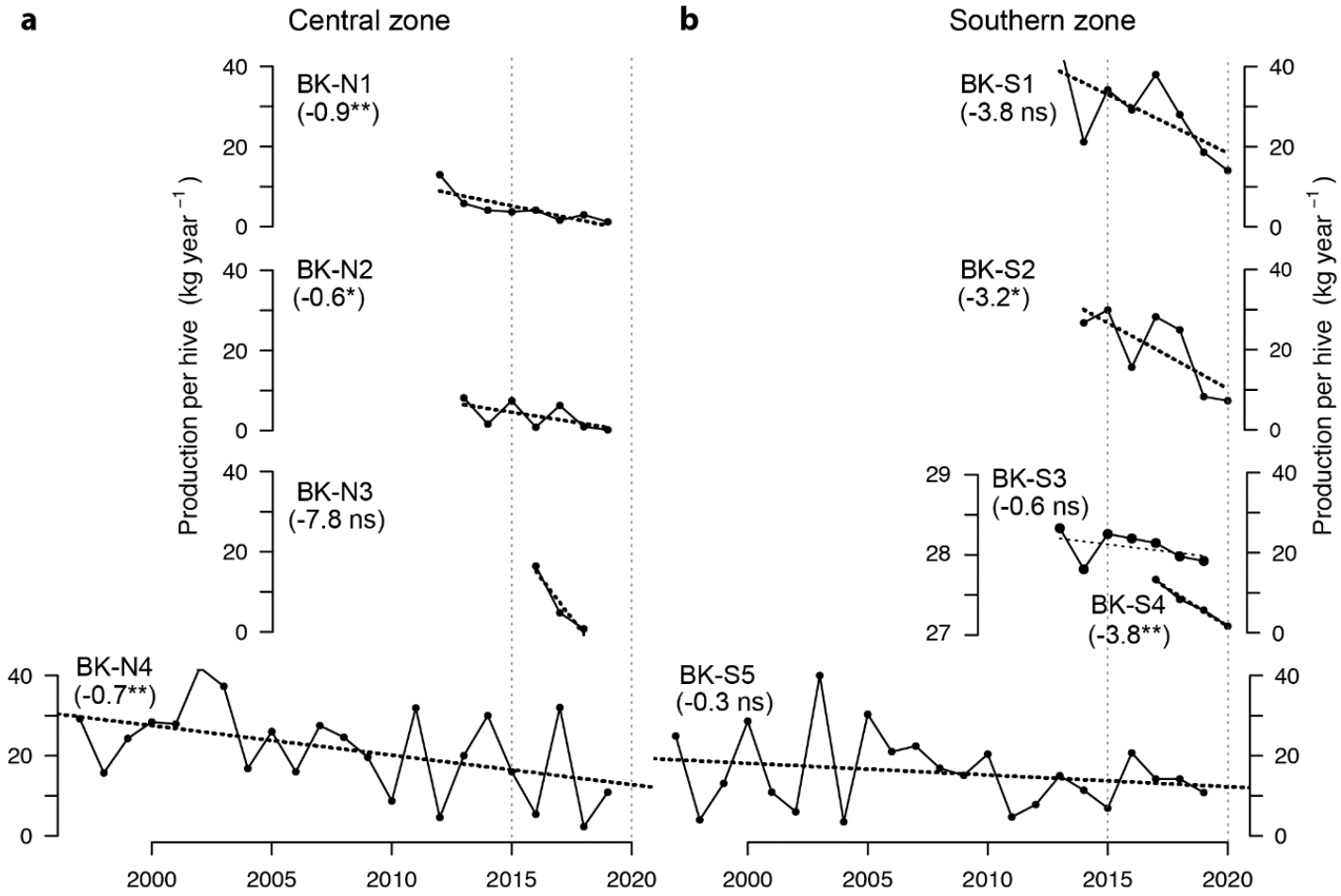
23 junio, 2020 · 1322

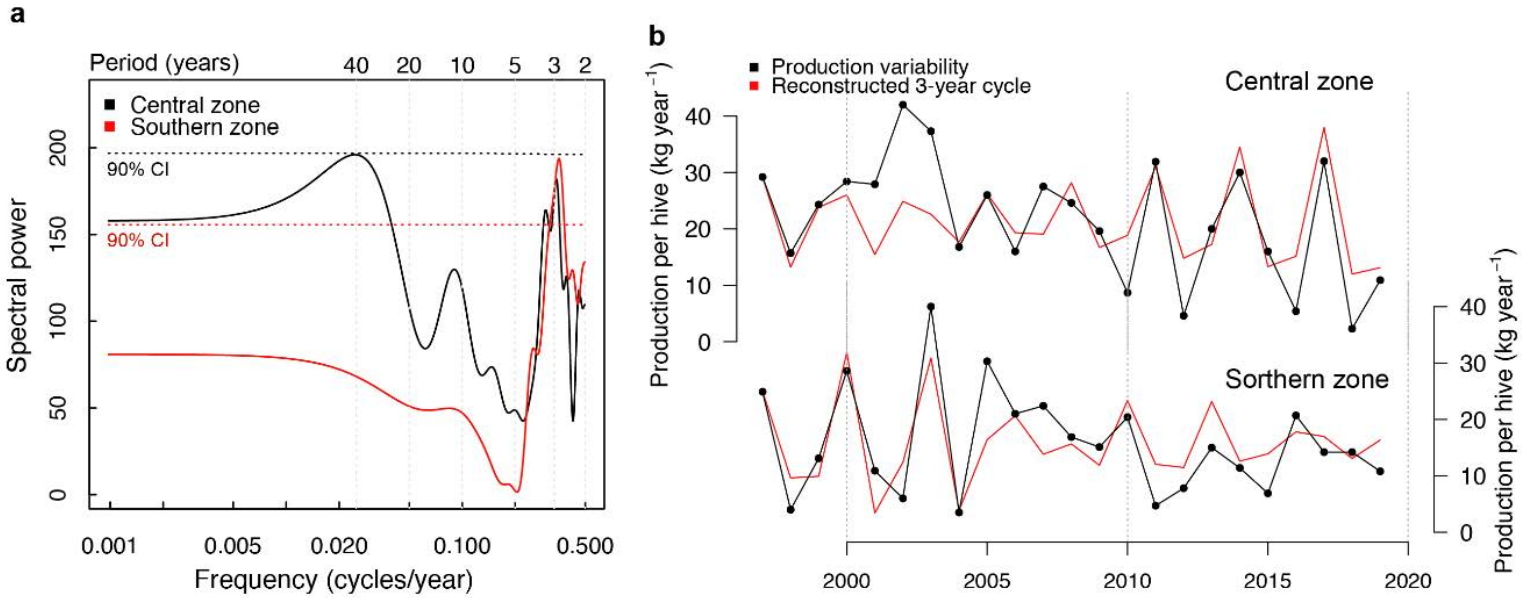
Alejandro Miranda, Antonio Lara, Adison Altamirano, Carlos Di Bella, Mauro E. González y Jesús Camarero

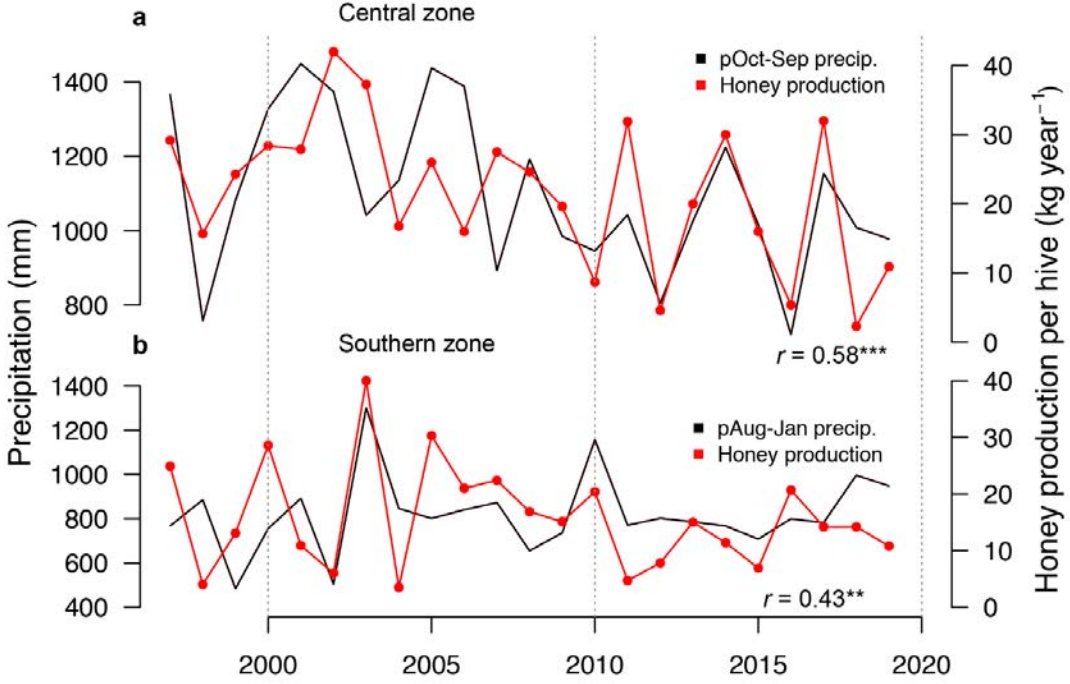
METODOLOGÍA

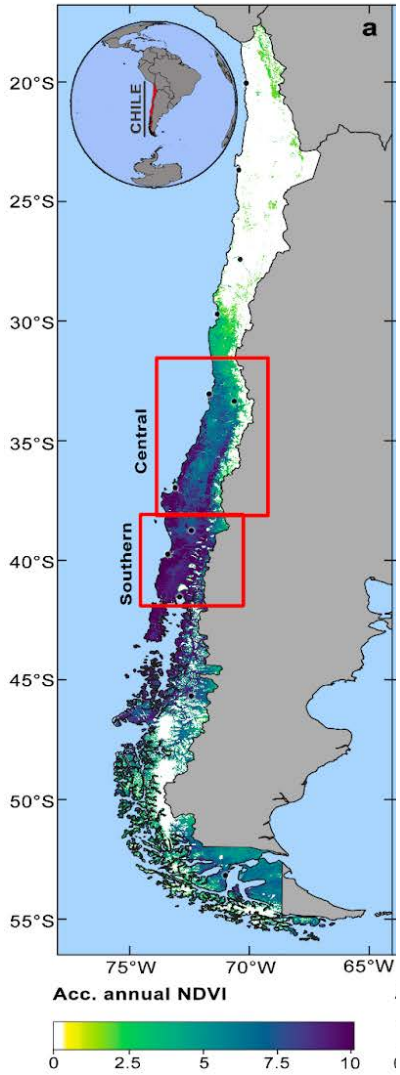
- Encuestas y Entrevistas apicultores
- Análisis de registros de producción
- Relaciones entre los cambios en el clima y los registros de producción de miel

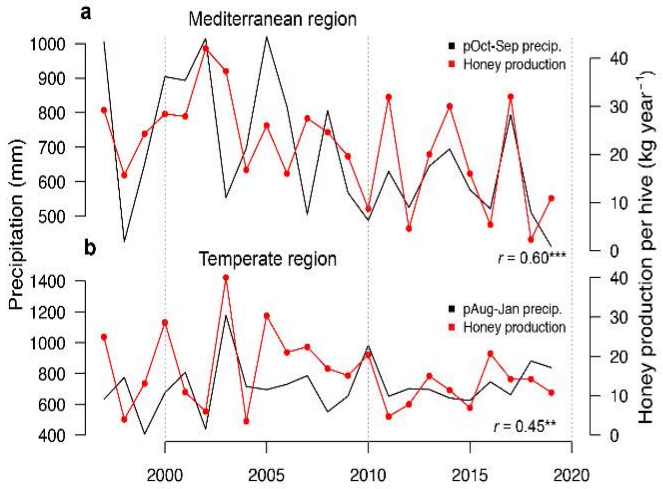


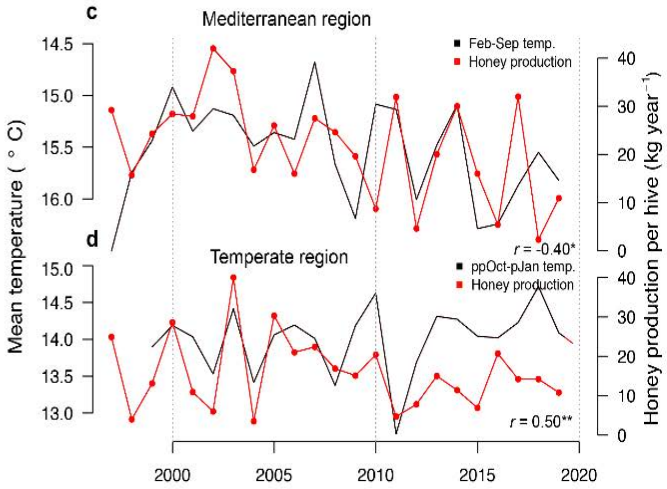

a
Central zone
b
Southern zone
Production per hive (kg year^{-1})
BK-N1
(-0.9**)
BK-N2
(-0.6*)
BK-N3
(-7.8 ns)
BK-N4
(-0.7**)
BK-S1
(-3.8 ns)
BK-S2
(-3.2*)
BK-S3
(-0.6 ns)
BK-S4
(-3.8**)
BK-S5
(-0.3 ns)
0
20
40
27
28
29
2000
2005
2010
2015
2020

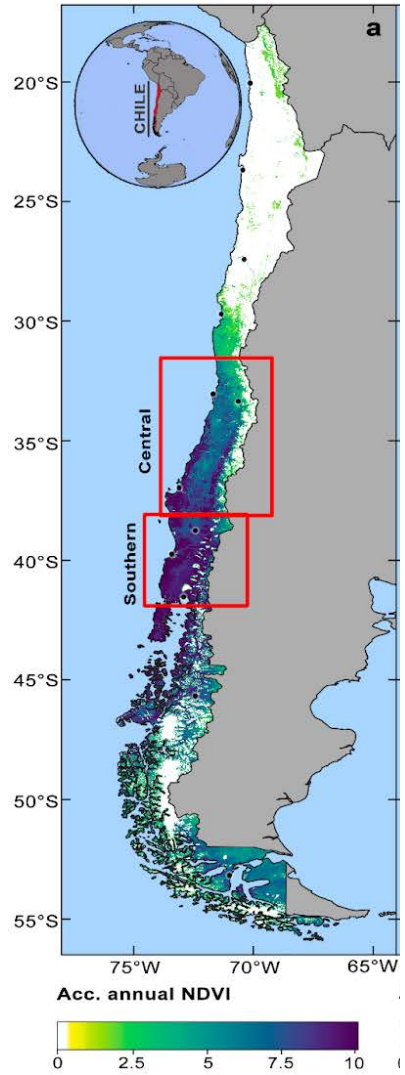

a
Period (years)
40
20
10
5
3
2
Central zone
Southern zone
90% CI
90% CI
Spectral power
0
50
100
150
200
0.001
0.005
0.020
0.100
0.500
Frequency (cycles/year)
b
Production variability
Reconstructed 3-year cycle
Central zone
Sorthern zone
Production per hive (kg year⁻¹)
0
10
20
30
40
2000
2005
2010
2015
2020

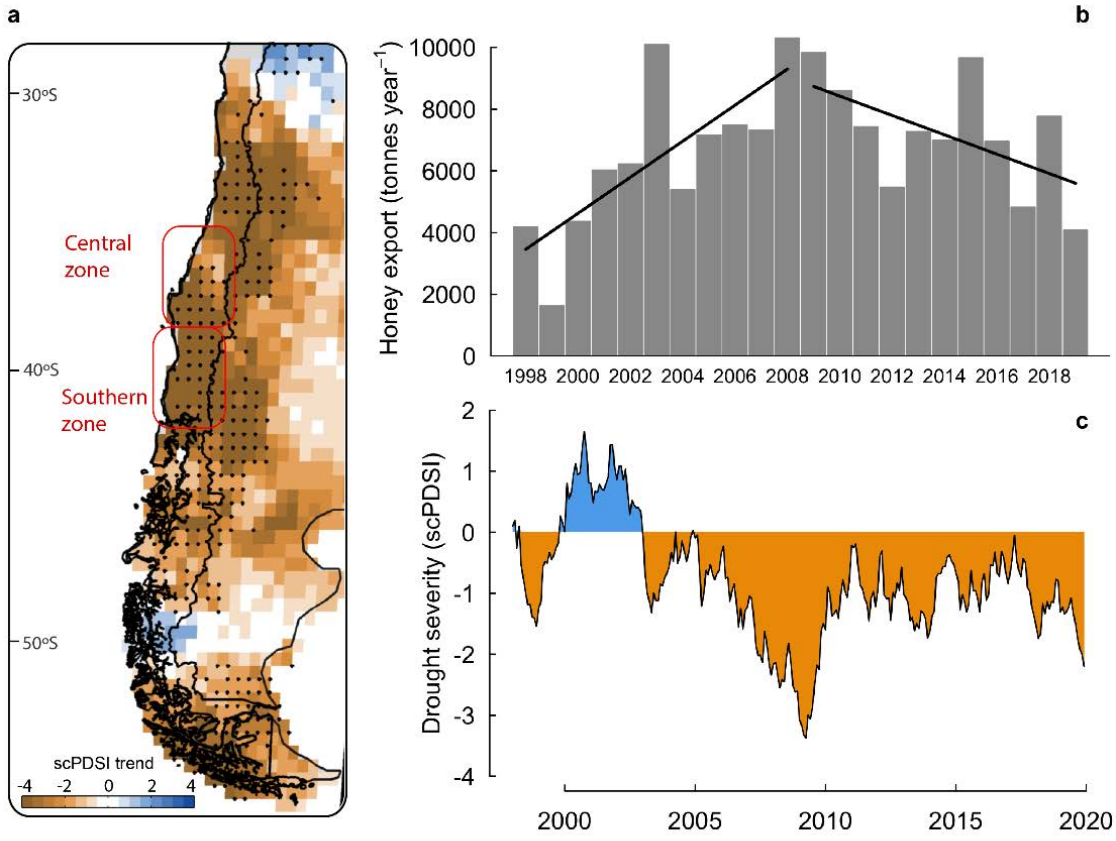

a
Central zone
pOct-Sep precip.
Honey production
r = 0.58***
b
Southern zone
pAug-Jan precip.
Honey production
r = 0.43**
Precipitation (mm)
Honey production per hive (kg year⁻¹)
2000
2005
2010
2015
2020

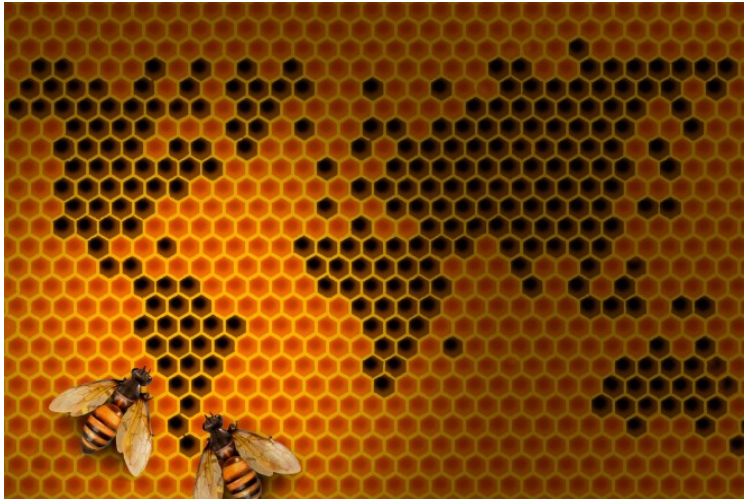

a
CHILE
Central
Southern
20°S
25°S
30°S
35°S
40°S
45°S
50°S
55°S
75°W
70°W
65°W
Acc. annual NDVI
0
2.5
5
7.5
10


a
Mediterranean region
pOct-Sep precip.
Honey production
r = 0.60***
b
Temperate region
pAug-Jan precip.
Honey production
r = 0.45**
Precipitation (mm)
Honey production per hive (kg year⁻¹)
2000
2005
2010
2015
2020

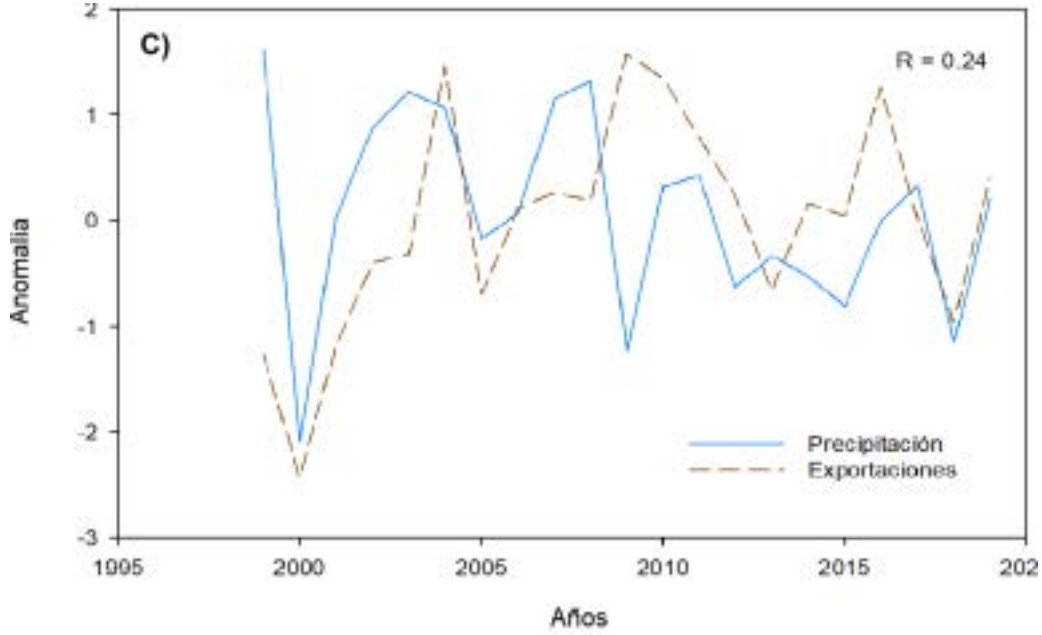

c
Mediterranean region
Feb-Sep temp.
Honey production
r = -0.40*
d
Temperate region
ppOct-pJan temp.
Honey production
r = 0.50**
Mean temperature (° C)
Honey production per hive (kg year⁻¹)
2000
2005
2010
2015
2020

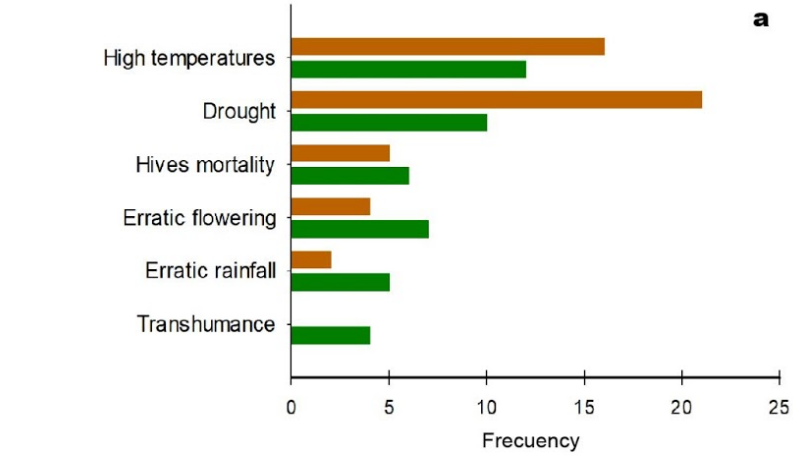

a
CHILE
Central
Southern
20°S
25°S
30°S
35°S
40°S
45°S
50°S
55°S
75°W
70°W
65°W
Acc. annual NDVI
0
2.5
5
7.5
10

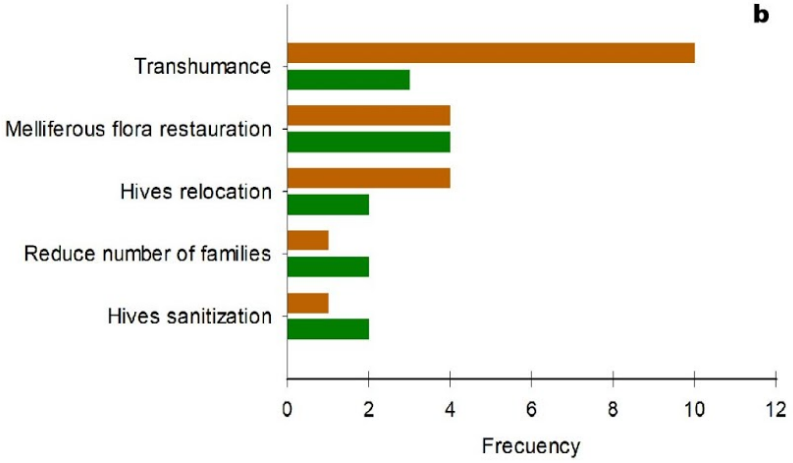

a
30°S
40°S
50°S
Central zone
Southern zone
scPDSI trend
-4 -2 0 2 4
b
Honey export (tonnes year^{-1})
10000
8000
6000
4000
2000
0
1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018
c
Drought severity (scPDSI)
2
1
0
-1
-2
-3
-4
2000 2005 2010 2015 2020



(C) Relación entre la precipitación del periodo Agosto-Marzo con las **exportaciones anuales** de miel a nivel nacional



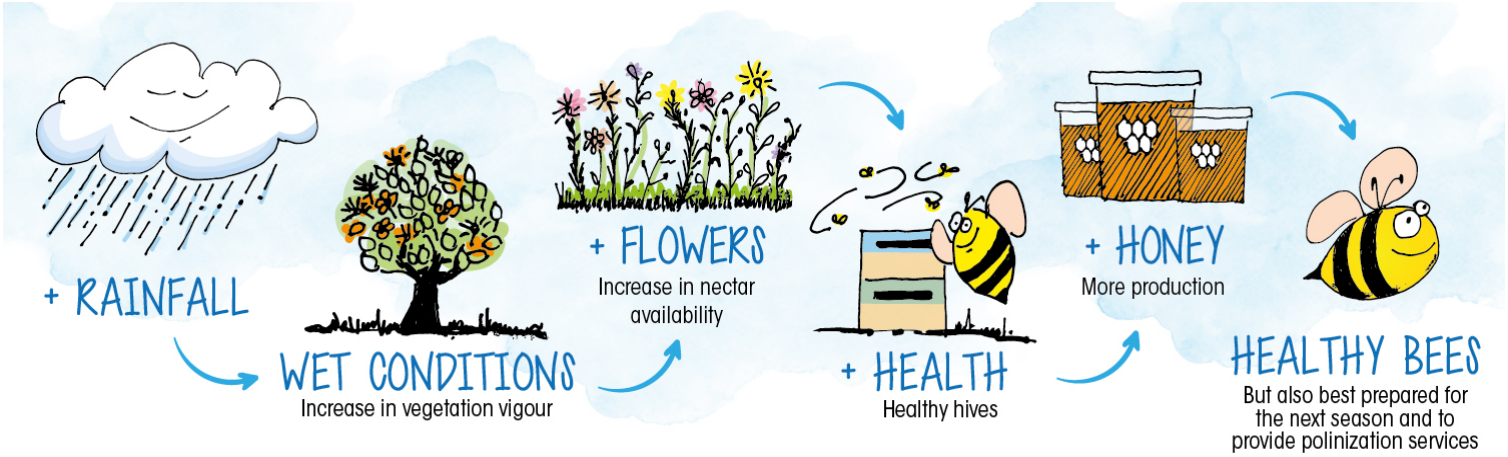

a
High temperatures
Drought
Hives mortality
Erratic flowering
Erratic rainfall
Transhumance
0
5
10
15
20
25
Frecuency

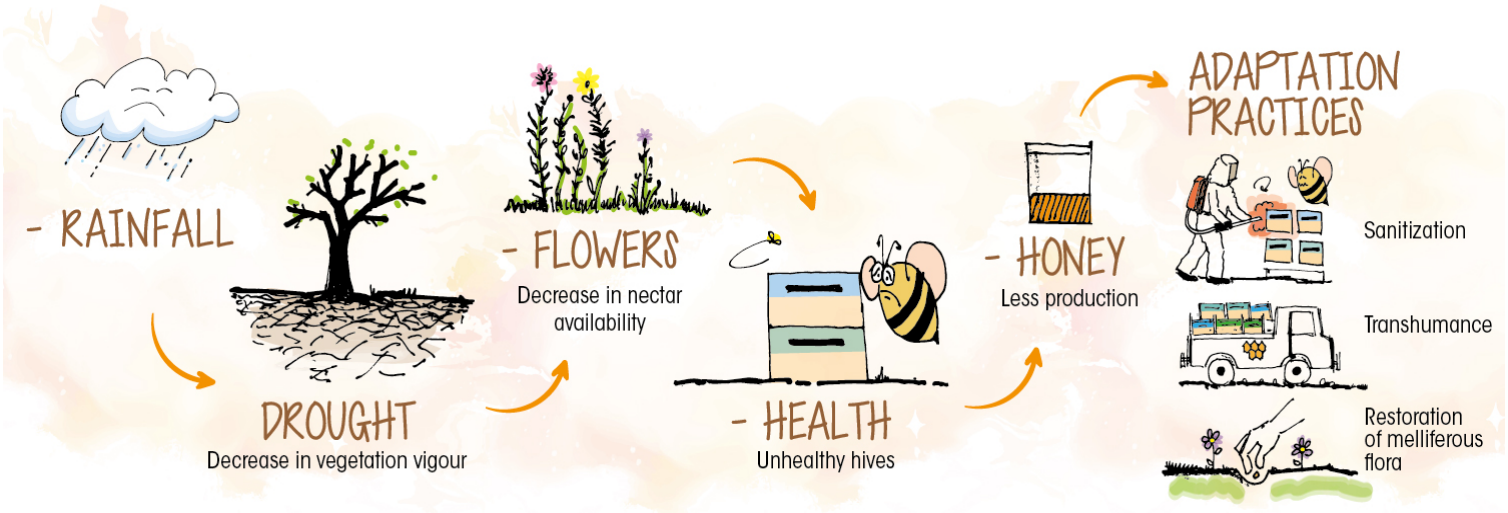

b
Transhumance
Melliferous flora restauration
Hives relocation
Reduce number of families
Hives sanitization
0
2
4
6
8
10
12
Frecuency


c


d


e


+ RAINFALL
WET CONDITIONS
Increase in vegetation vigour
+ FLOWERS
Increase in nectar availability
+ HEALTH
Healthy hives
+ HONEY
More production
HEALTHY BEES
But also best prepared for the next season and to provide polinization services


- RAINFALL
DROUGHT
Decrease in vegetation vigour
- FLOWERS
Decrease in nectar availability
- HEALTH
Unhealthy hives
- HONEY
Less production
ADAPTATION PRACTICES
Sanitization
Transhumance
Restoration of melliferous flora

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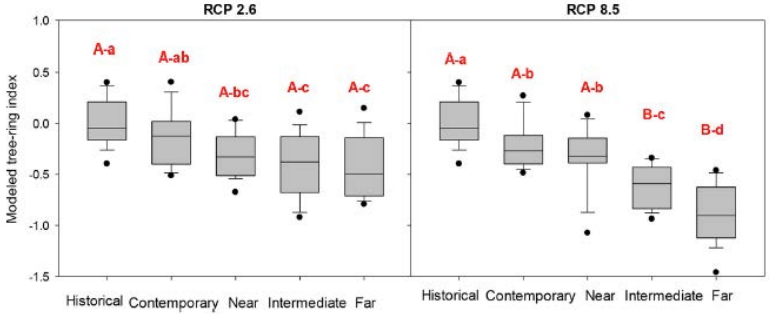
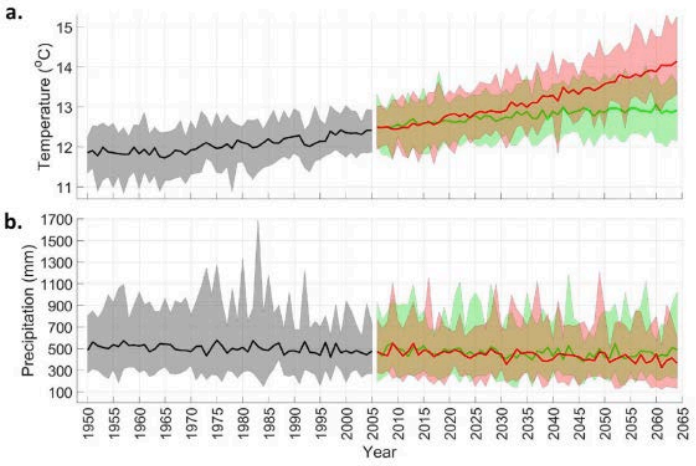
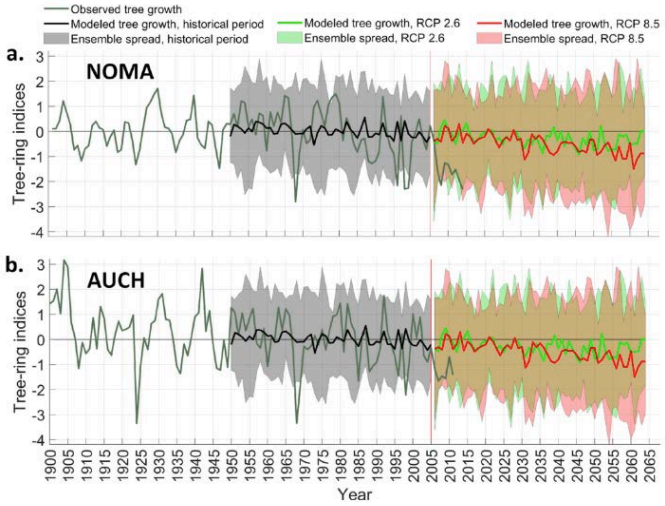
Tree growth decline as a response to projected climate change in the 21st century in Mediterranean mountain forests of Chile

Vladimir Matskovsky [a,1], Alejandro Venegas-González [b,*,1], René Garreaud [c,d], Fidel A. Roig [e,b], Alvaro G. Gutiérrez [f], Ariel A. Muñoz [d,g], Carlos Le Quesne [h], Karin Klock [g], Camila Canales [f]







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Centro de Acción Climática

GRACIAS!