Marismas de las costas bonaerense y patagónica: su rol ambiental y participación en los ciclos biogeoquímicos de nutrientes y de metales pesados

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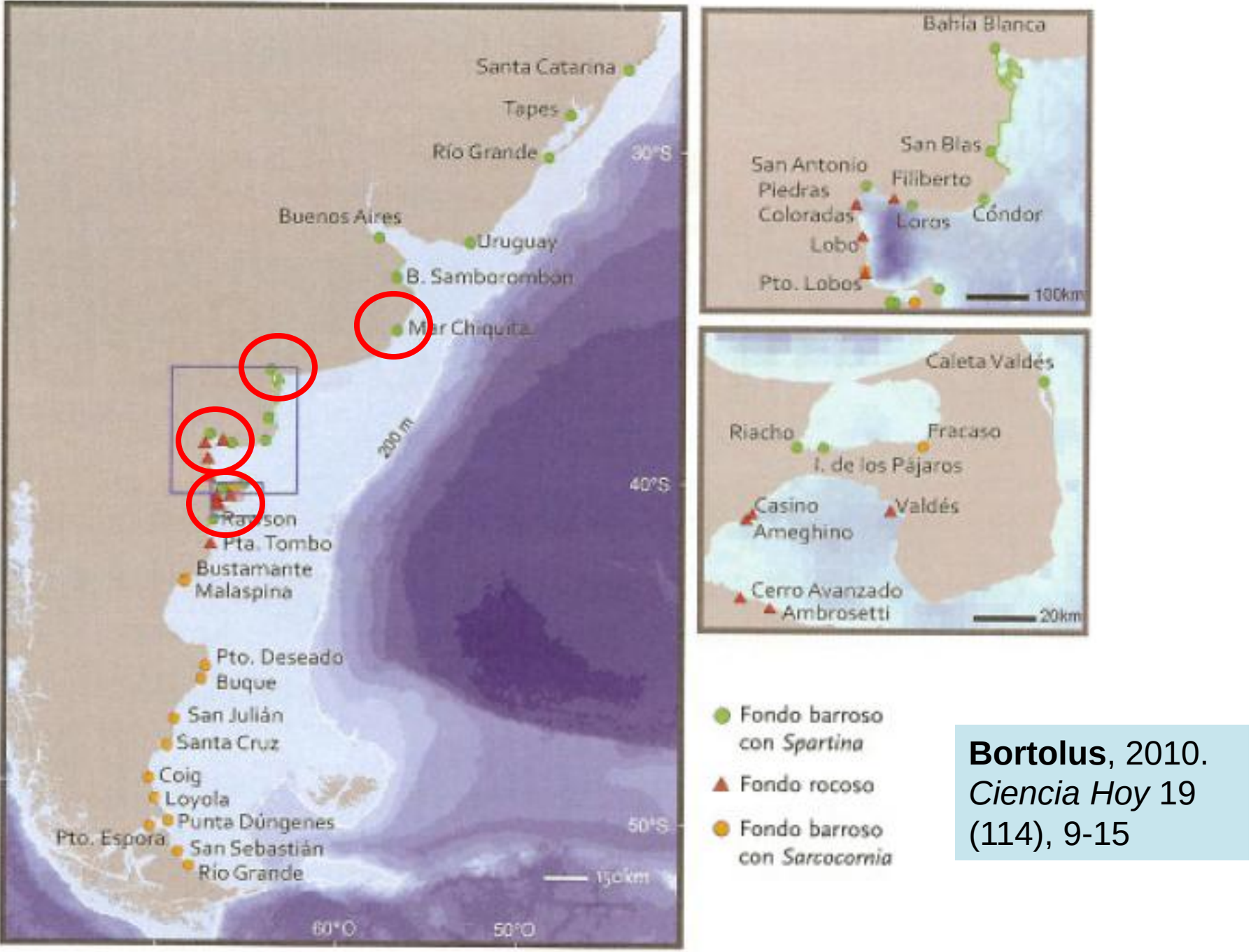
utn bhi Universidad Tecnologica Nacional Facultad Regional Bahía Blanca



Bortolus, 2010. *Ciencia Hoy* 19 (114), 9-15

MARISMAS COSTERAS

Proveedoras de servicios ecosistémicos:

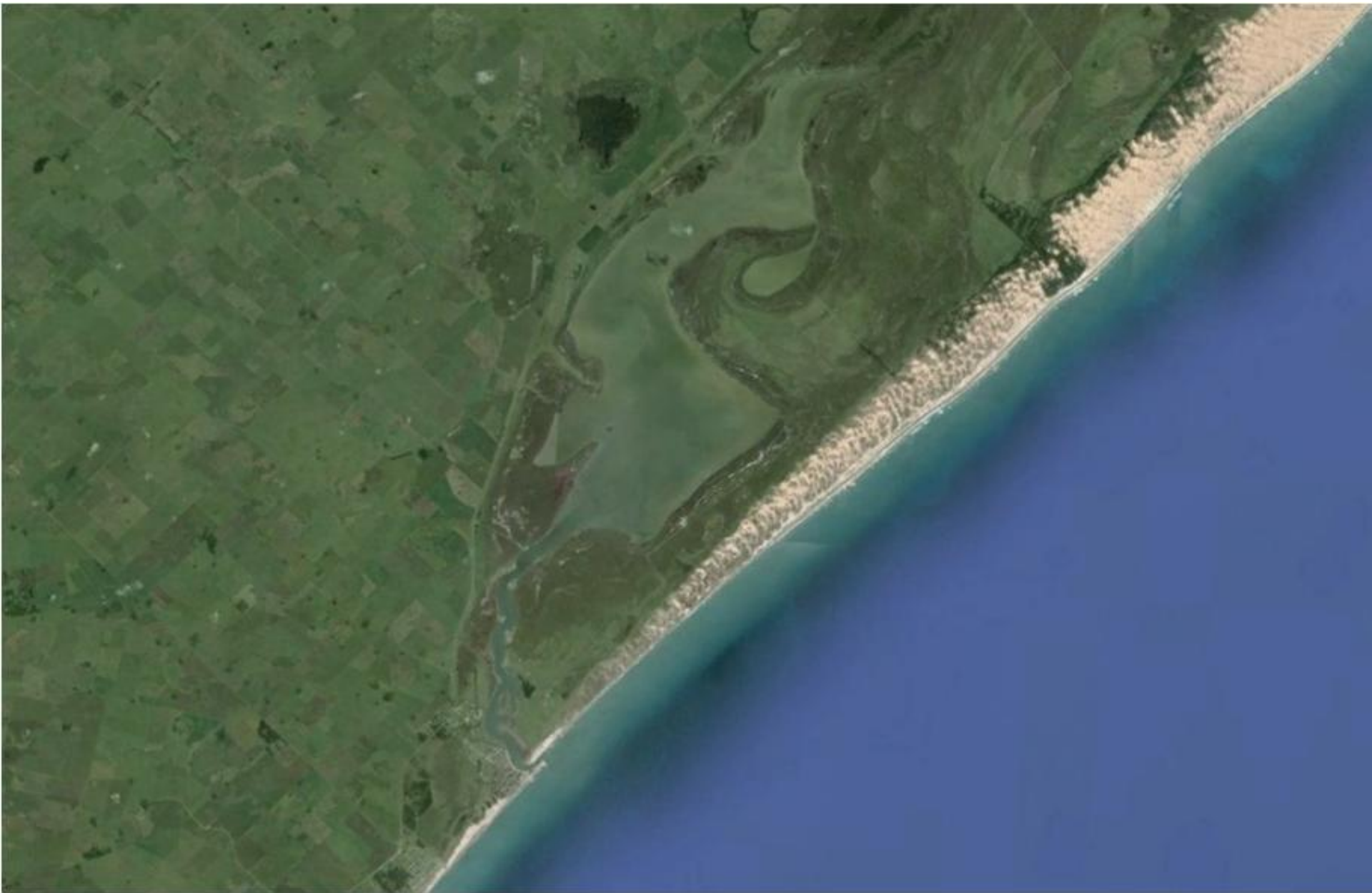
- Pueden prevenir / revertir la erosión a través de captura y fijación de sedimentos

- Generan detrito (tanto orgánico como inorgánico)

- Abastecen los ciclos biogeoquímicos

- Acumulan sustancias químicas

MARISMAS DE LA LAGUNA COSTERA MAR CHIQUITA



MARISMAS DE LA LAGUNA COSTERA MAR CHIQUITA

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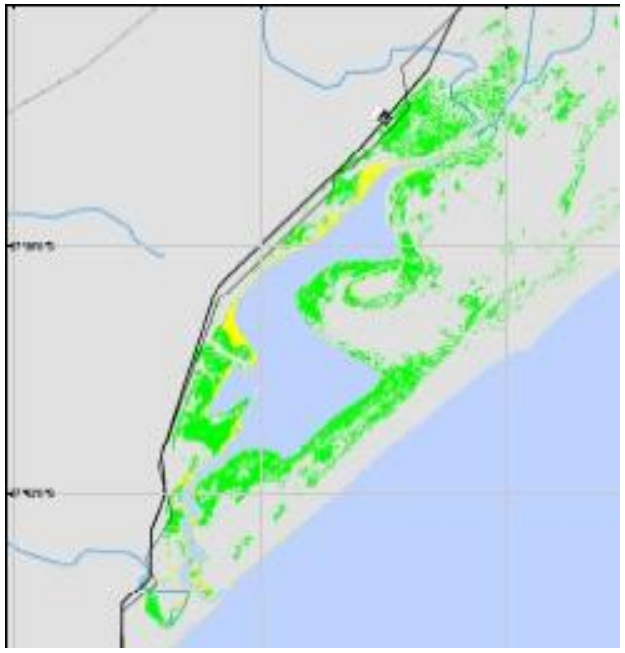
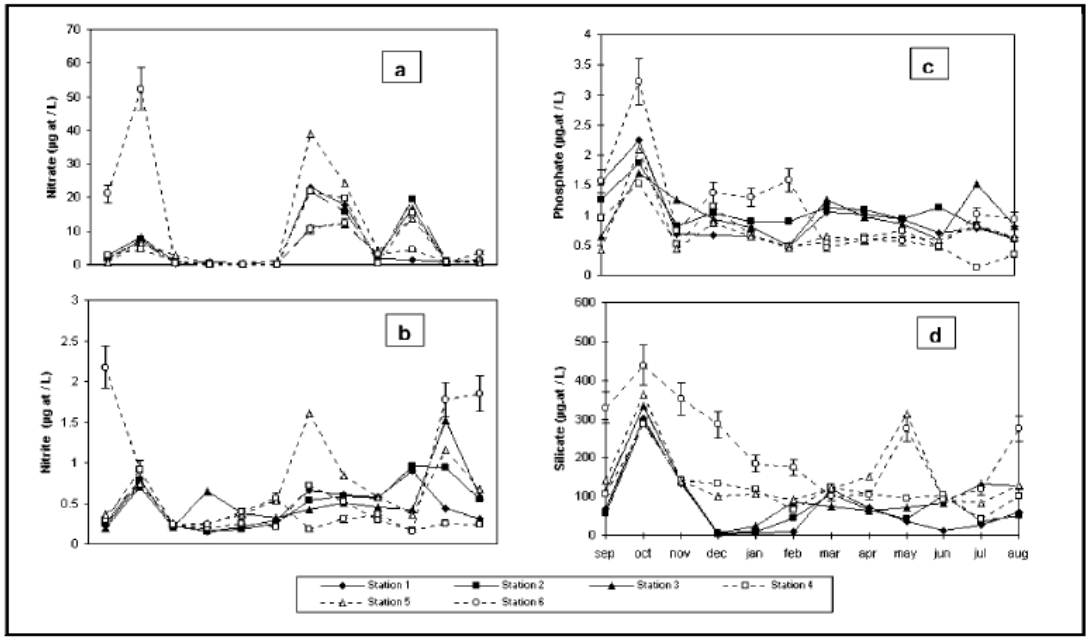
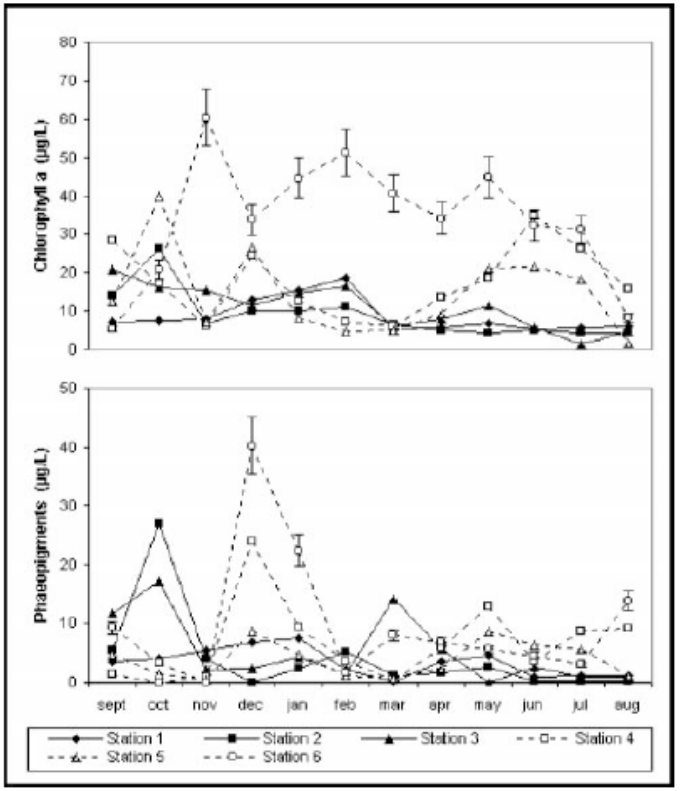


Spartina densiflora

MARISMAS DE LA LAGUNA COSTERA MAR CHIQUITA





De Marco et al., 2005. *Journal of Coastal Research* 21 (4), 818-825

MARISMAS DE LA LAGUNA COSTERA MAR CHIQUITA

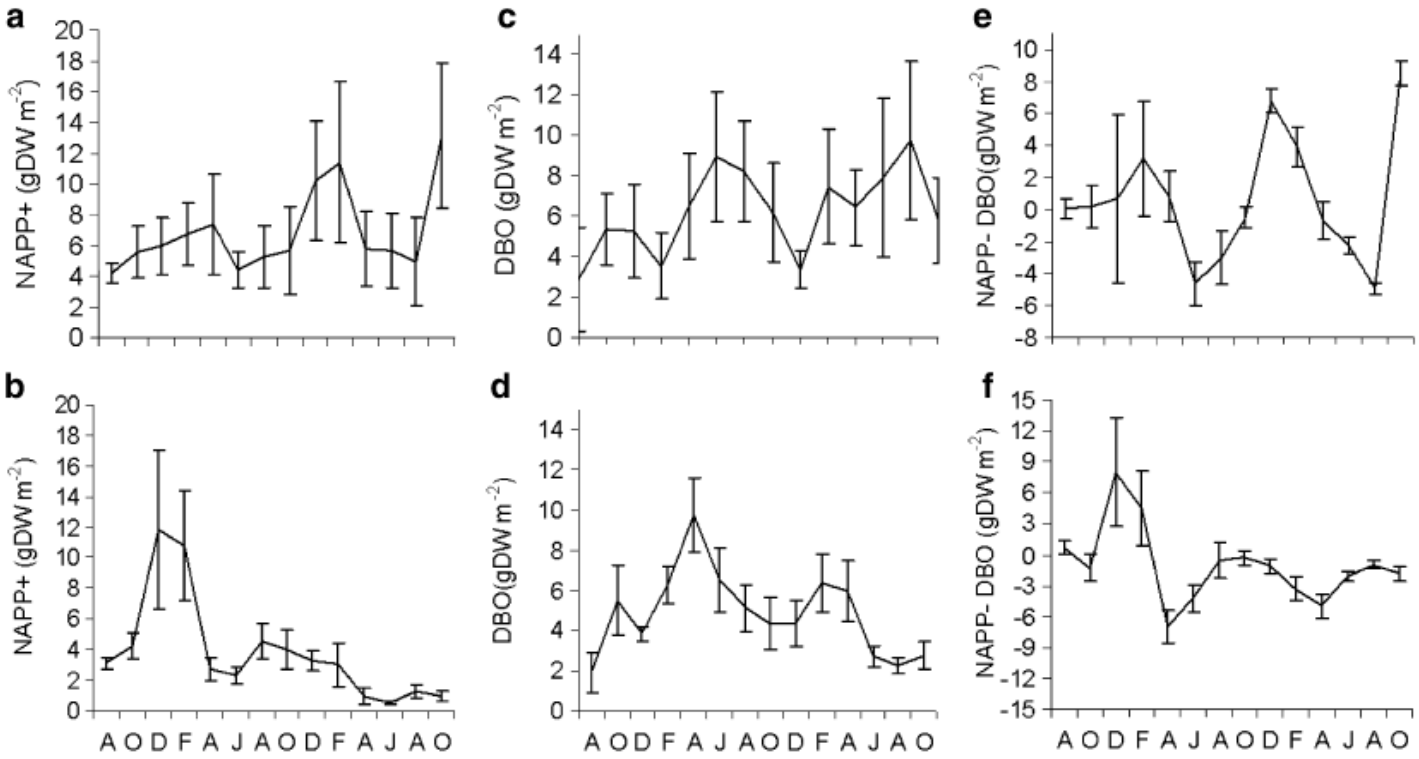


Fig. 9 Net aerial primary productivity (NAPP), dead biomass output (DBO), and its difference (NAPP-DBO) for high (HM) and low (LM) marsh populations of *S. densiflora*

Table 2 Annual NAPP and DBO values of low marsh (LM) and high marsh (HM) zones in Mar Chiquita coastal lagoon

Site/year	NAPP ($gDWm^{-2}yr^{-1}$)	DBO ($gDWm^{-2}yr^{-1}$)
LM/1	2181±605 (1584)	2155±316 (2175)
LM/2	602±154 (619)	1465±307 (1492)
HM/1	2128±710 (2010)	2332±800 (2065)
HM/2	3071±1270 (1752)	2386±849 (1711)

Gonzalez Trilla et al., 2010. *Estuaries & Coasts* 33, 953-962

MARISMAS DEL ESTUARIO DE BAHÍA BLANCA

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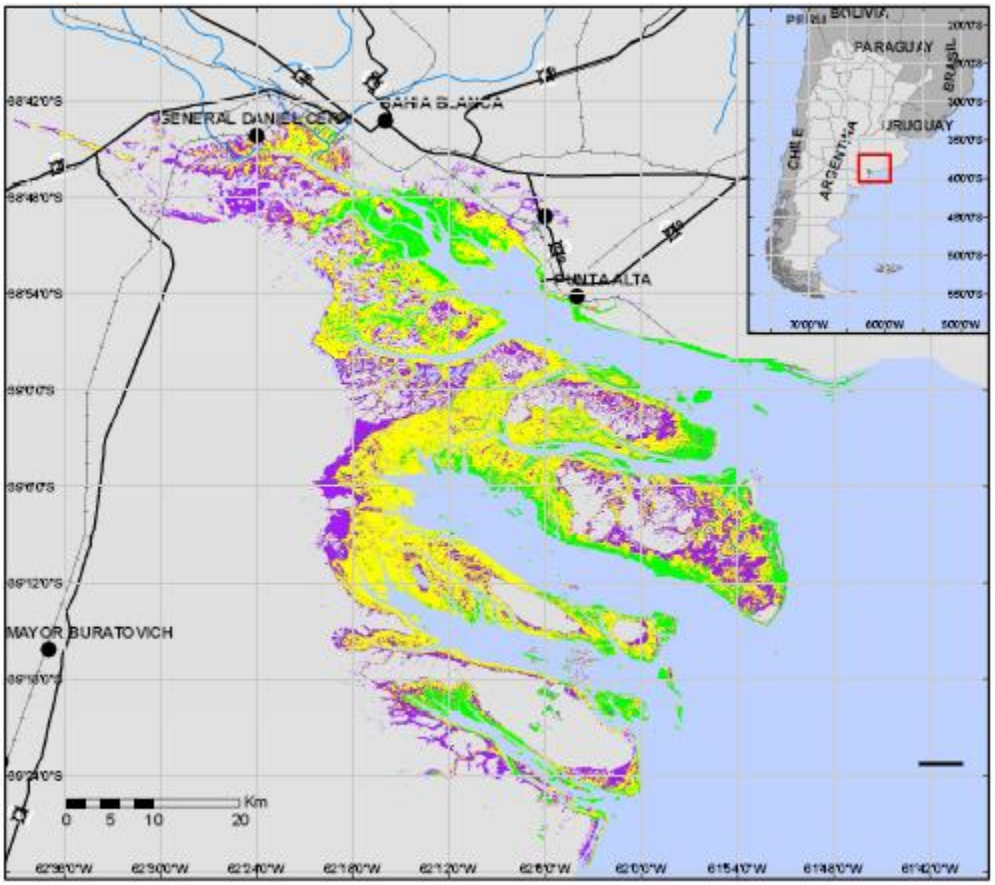


Spartina alterniflora

MARISMAS DEL ESTUARIO DE BAHÍA BLANCA

Table 3 Metal concentrations (mean values ± standard deviation, n=12) in *Spartina alterniflora* samples (in μg.g^{-1} d.w.)

Sample	Cd	Pb	Cu	Zn	Cr	Ni	Mn	Fe
A 1.1	0.10±0.04	<0.12	13±2	27±3	<0.02	5.0±0.6	57±8	365±20
A 1.2	<0.01	<0.12	37±4	46±5	<0.02	5.0±0.4	14.3±1.6	510±23
A 3.1	0.5±0.1	2.1±0.2	4±0.2	19±2	<0.02	3.0±0.2	63±5	185±11
A 3.2	0.6±0.1	<0.12	8.7±0.3	75±8	<0.02	2.0±0.2	18±2	197±23
B 1.1	0.8±0.1	<0.12	5.0±0.4	19±3	<0.02	3.0±0.3	25±2	199±22
B 1.2	0.10±0.06	2.0±0.2	12.0±1.5	63±5	<0.02	3.6±0.2	7.8±0.9	239±25
B 3.1	0.3±0.1	2.0±0.3	5.2±0.4	18±3	<0.02	2.7±0.3	35.8±4.3	182±15
B 3.2	0.20±0.04	<0.12	14±2	103±15	<0.02	3.3±0.4	15.0±2.4	284.15±35.39

Hempel et al., 2008. *Journal of Soil & Sediments* 8, 289-297.

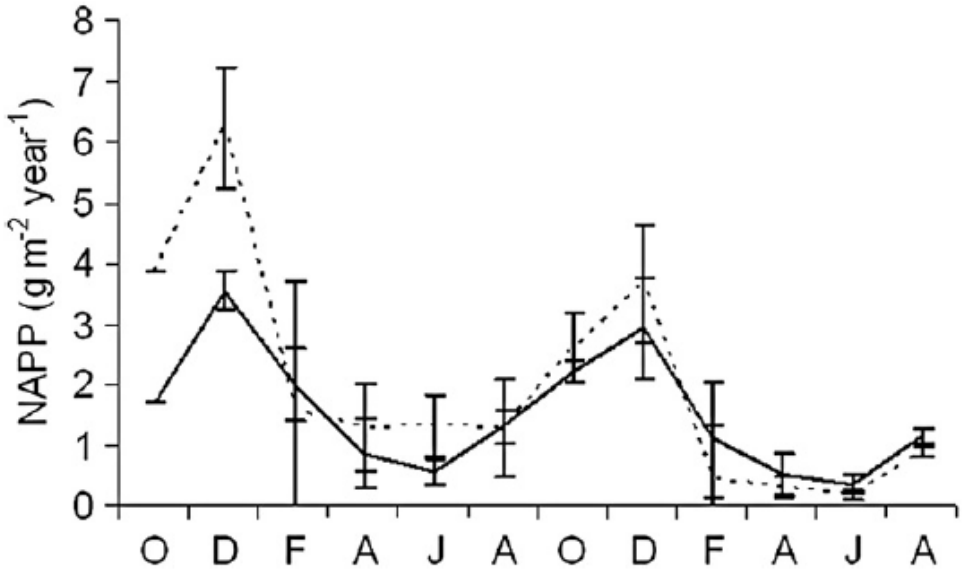


Fig. 6. Net aboveground primary productivity (NAPP) in a *Spartina alterniflora* marsh from the Bahia Blanca Estuary from October 2005 to August 2007. High marsh (filled line) and low marsh (dotted line) sites are shown.

Gonzalez Trilla et al., 2009. *Estuarine Coastal & Shelf Science 85, 126-133.*

MARISMAS DEL ESTUARIO DE BAHÍA BLANCA

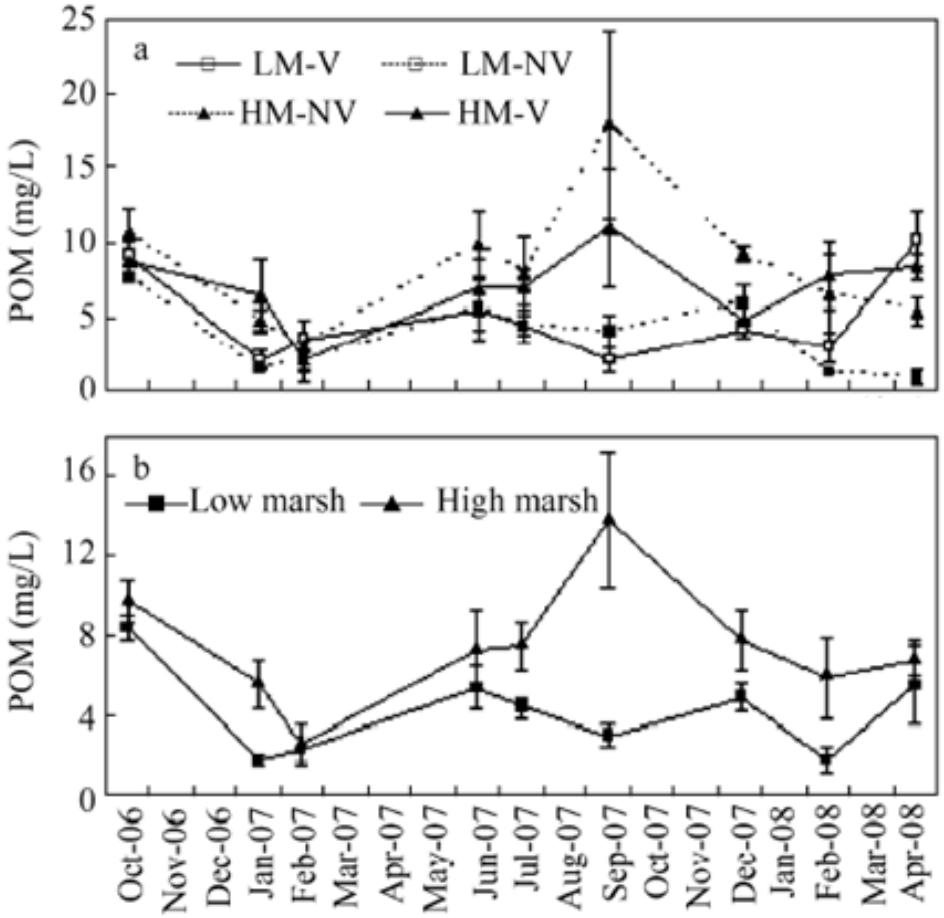


Fig. 4 Concentration of particulate organic matter (POM) in pore water for the four sites (a) and for the two flooding conditions of low and high marshes (b).

Negrin et al., 2011. *Journal of Environmental Sciences 23 (2), 212-221.*

MARISMAS DEL ESTUARIO DE BAHÍA BLANCA

Table 1 Concentration of C, N and P (%) in belowground biomass, decomposition rate (% lost during the first year) and C/N and C/P molar ratios before and after decomposition in *Spartina alterniflora* and *Sarcocornia perennis*

	HM *S. alterniflora*	LM *S. alterniflora*	*S. perennis*
C[a] (%)	41.37 ± 0.89	41.50 ± 1.09	42.11 ± 2.27
N[a] (%)	0.96 ± 0.33	1.07 ± 0.30	1.02 ± 0.19
P[a] (%)	0.06 ± 0.033	0.06 ± 0.033	0.09 ± 0.35
Decomposition rate (%)	28.8 ± 3.31	–	70.6 ± 4.4
C/N initial[b]	74.2 ± 9	–	38.2*
C/N final[b]	36.6 ± 1.67	–	33.7 ± 4.16
C/P initial[b]	1167 ± 194	–	429*
C/P final[b]	1509 ± 1156	–	612 ± 22

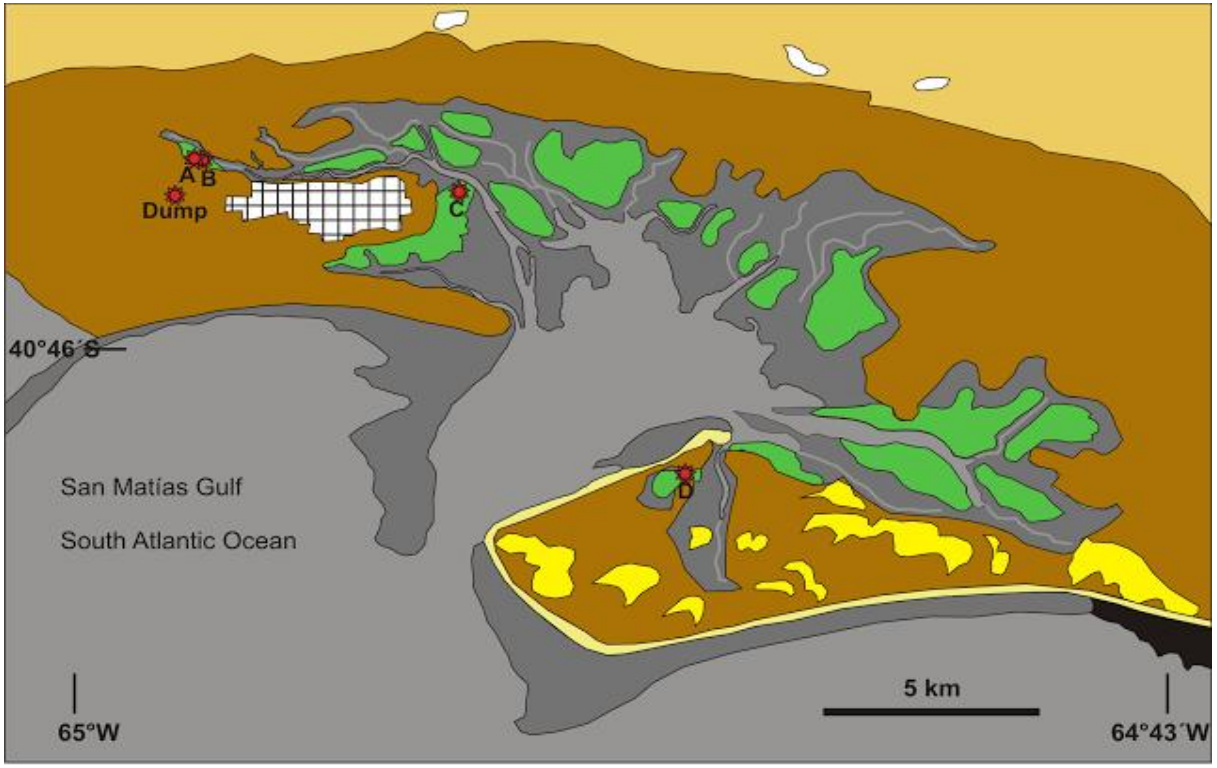
Table 2 Concentration of C, N and P (%) in aboveground biomass, decomposition rate (% lost during the first year) and C/N and C/P molar ratios before and after decomposition in *Spartina alterniflora* and *Sarcocornia perennis*

	HM *S. alterniflora*	LM *S. alterniflora*	*S. perennis*
C[a] (%)	41.30 ± 1.02	39.46 ± 0.79	42.87 ± 1.87
N[a] (%)	1.12 ± 0.32	1.33 ± 0.29	1.08 ± 0.17
P[a] (%)	0.10 ± 0.023	0.11 ± 0.026	0.06 ± 0.03
Decomposition rate (%)	47.3 ± 3.6	–	63.9 ± 29
C/N initial[b]	53.6*	–	37.5 ± 2.9
C/N final[b]	58.5 ± 2.7	–	81.3 ± 25.6
C/P initial[b]	512*	–	476 ± 197
C/P final[b]	871 ± 486	–	1093 ± 145

Negrin et al., 2015. *Hydrobiologia* (DOI: 10.1007/s10750-015-2582-9)

MARISMAS DE LA BAHÍA SAN ANTONIO (RIO NEGRO)

MARISMAS DE LA BAHÍA SAN ANTONIO (RIO NEGRO)



References

- Pleistocene beach ridges
- Holocene beach ridges
- Dunefield
- Tidal flat
- Salt marshes
- Wave-cut platform
- Coluvial deposits
- Salt pans
- San Antonio City
- Sampling sites

MARISMAS DE LA BAHÍA SAN ANTONIO (RIO NEGRO)

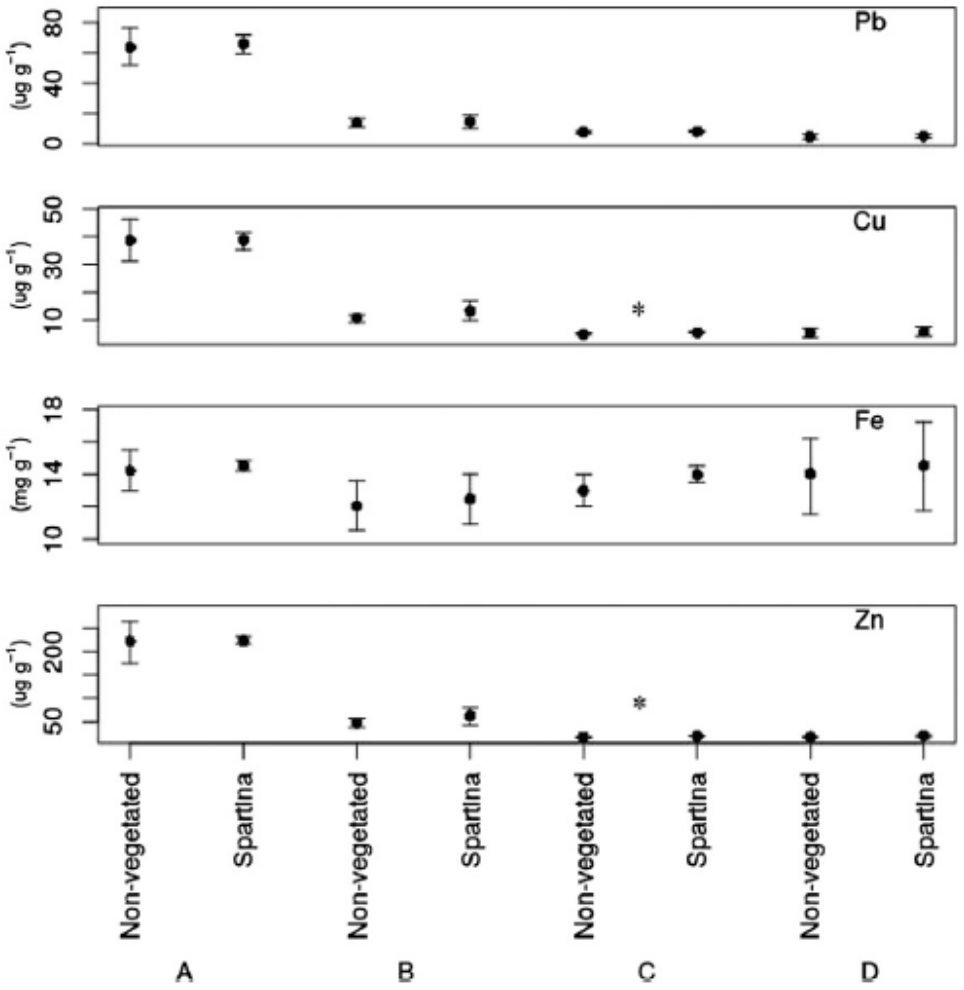


Fig. 2. Confident intervals of trace metals in two soil types of the sample sites in the San Antonio salt marsh (site locations are shown in Fig. 1). Points and bars represent respectively the mean value and the error (95% confidence interval). * indicates significant differences ($p < 0.05$).

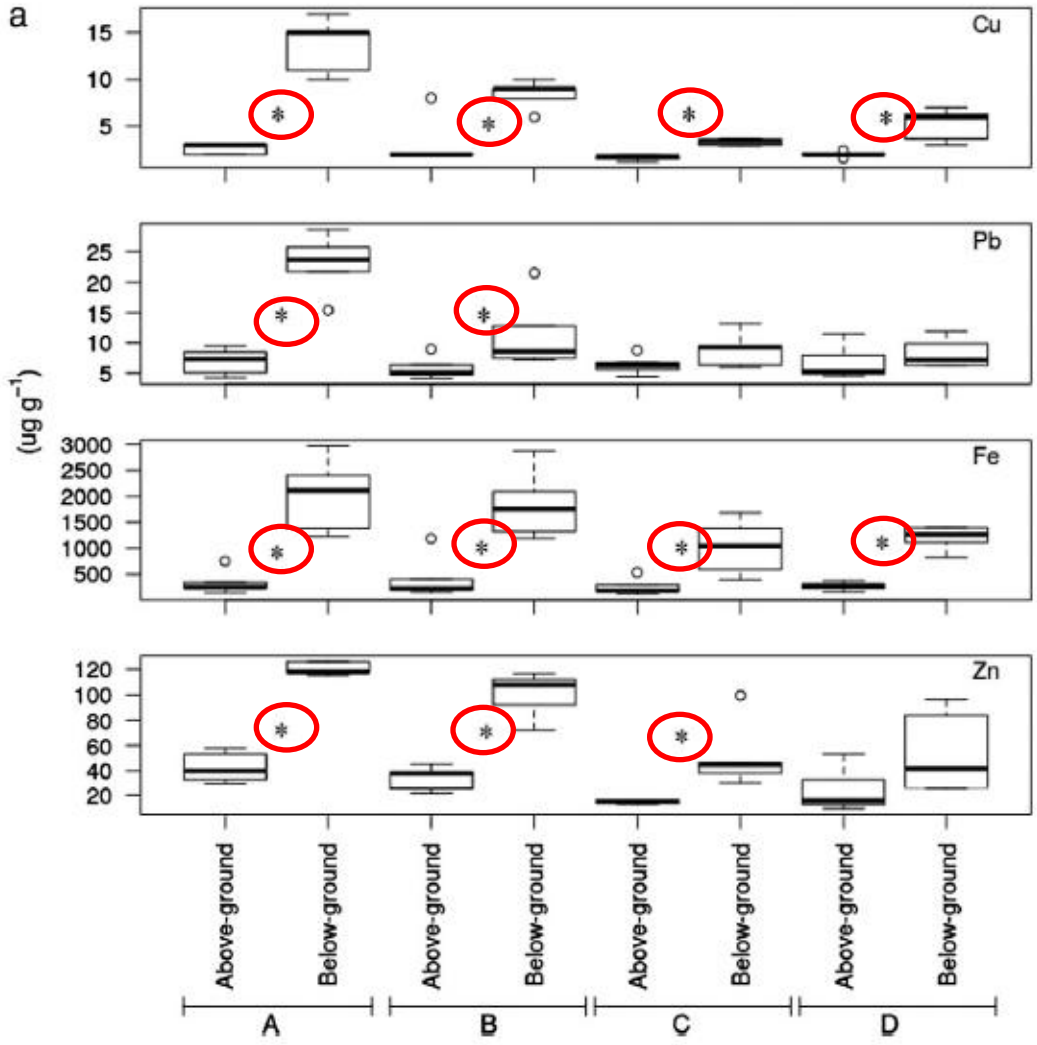
[Fe] > [Zn] > [Pb] > [Cu]

Tendencia general (salvo Fe): los metales disminuyen desde el sitio A hacia los sitios C y D, independientemente de la presencia de planta

Idaszkin et al., 2015. *Marine Pollution Bulletin 101, 457-465*.

MARISMAS DE LA BAHÍA SAN ANTONIO (RIO NEGRO)

Diferencias entre estructuras de *S. densiflora* dentro de cada sitio



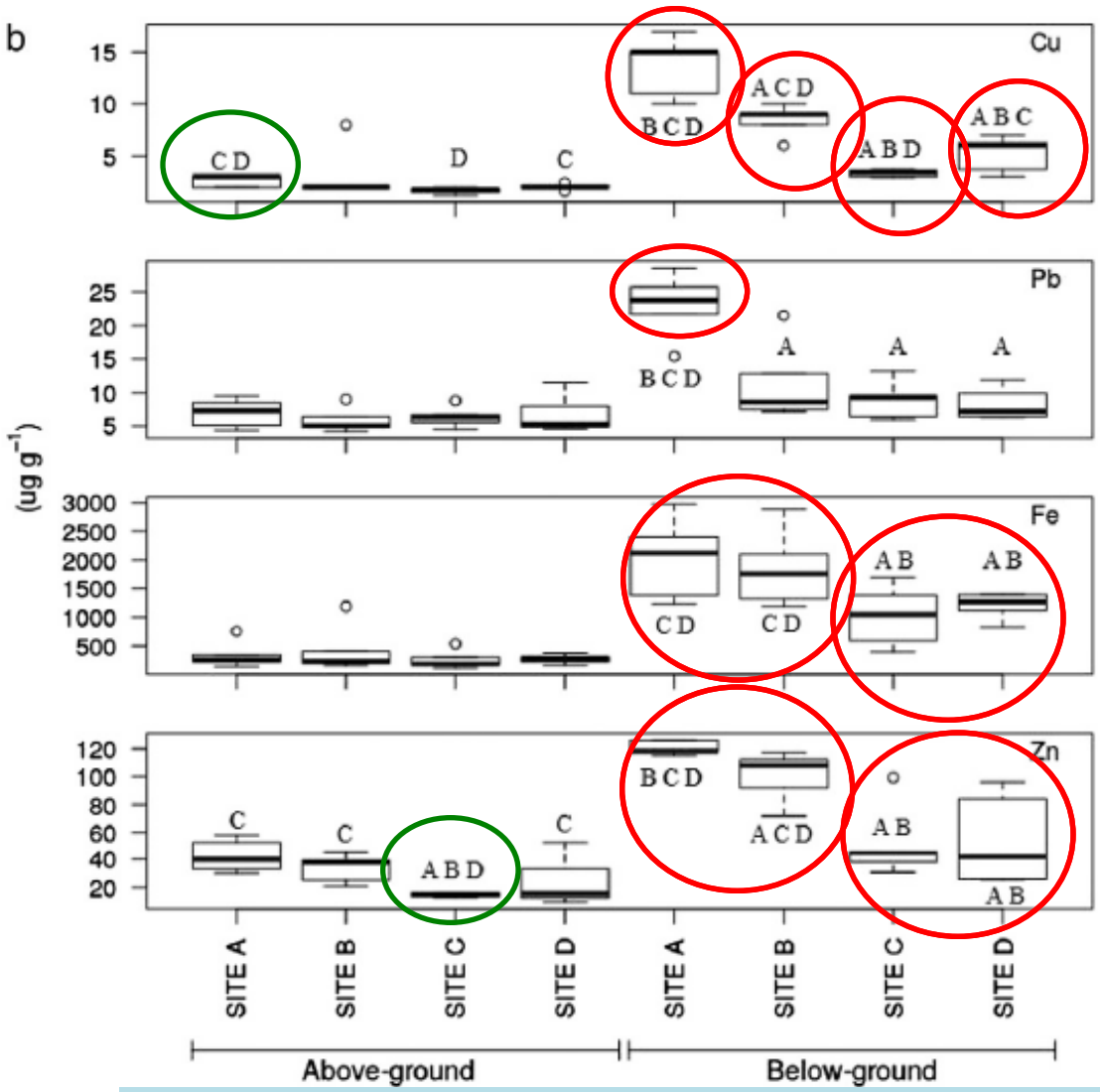
En general, la concentración de los metales es mayor en las estructuras subterráneas

Idaszkin et al., 2015. *Marine Pollution Bulletin 101, 457-465*.

Fig. 5. Trace metal concentration in below- and above-ground structures of *Spartina densiflora* in the San Antonio salt marsh. Horizontal lines in boxes represent median values of metal concentration. Lower and upper hinges represent 25 and 75% percentiles respectively. Upper panel (a) shows comparatively metal concentrations between structures (above- and below-ground) for the four sampled sites (site locations are shown in Fig. 1). * indicates significant differences ($p < 0.05$). Lower panel (b) shows the metal concentration between sites for structures above- and below-ground. Letters indicate the sites that were significantly different ($p < 0.05$). Comparisons were done using pairwise resampling analysis based on a Student's t-test.

MARISMAS DE LA BAHÍA SAN ANTONIO (RIO NEGRO)

Diferencias entre sitios para cada estructuras de *S. densiflora*



Estructuras aéreas:
[Cu] mayor en sitio A que en C y D
[Zn] menor en sitio C

Estructuras subterráneas:
[Cu] mayor en sitio A > B > D > C
[Pb] mayor en sitio A
[Fe] y [Zn] mayor en sitios A y B

Idaszkin et al., 2015. *Marine Pollution Bulletin 101, 457-465*.

MARISMA RAWSON (RIO CHUBUT, CHUBUT)

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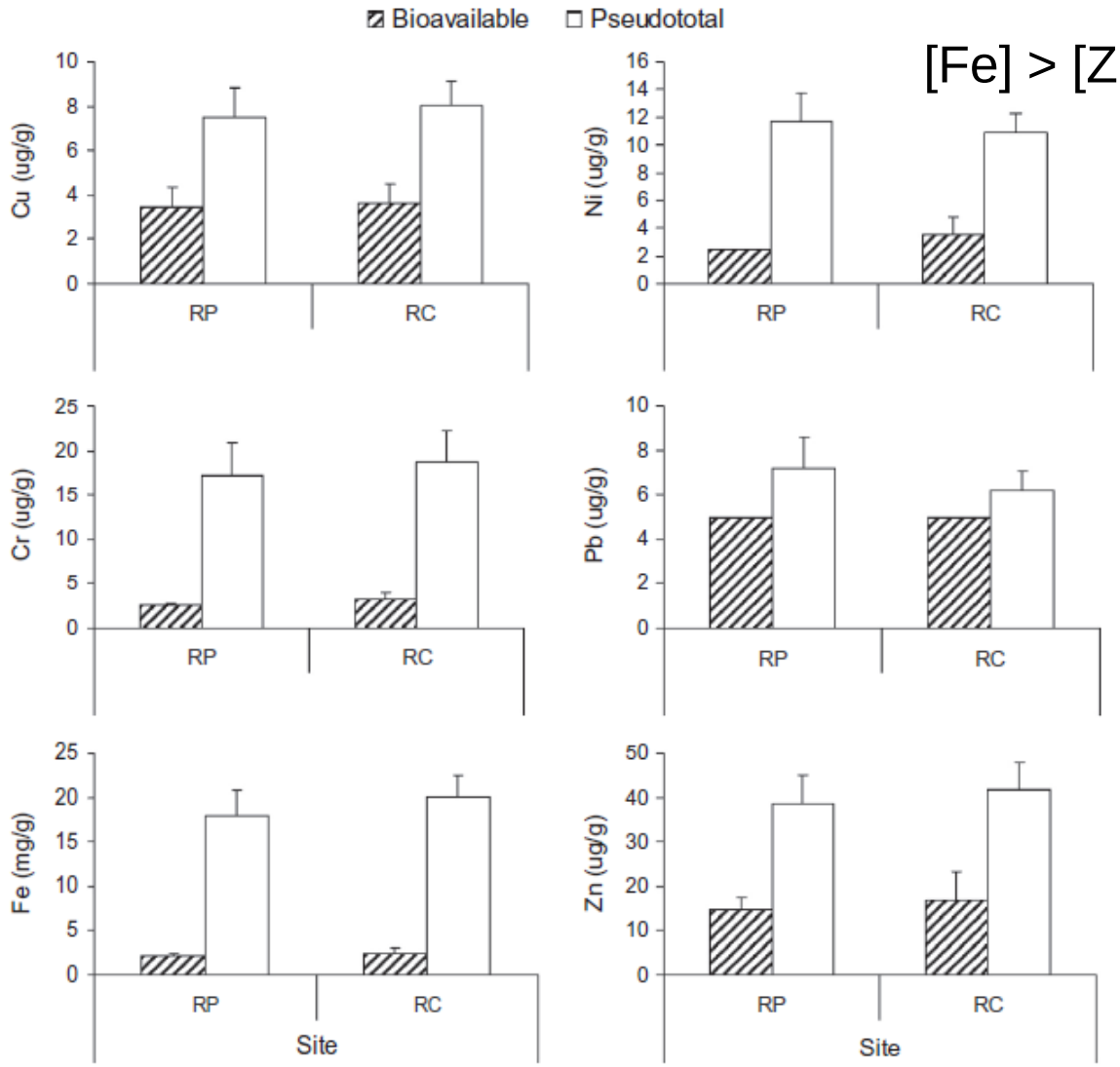
MARISMA RAWSON (RIO CHUBUT, CHUBUT)



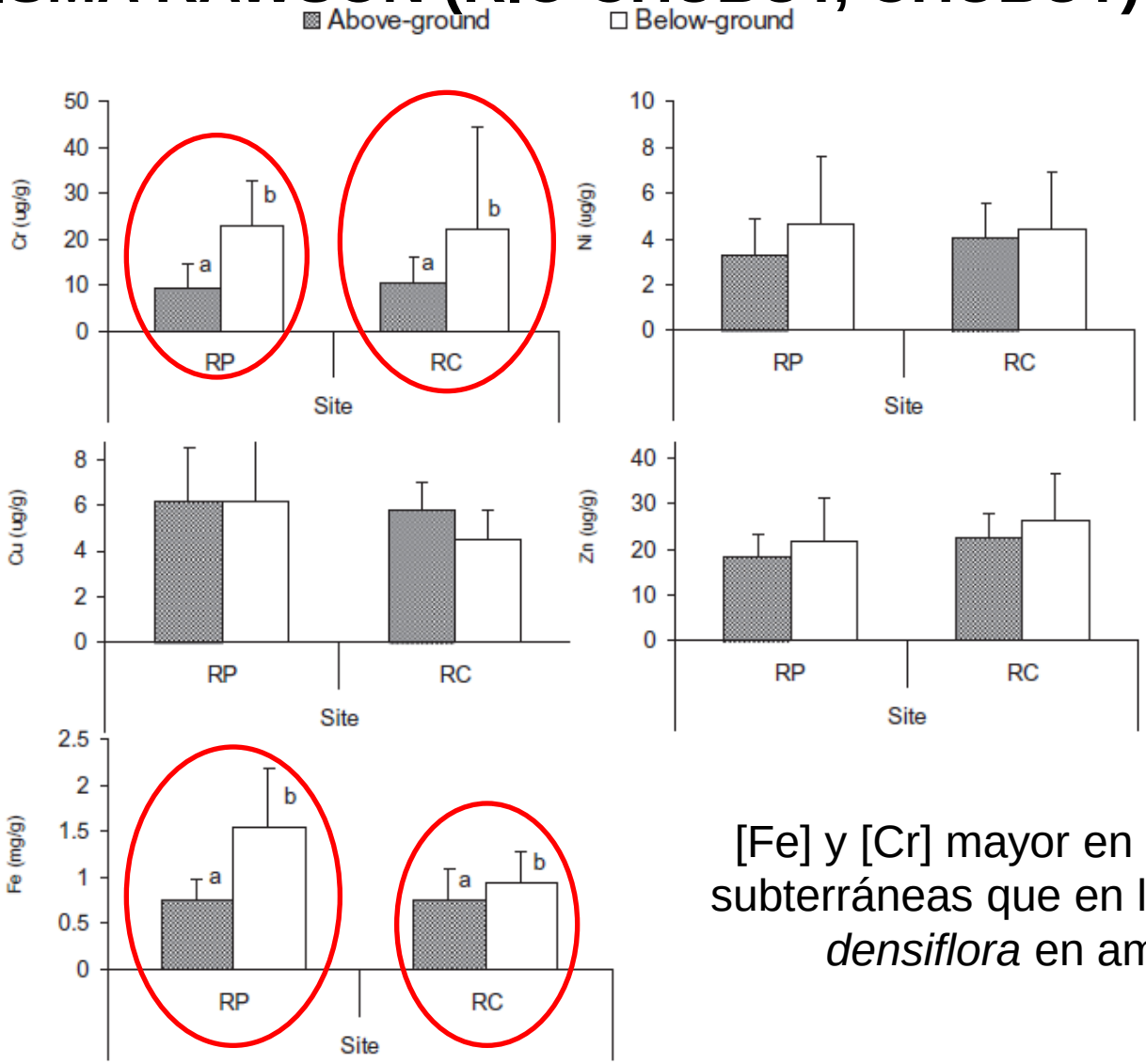
seudototal and potentially bioavailable concentration of studied trace metals in soil from each sample site in the Rawson salt marsh. Data are means + SD, $n = 5$.

[Fe] > [Zn] > [Cr] > [Ni]>[Pb] > [Cu]

No se encontraron diferencias entre sitios en las concentraciones de metales.

Idaszkin et al., 2014. *Marine Pollution Bulletin 89, 444-450*.

MARISMA RAWSON (RIO CHUBUT, CHUBUT)



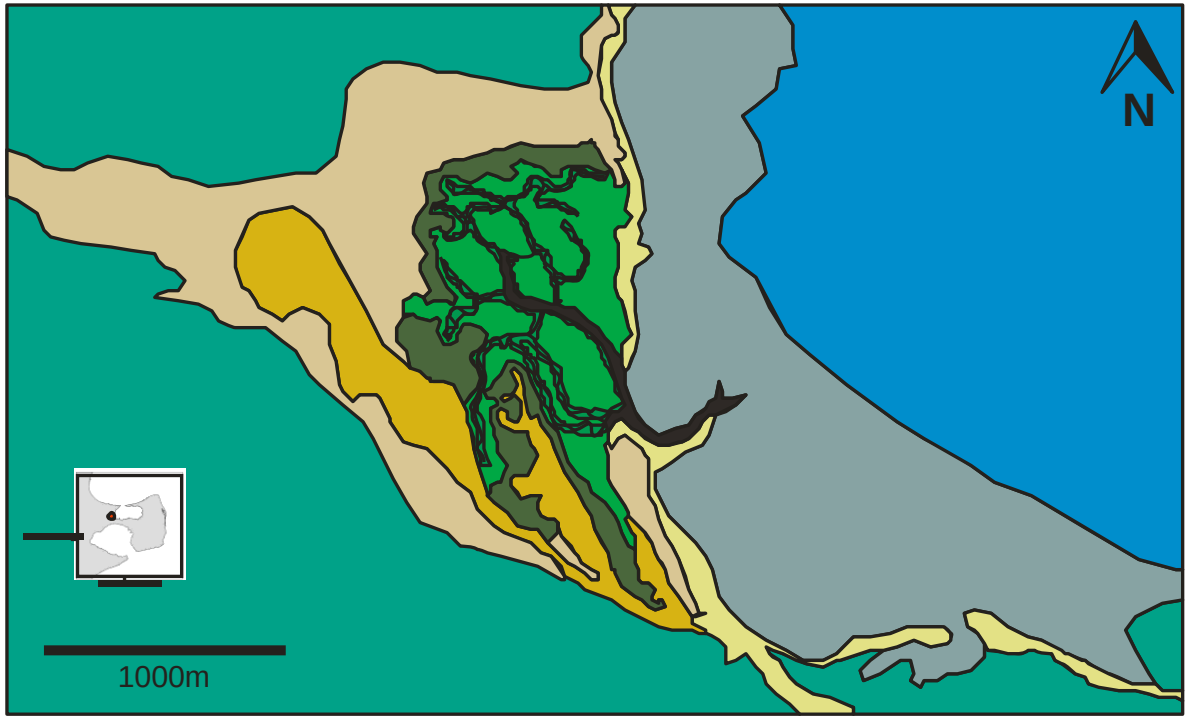
[Fe] y [Cr] mayor en las estructuras subterráneas que en las aéreas de *S. densiflora* en ambos sitios

Fig. 4. Trace metal concentrations in below- and above-ground structures of *Spartina densiflora* from each sample site in the Rawson salt marsh. Data are means + SD, $n = 5$. Different letters indicate significant differences ($p < 0.05$) between structures in two-way ANOVA test.

Idaszkin et al., 2014. *Marine Pollution Bulletin 89, 444-450*.

MARISMA RIACHO (GOLFO SAN JOSE, CHUBUT)

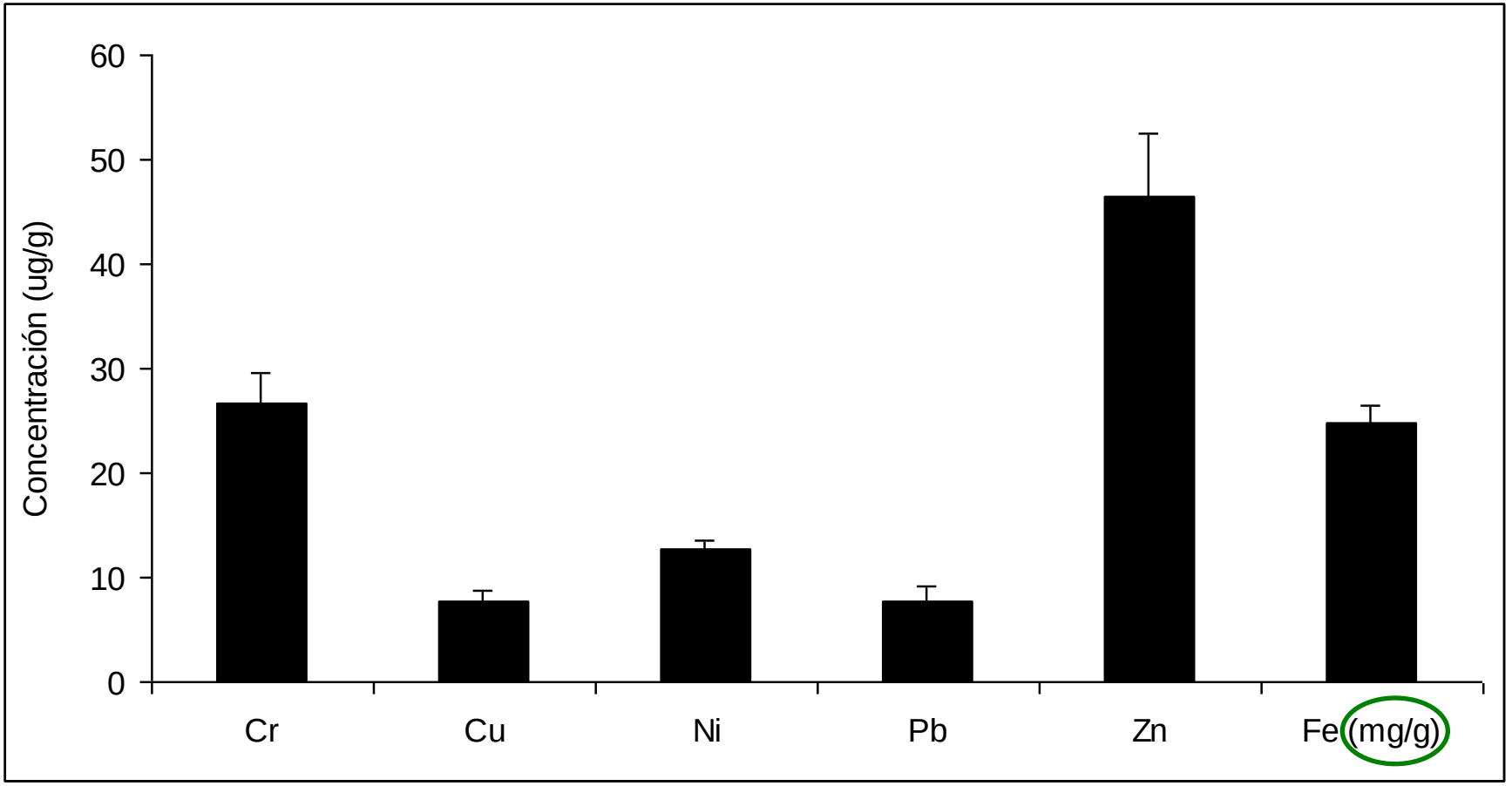
MARISMA RIACHO (GOLFO SAN JOSE, CHUBUT)



References

- Tidal flat
- Sandy beach ridges
- Salt pans (bare soils)
- Piedmont slope (bajada)
- Tidal channels
- Vegetation community dominated by *Spartina densiflora* (VC *Sd*)
- Vegetation community dominated by *Spartina alterniflora* (VC *Sa*)
- Vegetation community doy minated b*Sarcocornia perennis* and other shrubs (VC *Sp)*

MARISMA RIACHO (GOLFO SAN JOSE, CHUBUT)



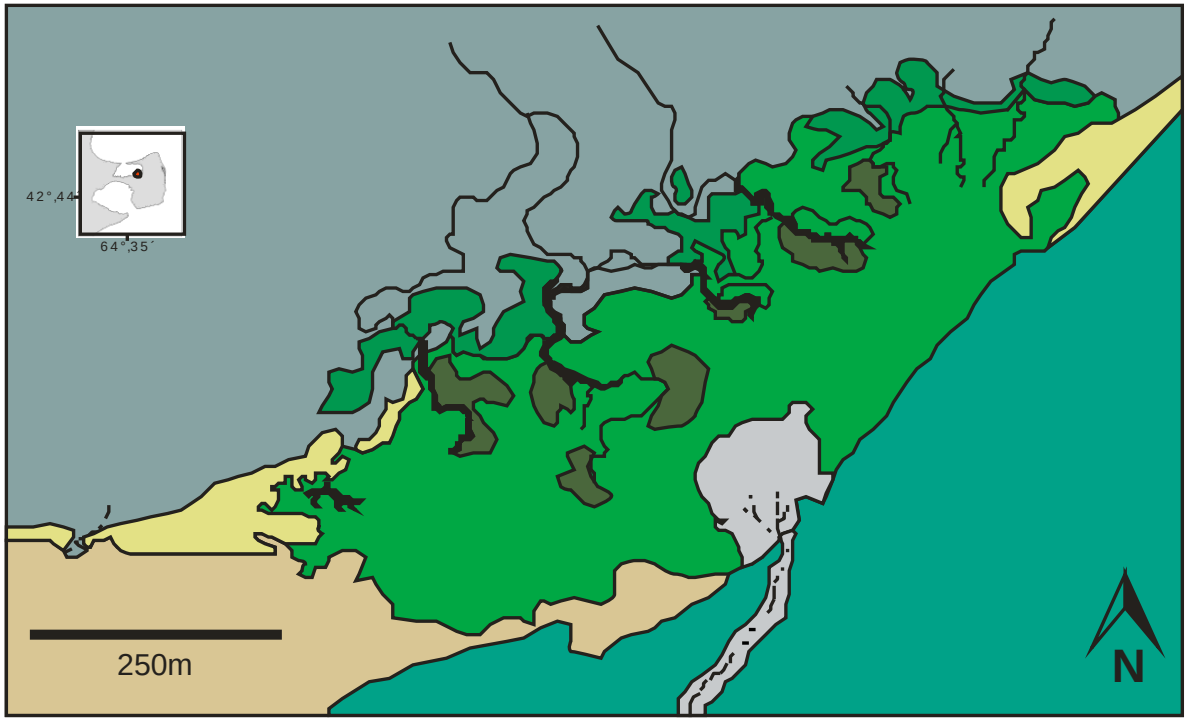
% arcilla	% limo	% arenas	Eh (mV)	pH	CE (mmhos/cm)	% MO
5,07 ± 1,21	16,99 ± 4,63	74,57 ± 5,17	-224,4 ± 59,33	7,38 ± 0,26	6,27 ± 0,59	2,05 ± 0,22

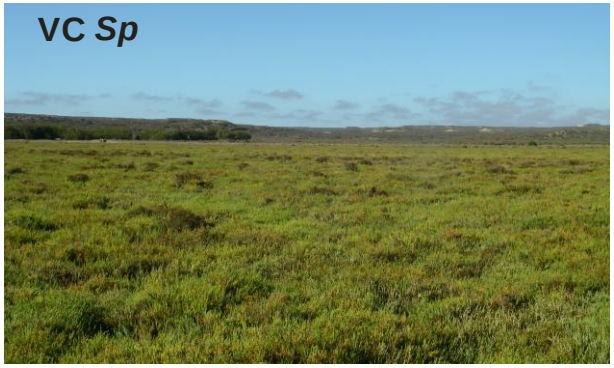
Cd (µg/g)	Cr (µg/g)	Cu (µg/g)	Ni (µg/g)	Pb (µg/g)	Zn (µg/g)	Fe (mg/g)
no detectable	(24,63;31,7)	(6,72;9,48)	(11,9;13,85)	(6,24;9,98)	(41,68;56,87)	(23,03;27,43)

Idaszkin et al., 2012. *IIIV Jornadas Nacionales de Cs del Mar*.

MARISMA FRACASSO (GOLFO SAN JOSE, CHUBUT)

MARISMA FRACASSO (GOLFO SAN JOSE, CHUBUT)

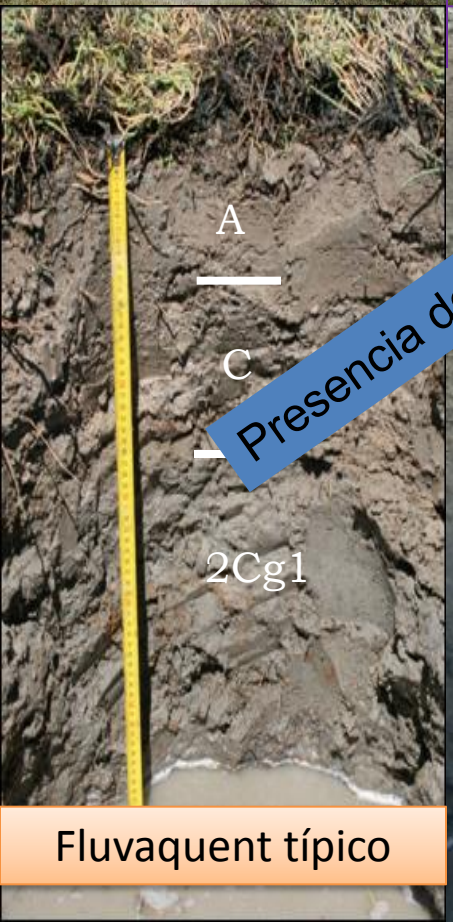




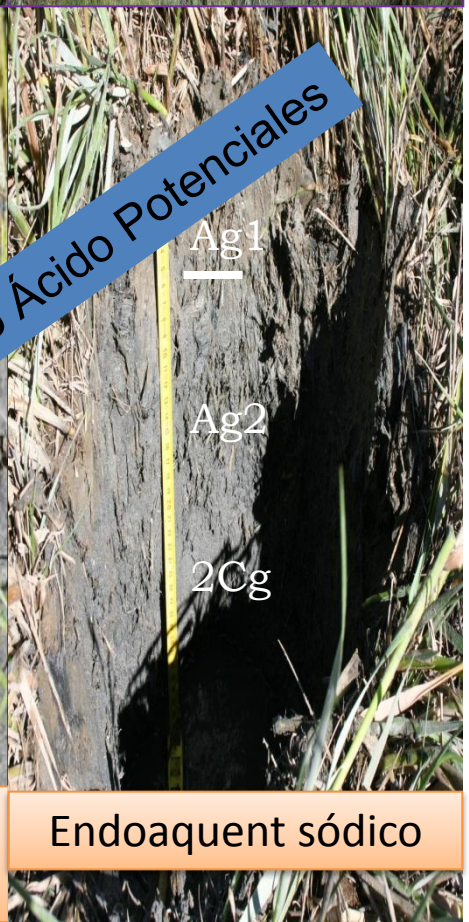
References

- Tidal flat
- Sandy beach ridges
- Salt pans (bare soils)
- Alluvial fan
- Piedmont slope (bajada)
- Vegetation community dominated by *Spartina alterniflora (VC Sa)*
- Vegetation community dominated by *Limonium brasiliense (VC Lb)*
- Vegetation community dominated by *Sarcocornia perennis (VC Sp)*
- Tidal channels

MARISMA FRACASSO (GOLFO SAN JOSE, CHUBUT)



Presencia de material sulfídico



Suelos Sulfato Ácido Potenciales

Fluvaquent típico

Fluvaquent típico

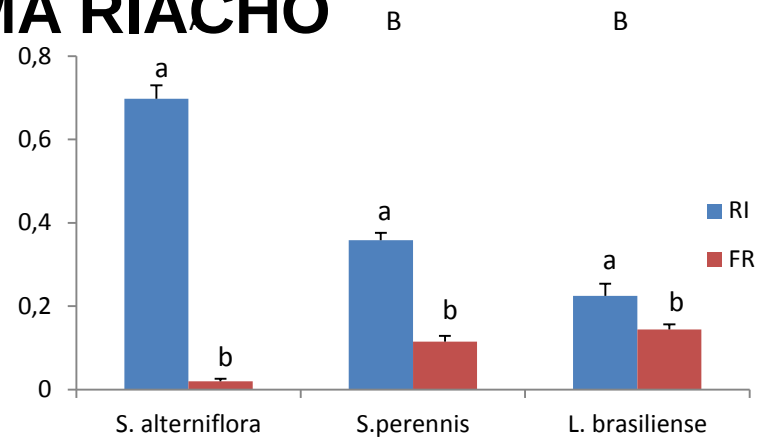
Psammaquent sódico

Endoaquent sódico

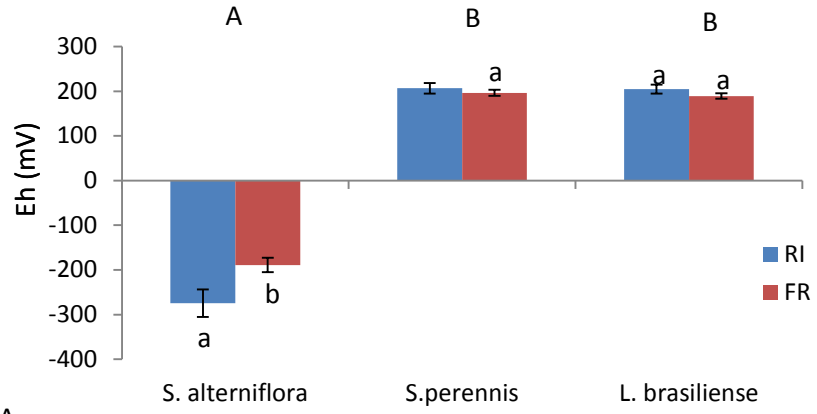
MARISMA FRACASSO VS MARISMA RIACHO

Variables edáficas

N



Eh



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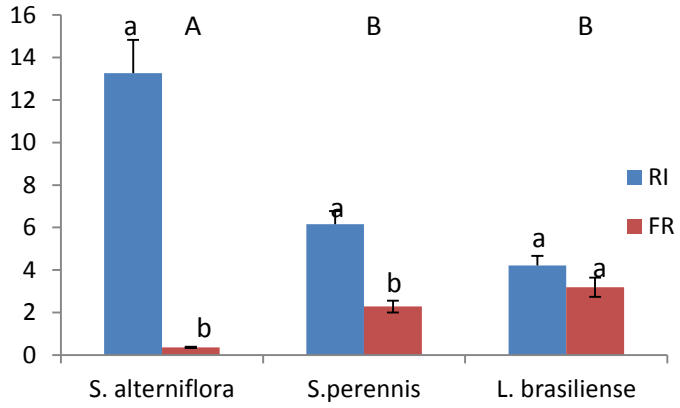
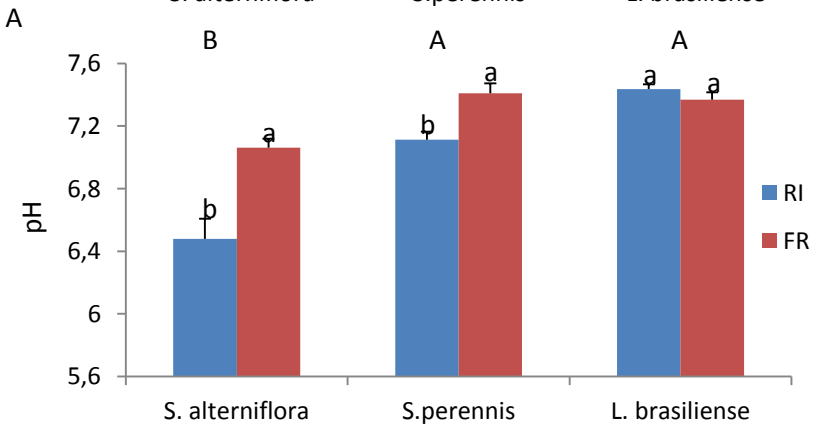


pH



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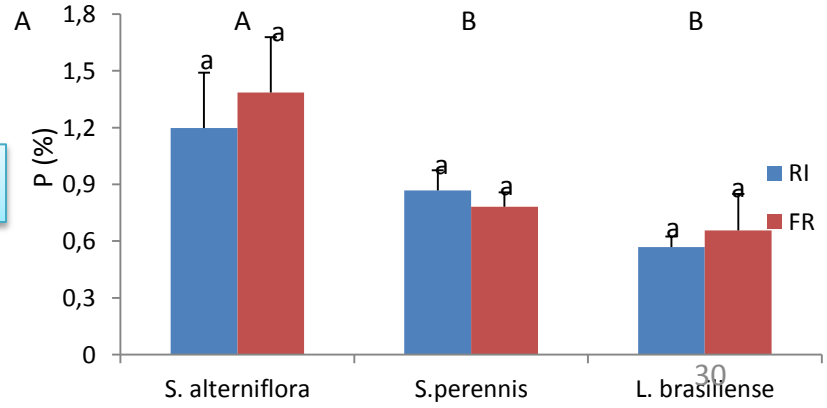
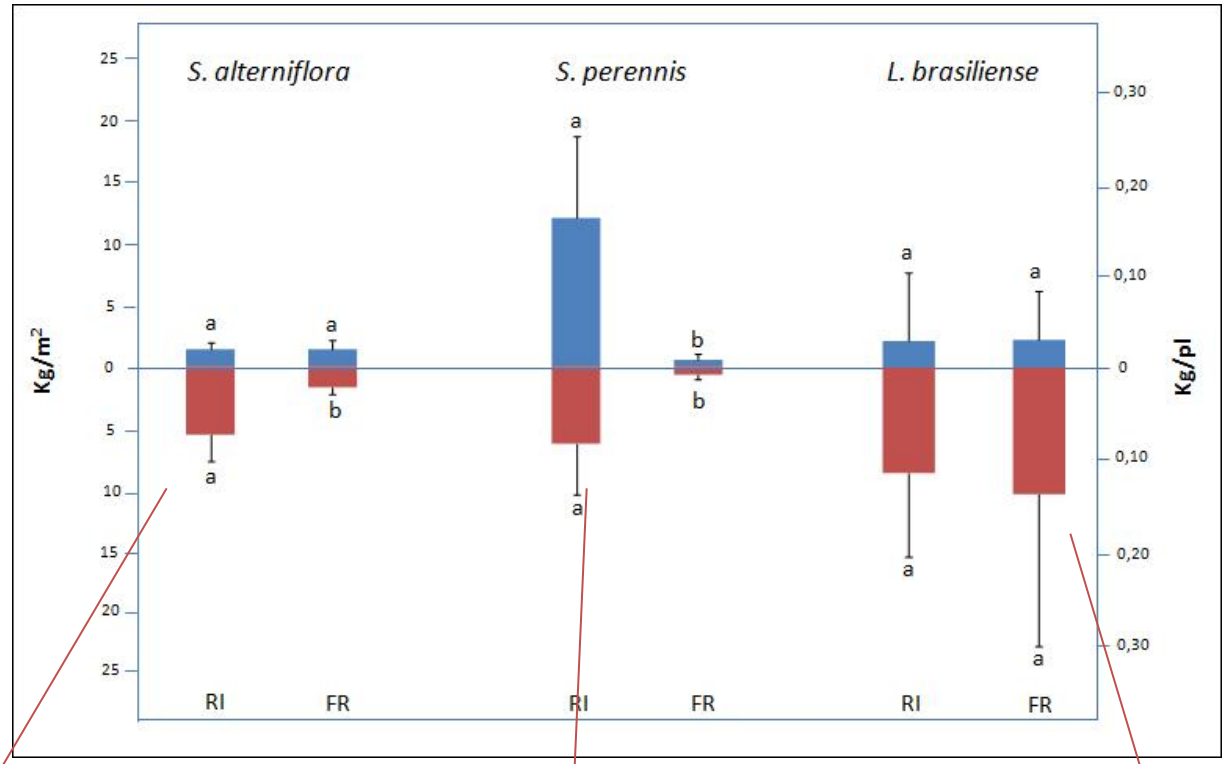


MARISMA FRACASSO VS MARISMA RIACHO

Distribución de biomasa



B aérea

B raíces

S. alterniflora

Ba: no se encontraron diferencias entre sitios.
Br: RI>FR

S. perennis

Ba: RI> FR.
Br: RI>FR

L. brasiliense

Ba: no hay diferencias
Br: mayor órgano concentrador. Sin diferencias

CONCLUSIONES

Las marismas costeras conformadas con vegetación halófita muestran cumplir un rol trascendente en los ambientes marinos costeros de nuestro país.

Son sistemas claramente proveedores de servicios ecosistémicos de gran importancia (p.e., control de erosión, captura de elementos potencialmente tóxicos, acumulación de MO y nutrientes, generación de detrito)

Algunas de sus propiedades pueden ser útiles para optimizar el diseño / funcionamiento de wetlands artificiales

MUCHAS GRACIAS POR SU ATENCIÓN!!!!