(CR)2 Center for Climate and Resilience Research
www.CR2.cl

Tertulia científica (CR)2 "Chile bajo una nube gris: contaminación atmosférica de norte a sur"

Perspectiva desde el Norte (18º-29ºS)

Eugenia M. Gayo
Laboratorio Biogeoquímica Isotópica – Universidad de Concepción
Center for Climate and Resilience Researc (CR)2

UNIVERSIDAD DE CHILE — PATROCINA
UNIVERSIDAD DE CONCEPCION, UNIVERSIDAD AUSTRAL DE CHILE — INSTITUCIONES ASOCIADAS
CONICYT — FINANCIA

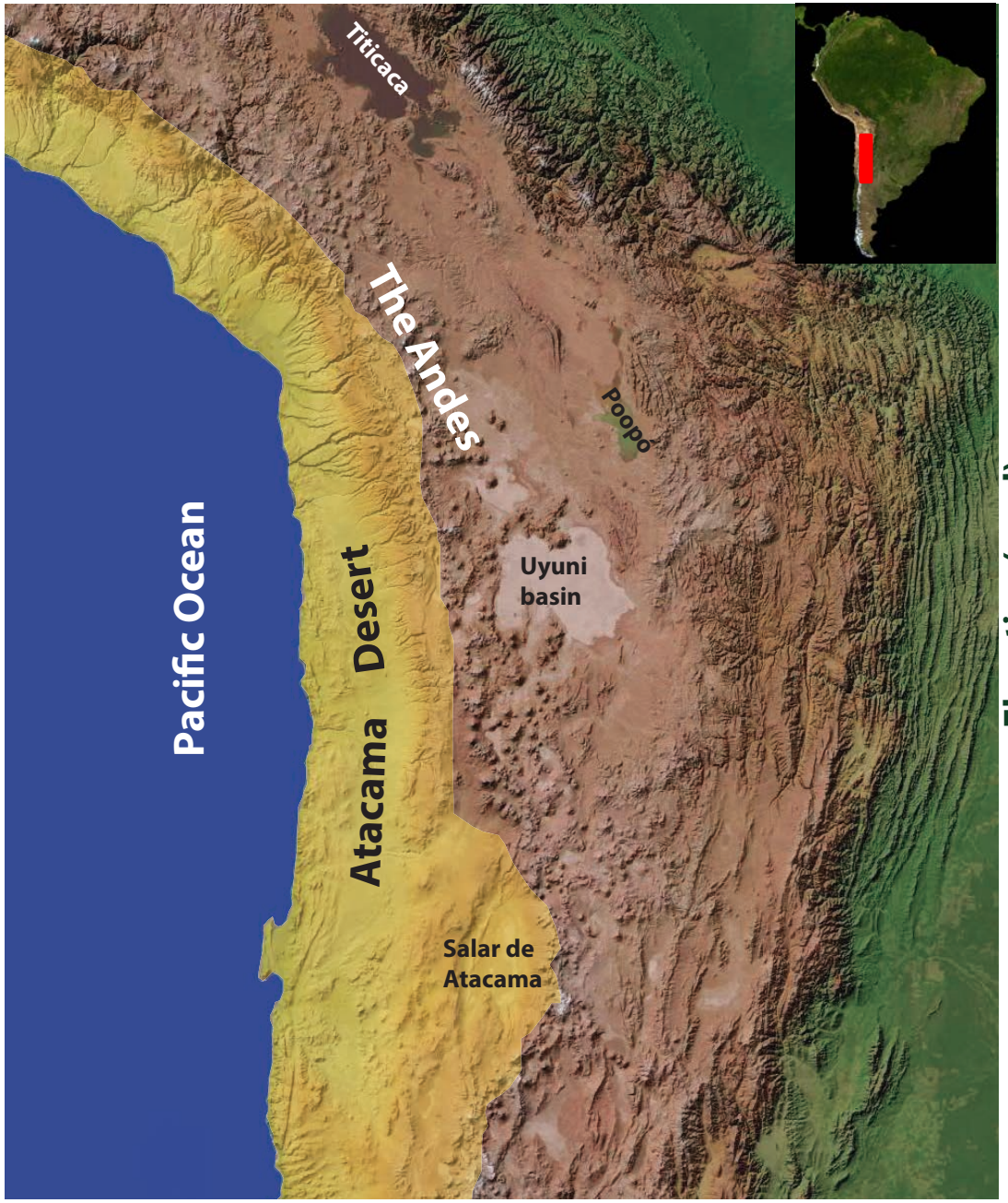
www.cr2.cl
@cr2_uchile
/cr2uchile

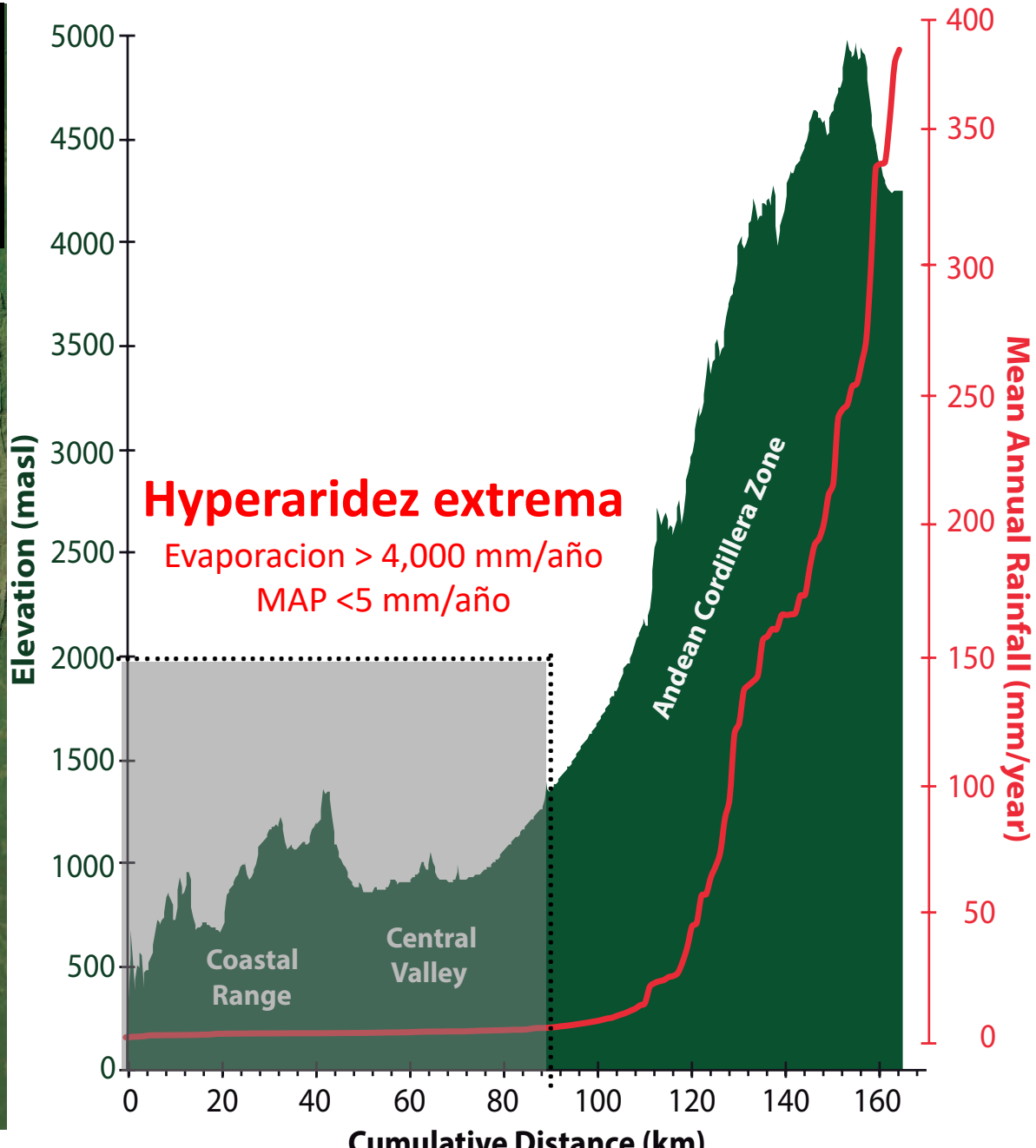
ESCALLONIA
Centro UC CAPES - Center of Applied Ecology & Sustainability
Arqueología Desierto Atacama
PEOPLE 3000

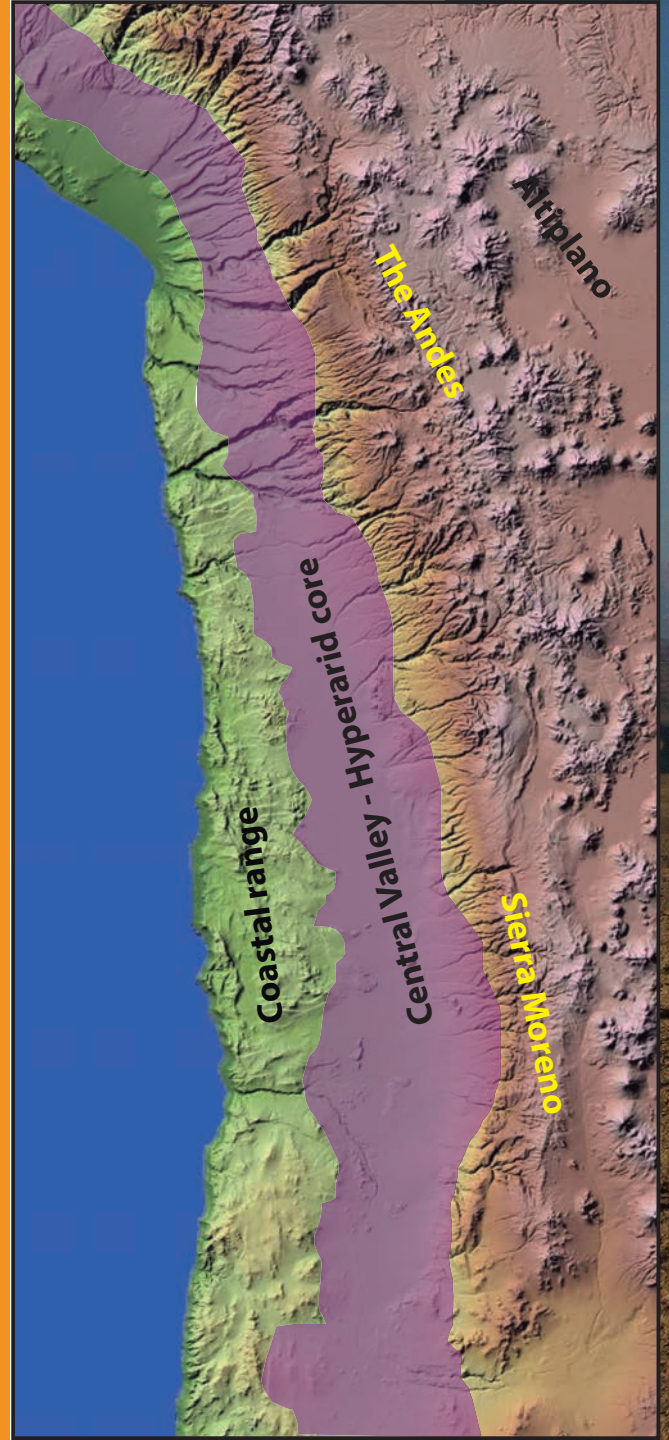
La interacción ambiente-humano (HEI) se refiere al proceso que describe como los humanos se adaptan, dependen y modifican su ambiente

Latorre et al 2016

Norte de Chile → Atacama Desert (16°-25°S) → el desierto más árido del planeta

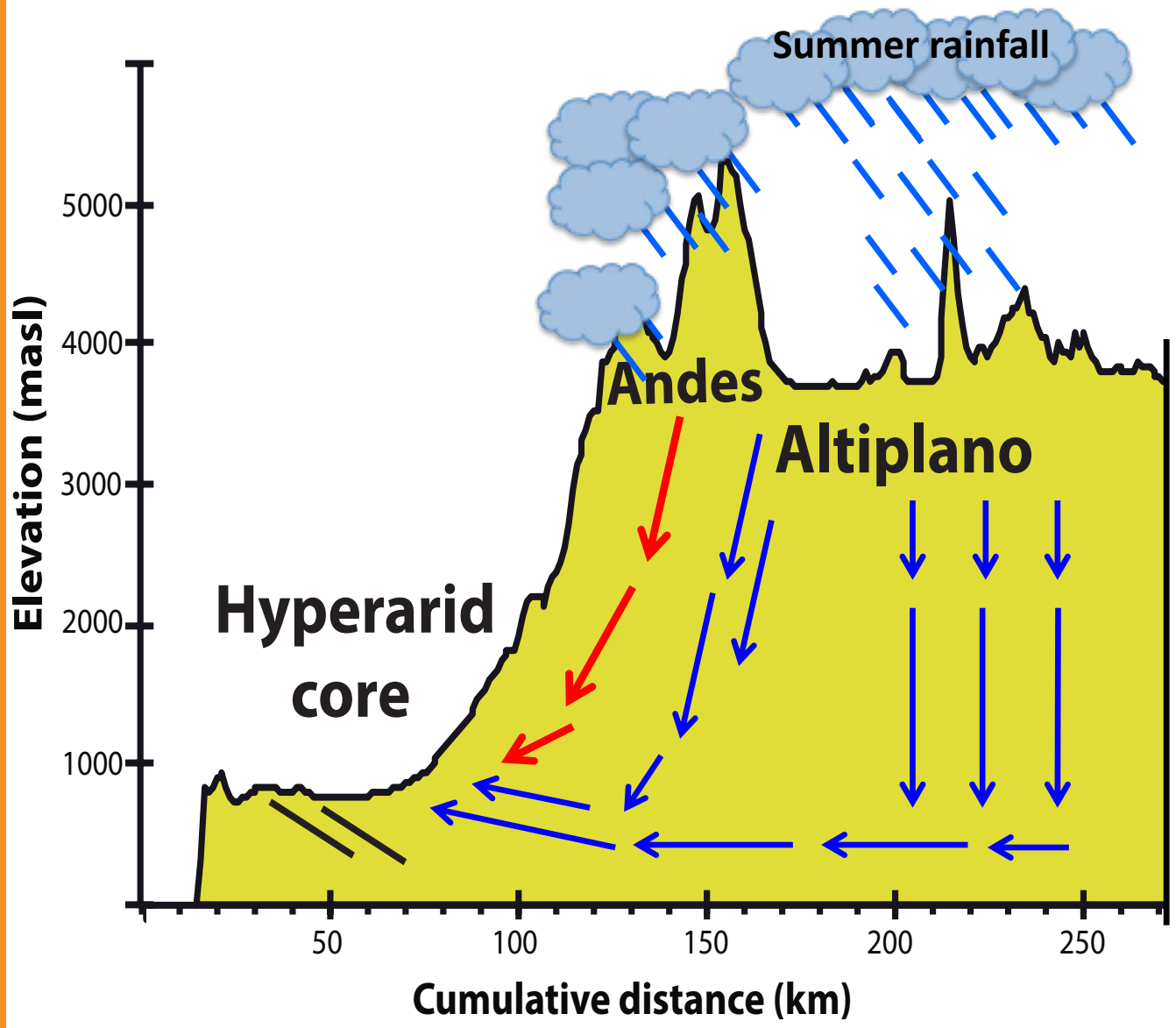




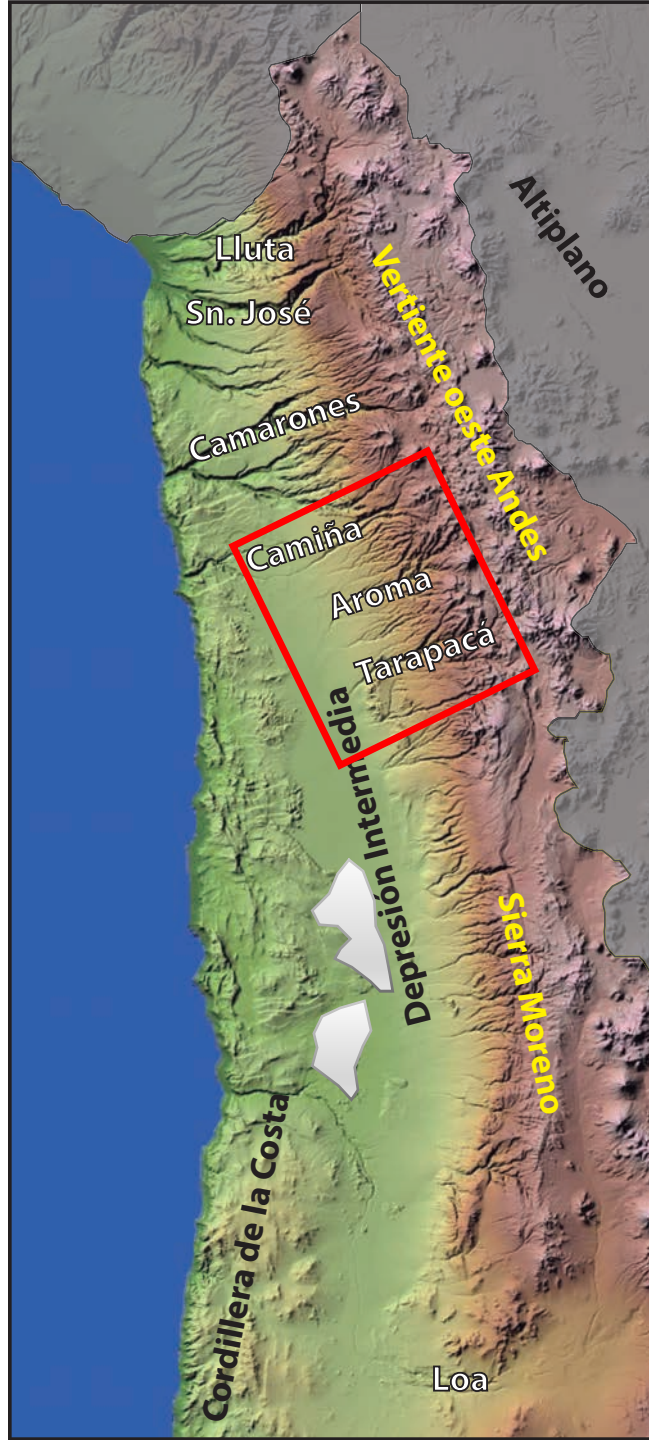


El Desierto Absoluto

Flujos de agua hacia el núcleo hiperárido del Atacama a los 20º18'S



Adapted from Magaritz *et al* (1990)

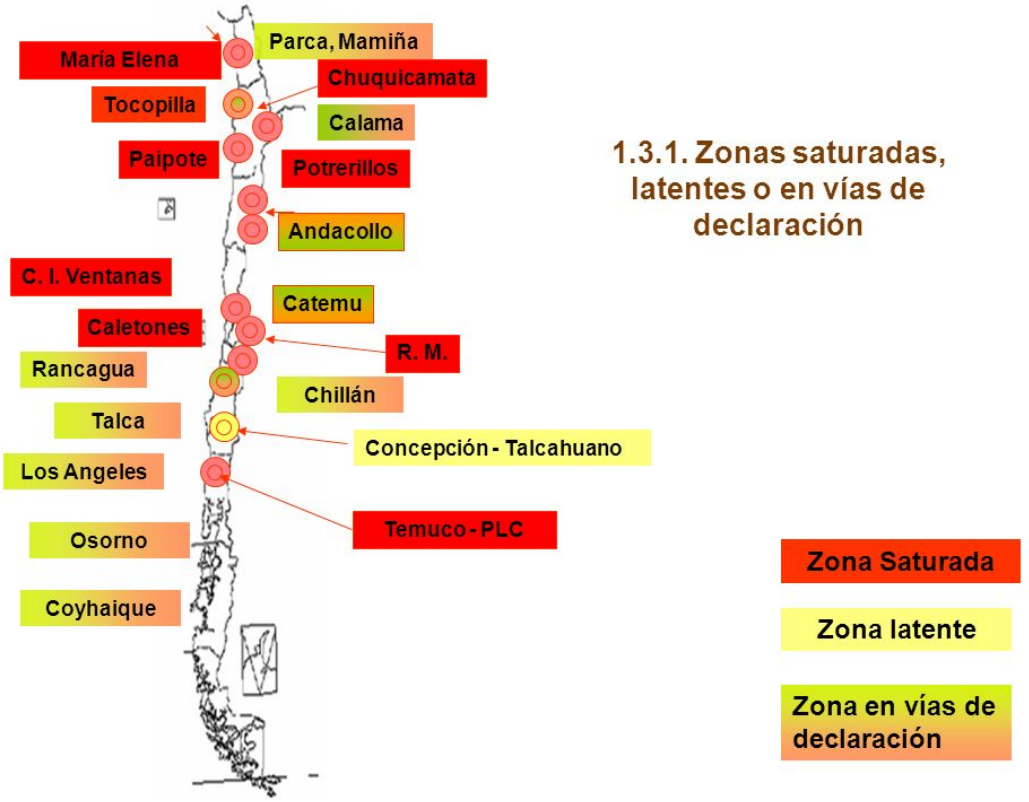


Termoeléctricas

Varias localidades han sido declaradas zonas saturadas o latentes

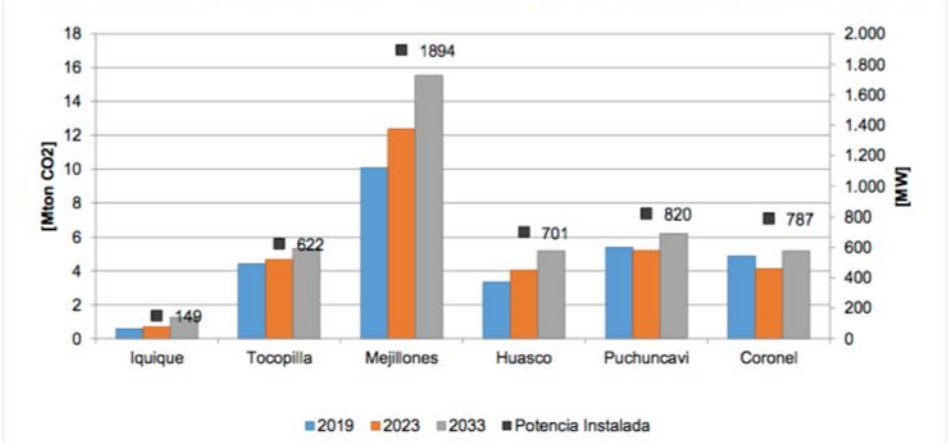
Tabla 1: Parque generador termoeléctrico a carbón SING+SIC, año 2016

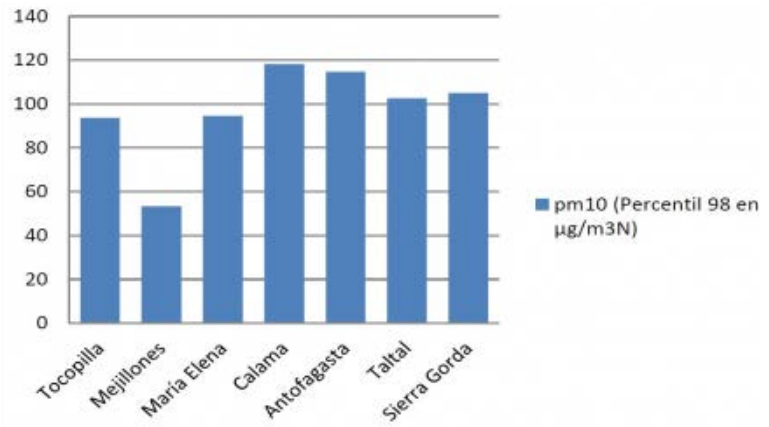
Orden	Titular (Compañía)	Central (Nombre)	Potencia (MW)	Energía (GWh)	Unicación Comuna	Unicación Región	Antigüedad (años)
		SING					
1	ENEL/GAS ATACAMA	TARAPACÁ CTTAR	158,0	383.189	Iquique	Tarapacá	18
2	ENGIE/ANDINA	ANDINA CTA	177,0	1.264.093	Mejillones	Antofagasta	6
3	AES GENER/ANGAMOS	ANGAMOS ANG 1	276,9	2.148.511	Mejillones	Antofagasta	6
4	AES GENER/ANGAMOS	ANGAMOS ANG 2	281,3	2.255.211	Mejillones	Antofagasta	6
5	AES GENER/COCHRANE	COCHRANE CCH1	274,9	1.034.272	Mejillones	Antofagasta	2
6	AES GENER/COCHRANE	COCHRANE CCH2	274,8	599.572	Mejillones	Antofagasta	1
7	ENGIE	MEJILLONES CTM 1	159,6	971.158	Mejillones	Antofagasta	22
8	ENGIE	MEJILLONES CTM 2	173,8	1.012.563	Mejillones	Antofagasta	22
9	ENGIE/HORNITOS	HORNITOS CTH	177,5	1.105.964	Mejillones	Antofagasta	6
10	AES GENER	NORGENER NTO 1	139,5	941.788	Tocopilla	Antofagasta	22
11	AES GENER	NORGENER NTO 2	135,8	962.588	Tocopilla	Antofagasta	22
12	ENGIE	TOCOPILLA U12	86,9	440.259	Tocopilla	Antofagasta	57
13	ENGIE	TOCOPILLA U13	85,7	434.161	Tocopilla	Antofagasta	57
14	ENGIE	TOCOPILLA U14	135,6	898.378	Tocopilla	Antofagasta	57
15	ENGIE	TOCOPILLA U15	130,2	825.982	Tocopilla	Antofagasta	57
		SIC					
1	AES GENER / GUACOLDA	Guacolda 1	142,9	973.896	Huasco	Atacama	22
2	AES GENER / GUACOLDA	Guacolda 2	142,9	960.651	Huasco	Atacama	21
3	AES GENER / GUACOLDA	Guacolda 3	137,1	1.052.711	Huasco	Atacama	8
4	AES GENER / GUACOLDA	Guacolda 4	139,0	890.203	Huasco	Atacama	7
5	AES GENER / GUACOLDA	Guacolda 5	139,0	897.041	Huasco	Atacama	2



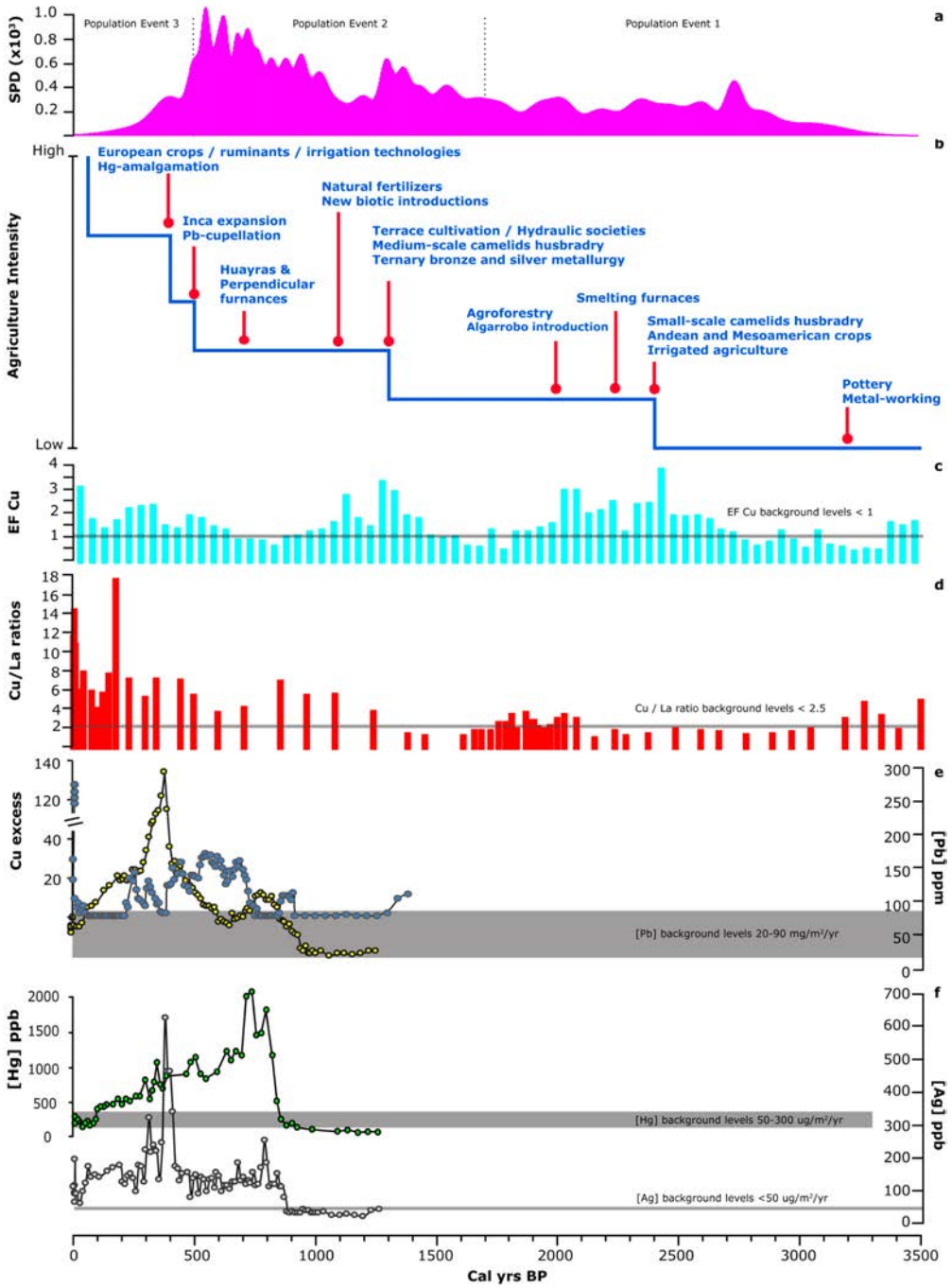
1.3.1. Zonas saturadas, latentes o en vías de declaración

Gráfico 12: Emisiones de CO2 de termoeléctricas a carbón por comuna. (MW y toneladas CO2)

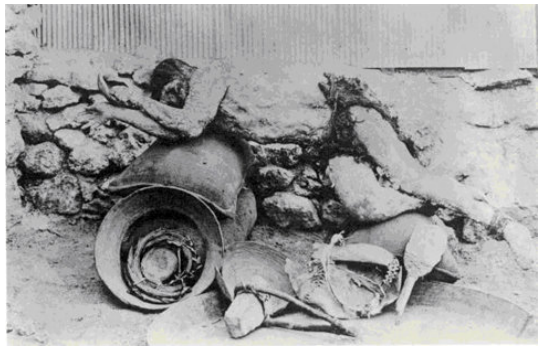




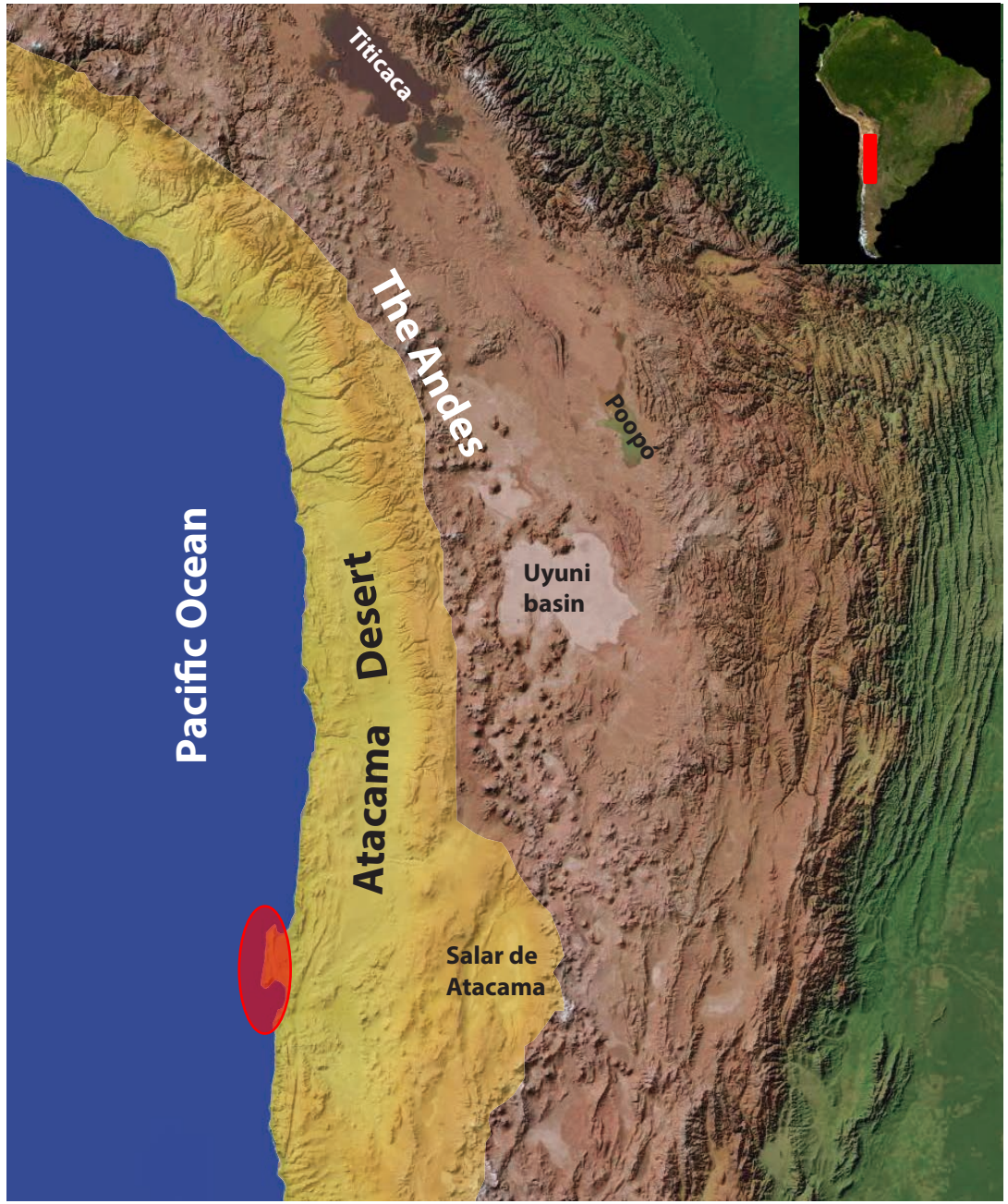
Polución del aire en el Desierto de Atacama por actividades metalurgicas

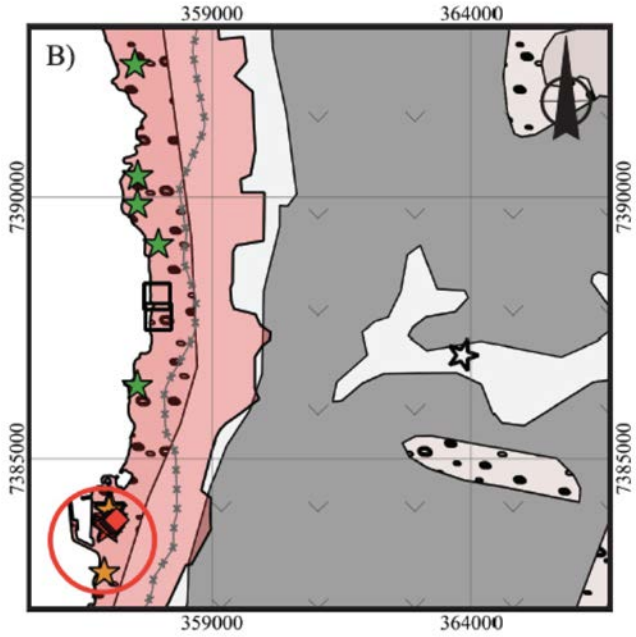


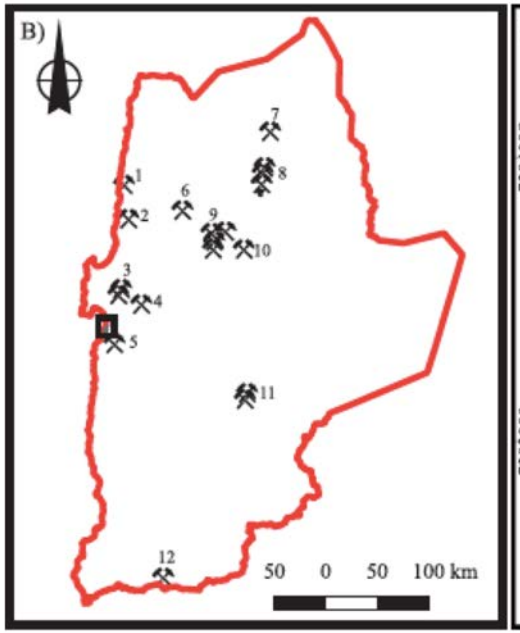
Gayo et al. submitted

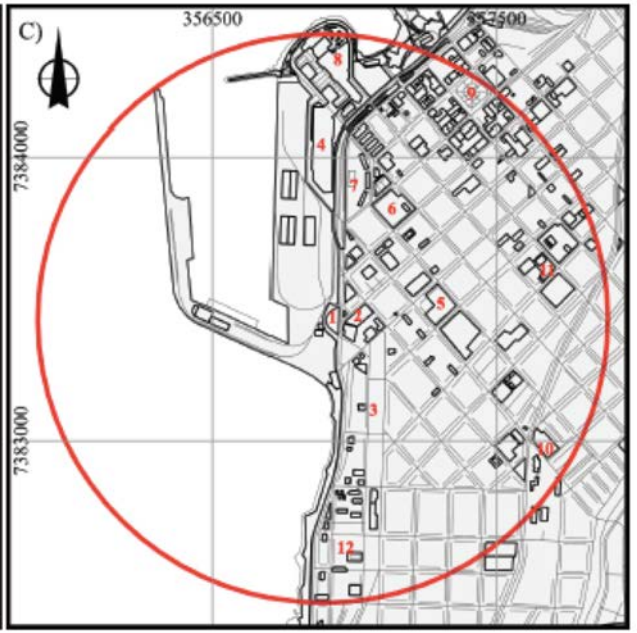


El caso del Puerto de Antofagasta

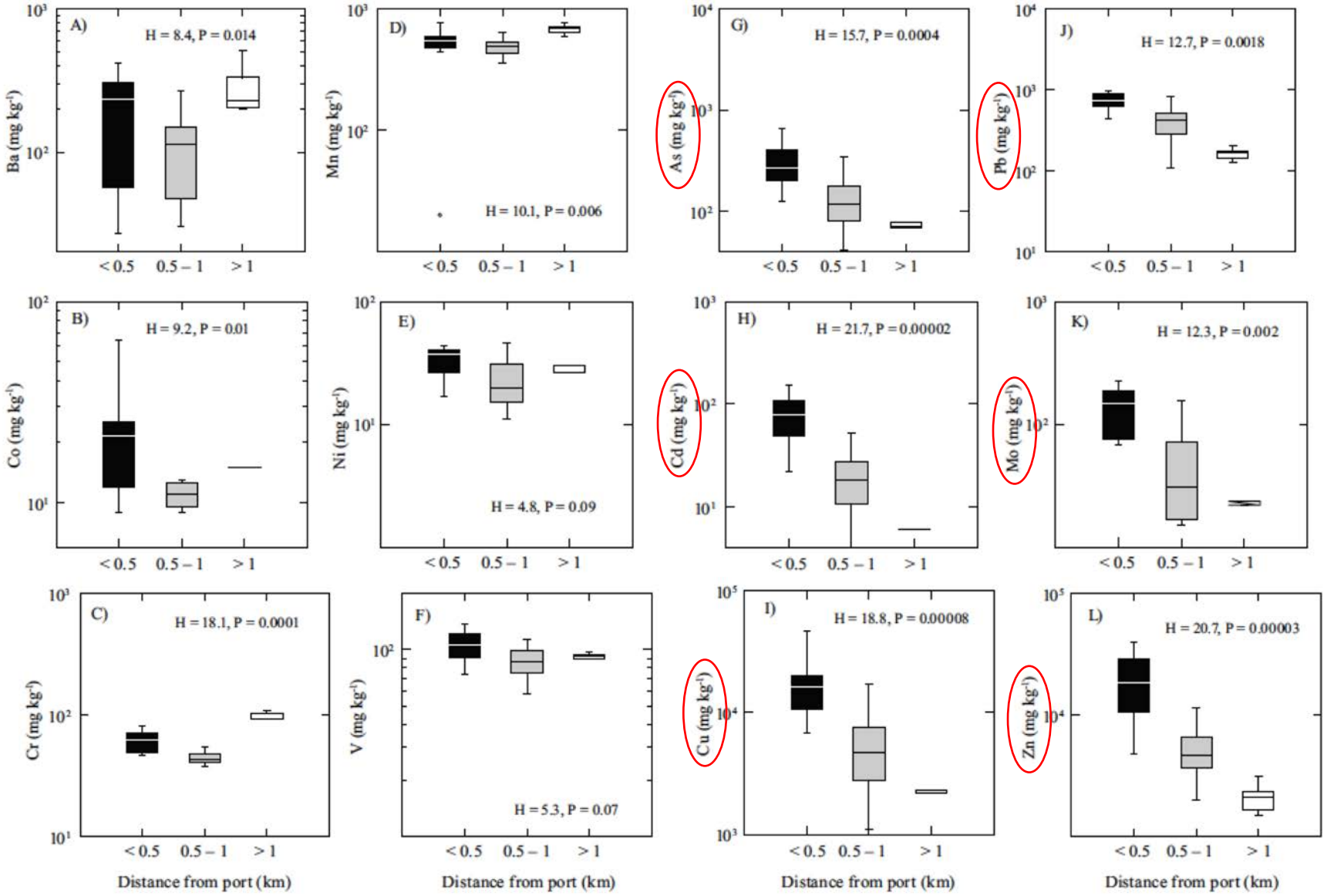








Despite the high observed variability in element concentrations of the city dust, the highest concentration values of As, Cd, Cu, Mo, Pb, and Zn were evident near the Antofagasta´s port



(Tapia et al 2018)

Table 8 City dust from Antofagasta.

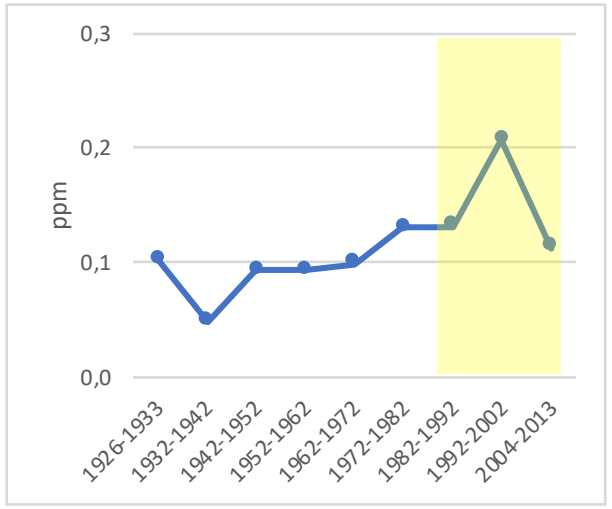
	Chile		China				Pakistan
	Antofagasta (mg · kg^{-1})	Santiago (mg · kg^{-1})	Fushun (mg · kg^{-1})	Baoji (mg · kg^{-1})	Zhuzhou (mg · kg^{-1})	QS (mg · kg^{-1})	Islamabad (mg · kg^{-1})
As	239 ± 269	12 ± 1.9	–	–	89 ± 183	32 ± 20	–
Ba	188 ± 129	411 ± 124	–	–	–	1,610 ± 984	–
Cd	45 ± 42	0.8 ± 0.19	–	–	41 ± 117	2.8 ± 1.8	5.0 ± 1.0
Co	17 ± 11	11 ± 2.3	139 ± 179	–	13 ± 11	20 ± 12	–
Cr	61 ± 20	38 ± 11	5,334 ± 10,667	–	125 ± 54	172 ± 96	–
Cu	10,821 ± 9,816	669 ± 567	149 ± 177	123 ± 43	139 ± 148	213 ± 180	52 ± 18
Mn	573 ± 153	619 ± 109	–	–	–	–	–
Mo	75 ± 74	73 ± 27	–	–	6.4 ± 12.4	7.2 ± 3.9	–
Ni	29 ± 11	24 ± 6.4	302 ± 555	49 ± 30	40 ± 16	38 ± 14	23 ± 6
Pb	710 ± 852	127 ± 50	–	408 ± 296	956 ± 2,815	336 ± 191	104 ± 29
V	95 ± 20	54 ± 11	14.6 ± 4.1	–	–	–	–
Zn	11,869 ± 10,743	943 ± 411	–	715 ± 320	2,379 ± 5,145	1,250 ± 889	116 ± 35

(Tapia et al 2018)

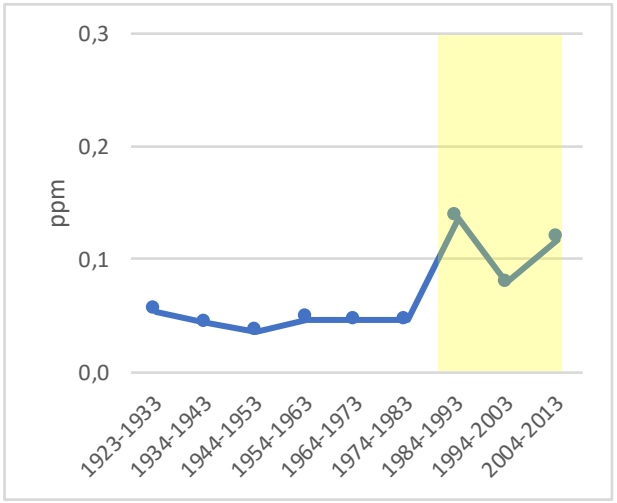
Urban trees used as pollution monitors to infer historical changes of heavy metal levels in the environment of Antofagasta, Chile

Results Pb

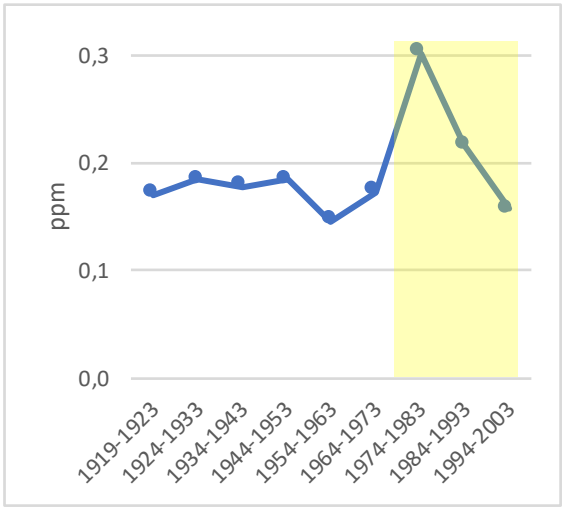
14A



21A



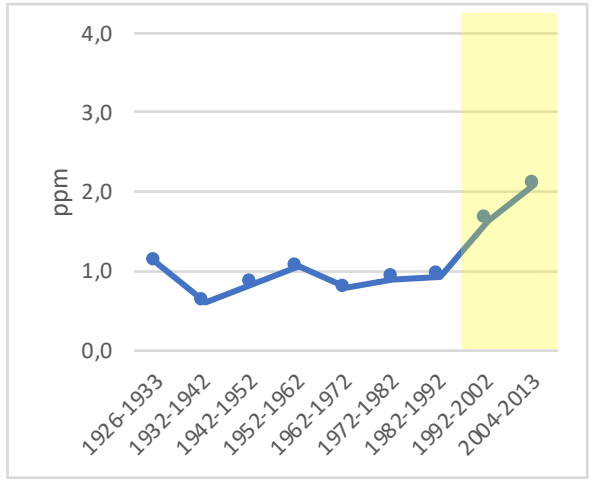
01B



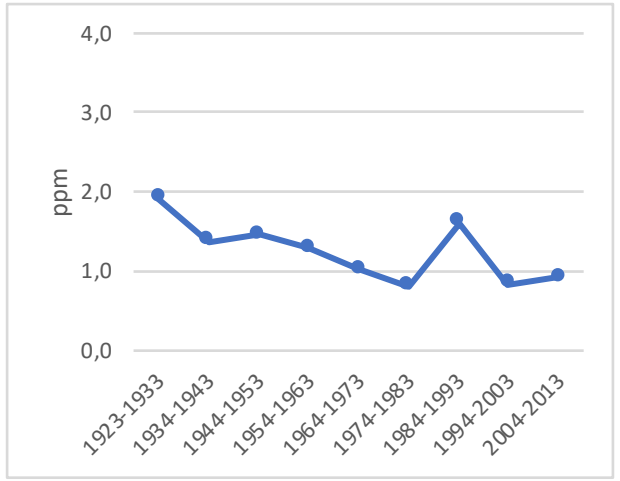
Increase in Pb, especially after 1970

Results: Cu

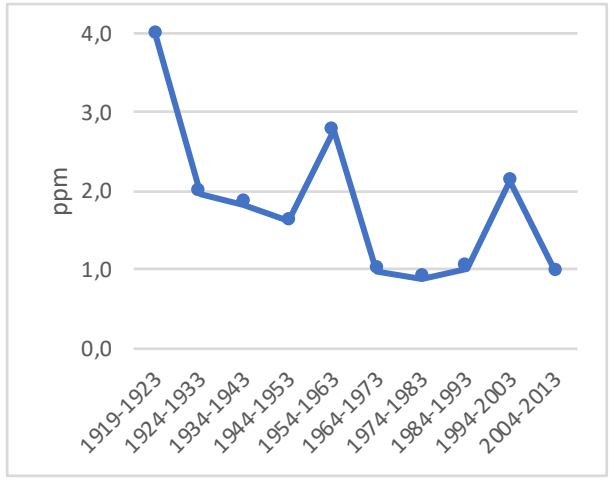
14A



21A



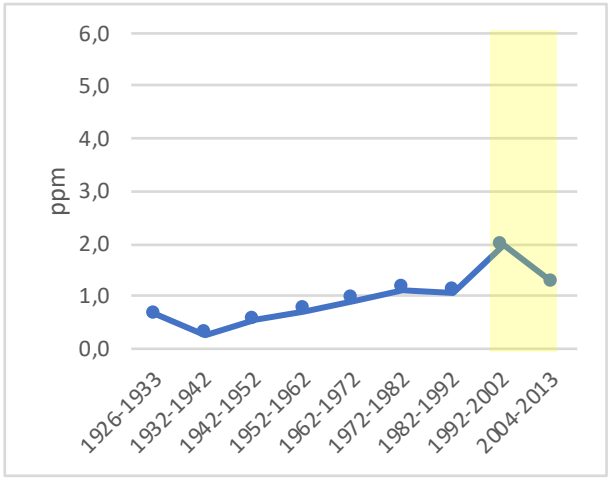
01B



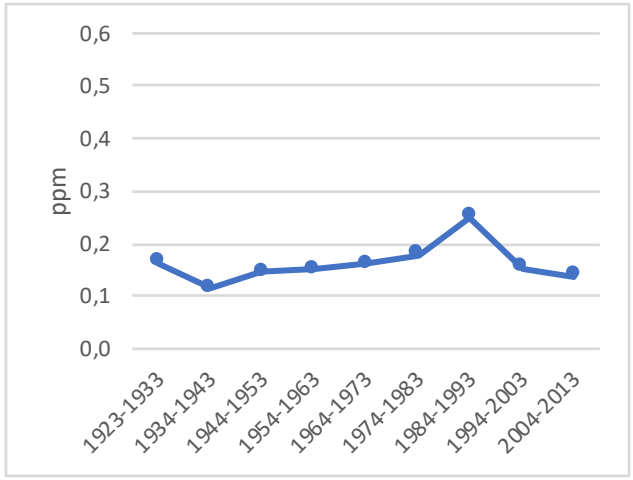
Increase in Cu only in the tree close to the port (14A), especially after 1990.
Reduction in Cu concentrations in trees distant from the port.

Results: Mo

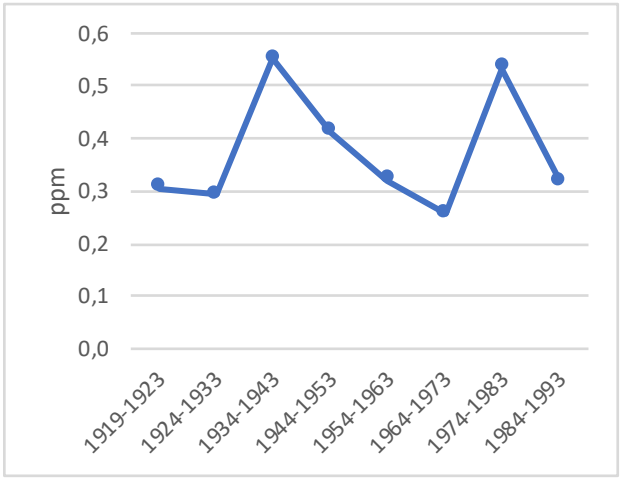
14A



21A



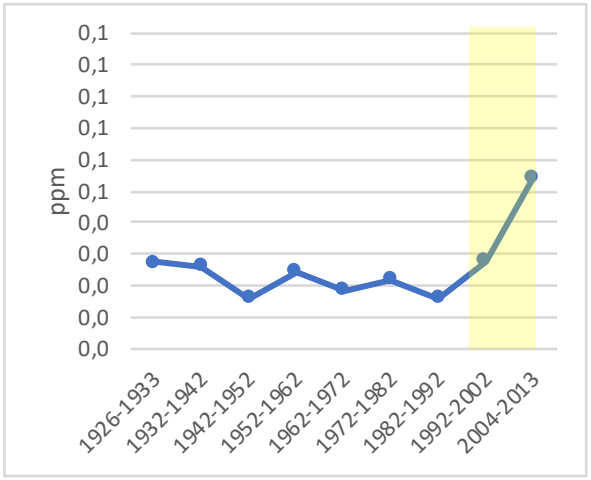
01B



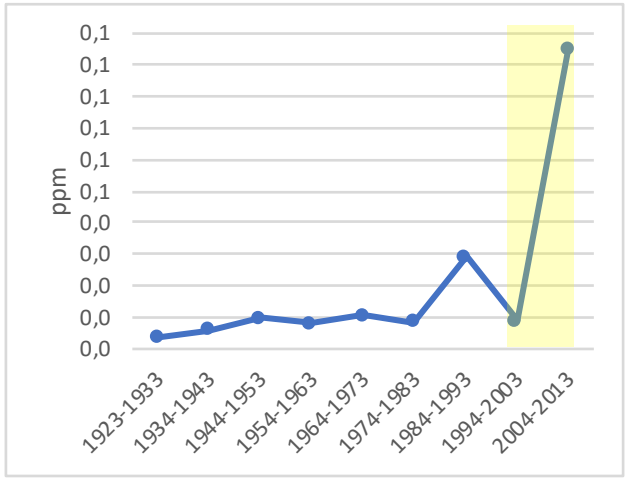
Increase in Mo only in the tree close to the port (14A), especially after 1990.
No trend in trees distant from the port.

Results: Ag

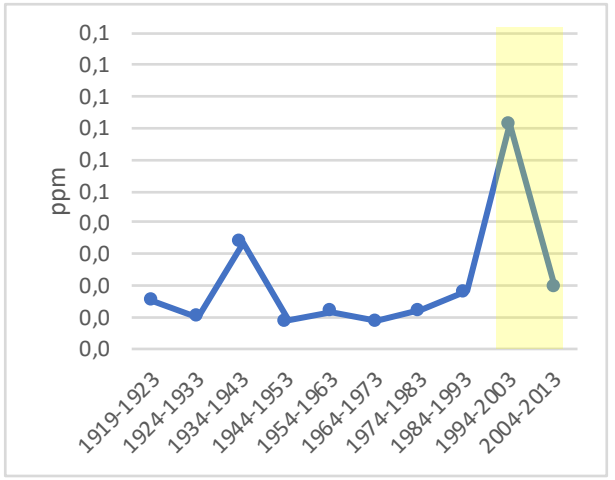
14A



21A



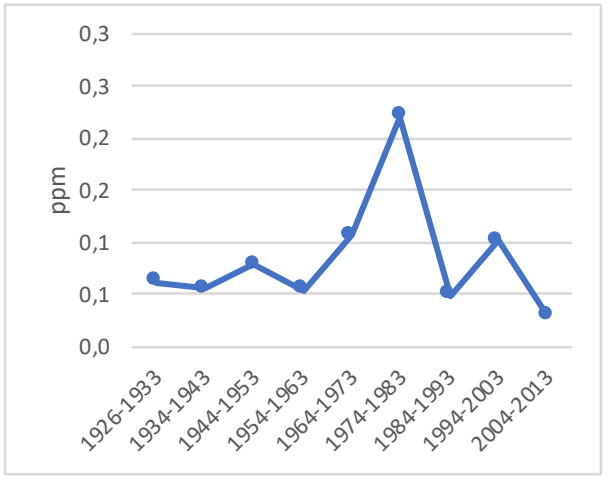
01B



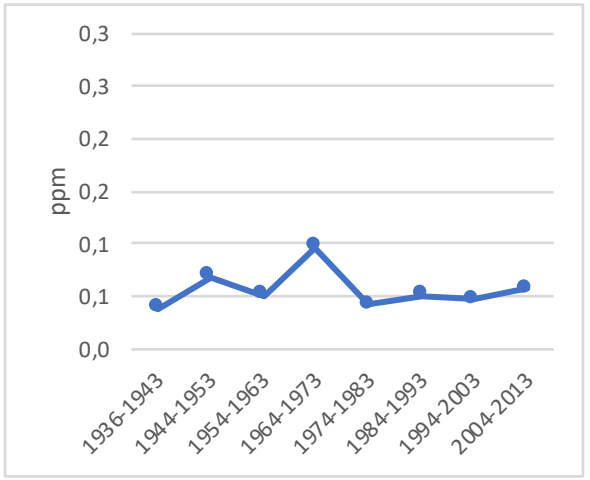
Increase in Ag in two trees, especially after 1990, clearer close to the port

Results: As

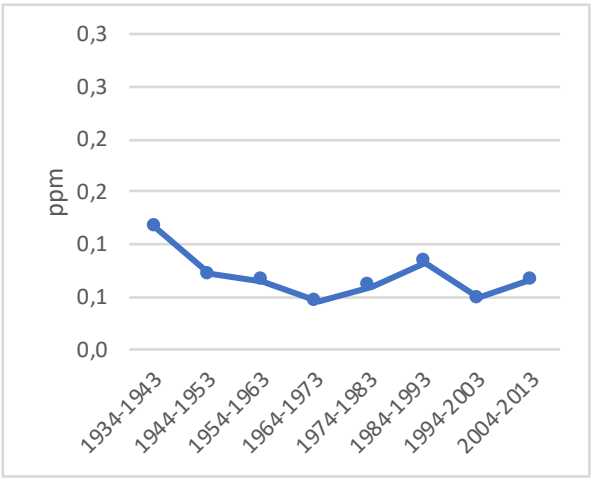
18A



07A



03A



Not clear trends were found in As. Trees showed peaks in the 60s, 70s, or 80s.