

Instituto de Ciencias Naturales
Alexander von Humboldt

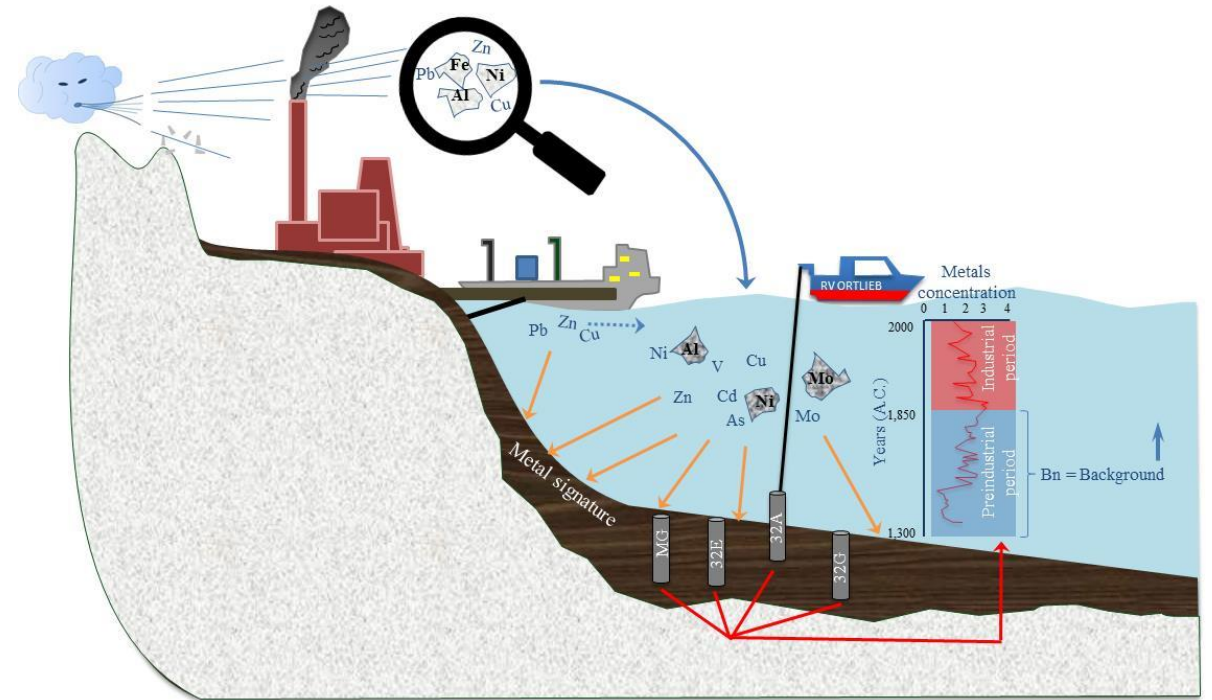
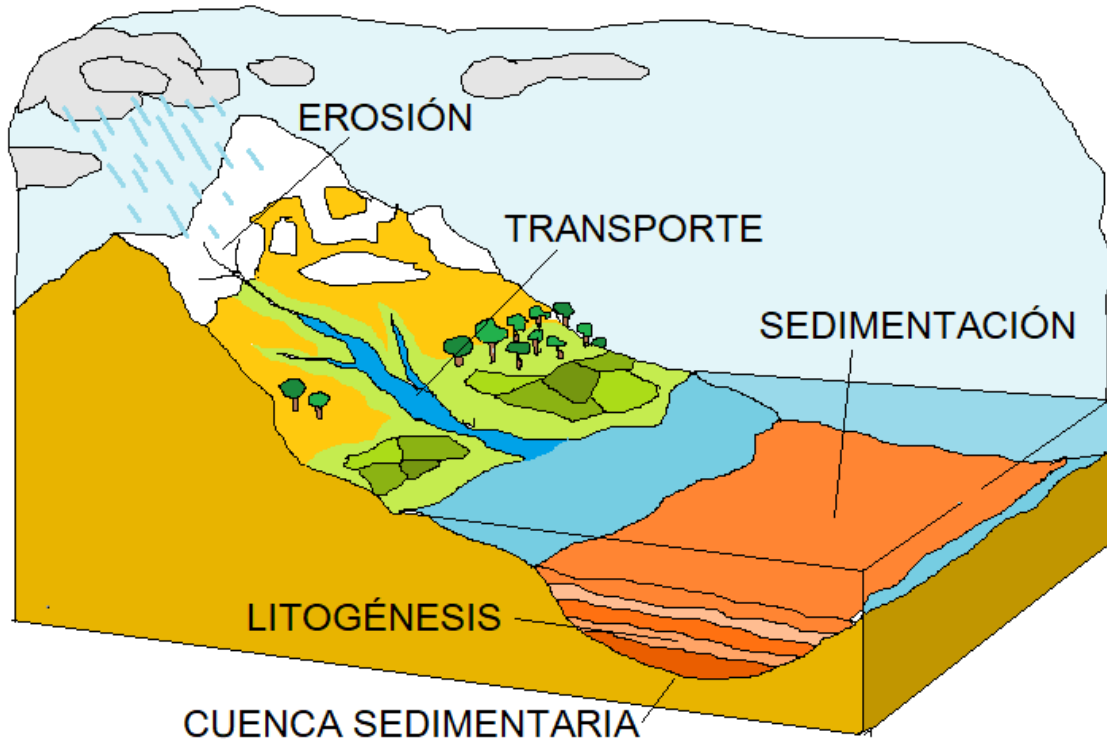
UNIVERSIDAD DE ANTOFAGASTA

**Análisis comparativo del contenido de metales en bahías del norte de Chile.
Bases para el establecimiento de normas de calidad de sedimentos.**

Jorge Valdés Saavedra



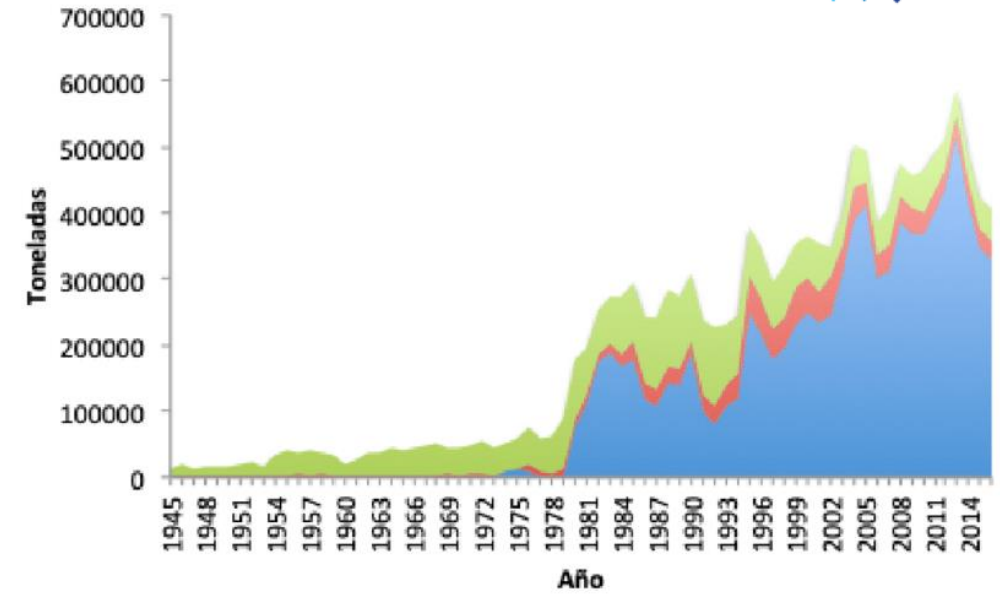
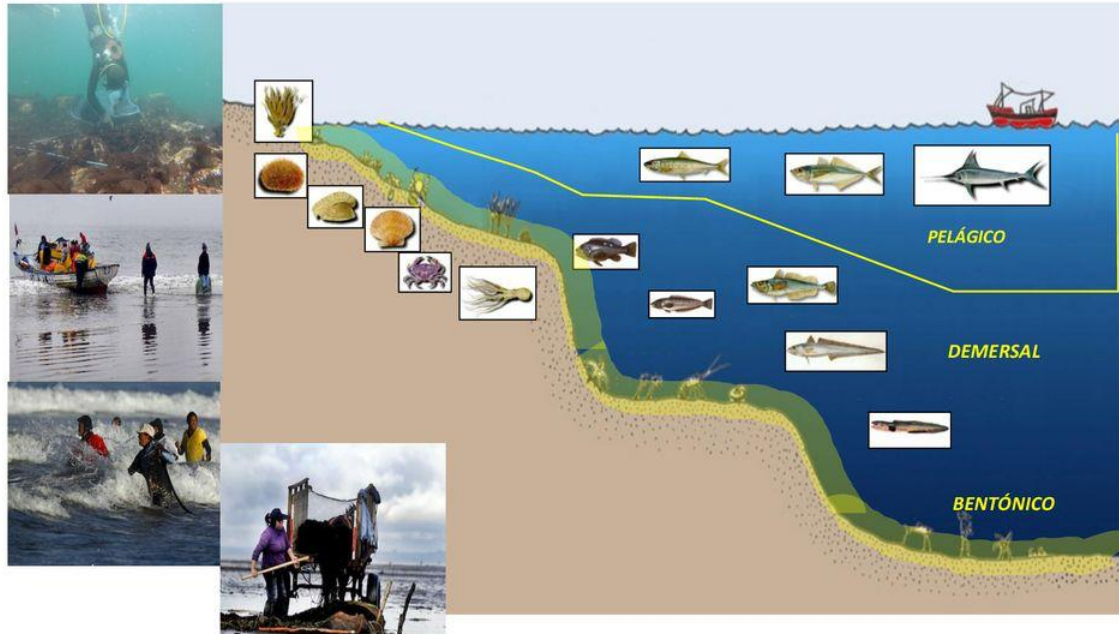
Proceso sedimentario en la zona costera



Ambiente bentónico

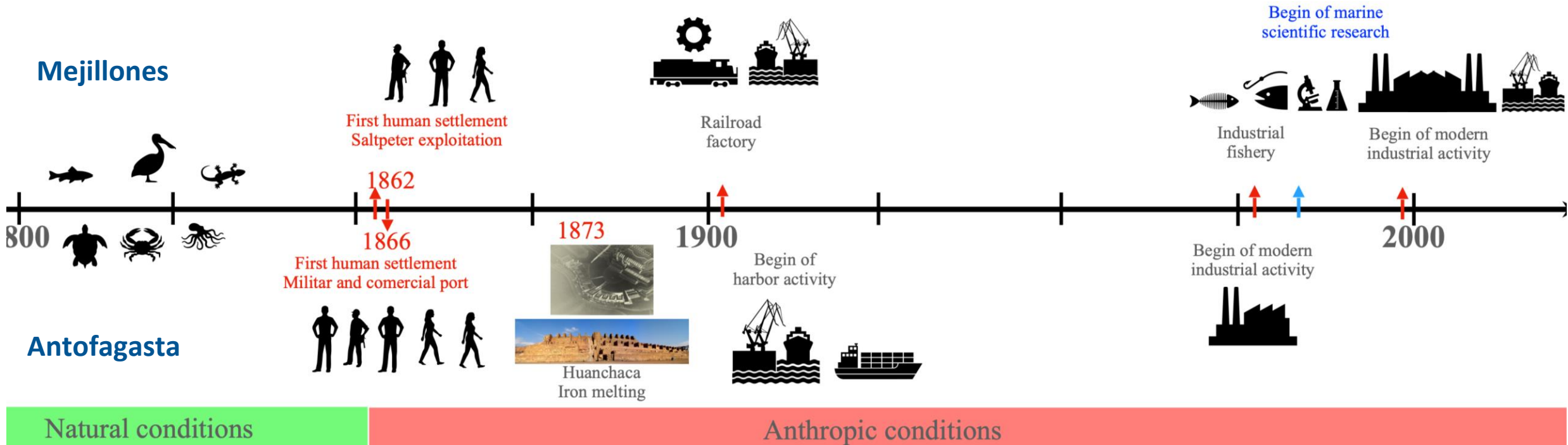


ANTECEDENTES
DEFINICION DE RECURSO BENTONICO



Algas Equinodermos Moluscos







Normas de Calidad Ambiental

(Aproximación técnica-legal)

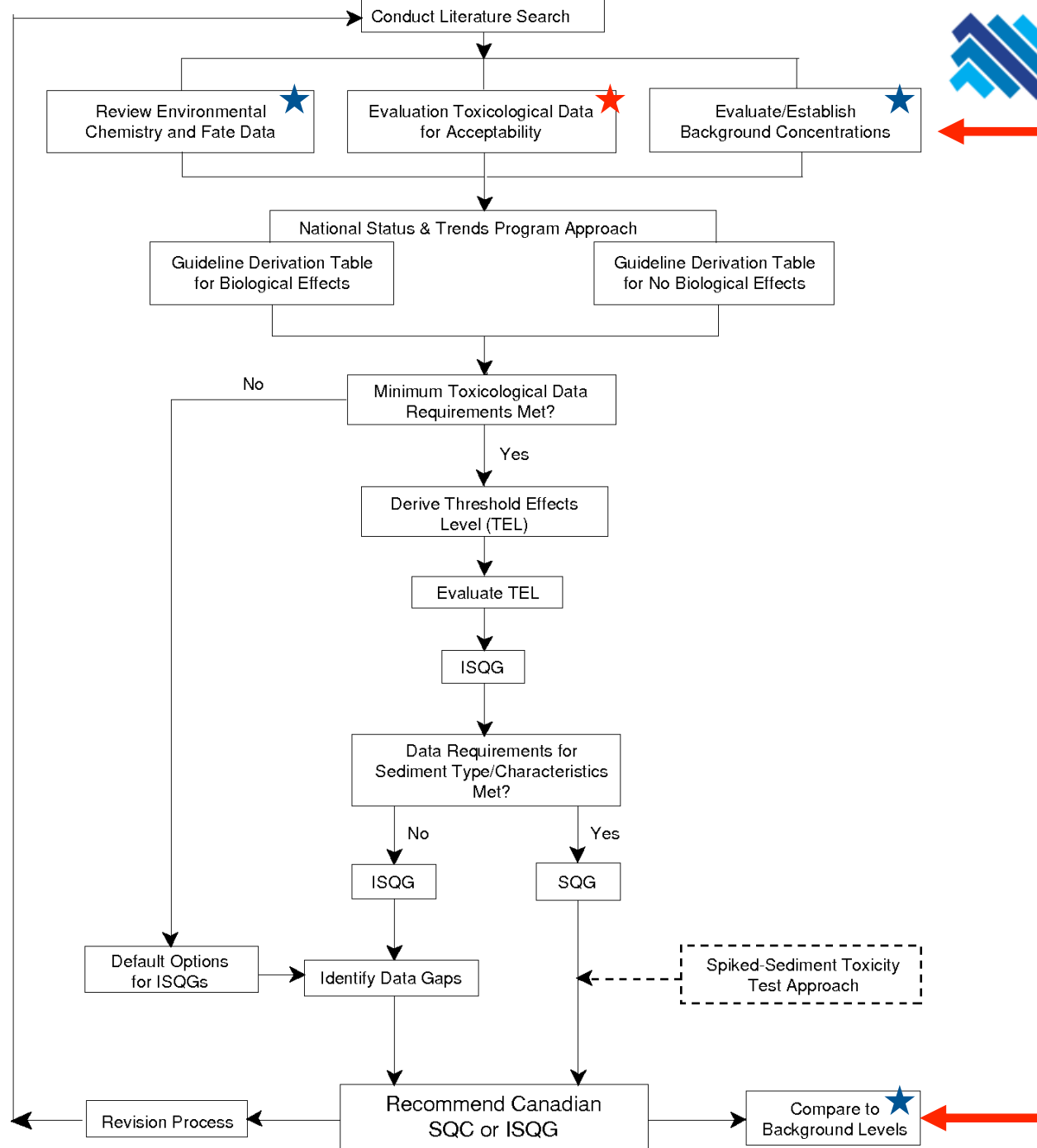
Instrumento de gestión ambiental que establece los límites de tolerancia de las sustancias emitidas al ambiente por la actividad antrópica.

NORMA DE CALIDAD DE SEDIMENTOS

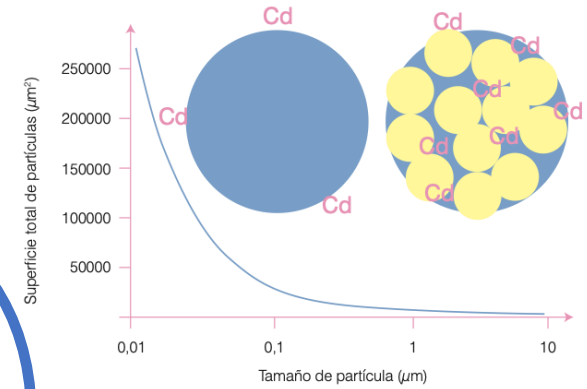
Trabaja sobre la base de rangos de concentración, definidos en función de su efecto toxicológico sobre los organismos marinos.

Protocol for the derivation of Canadian Sediment Quality Guidelines for the protection of aquatic life.

Canadian Council of Ministers of the Environment



Análisis de metales en sedimentos acuáticos



US-EPA 3052
Extracción total

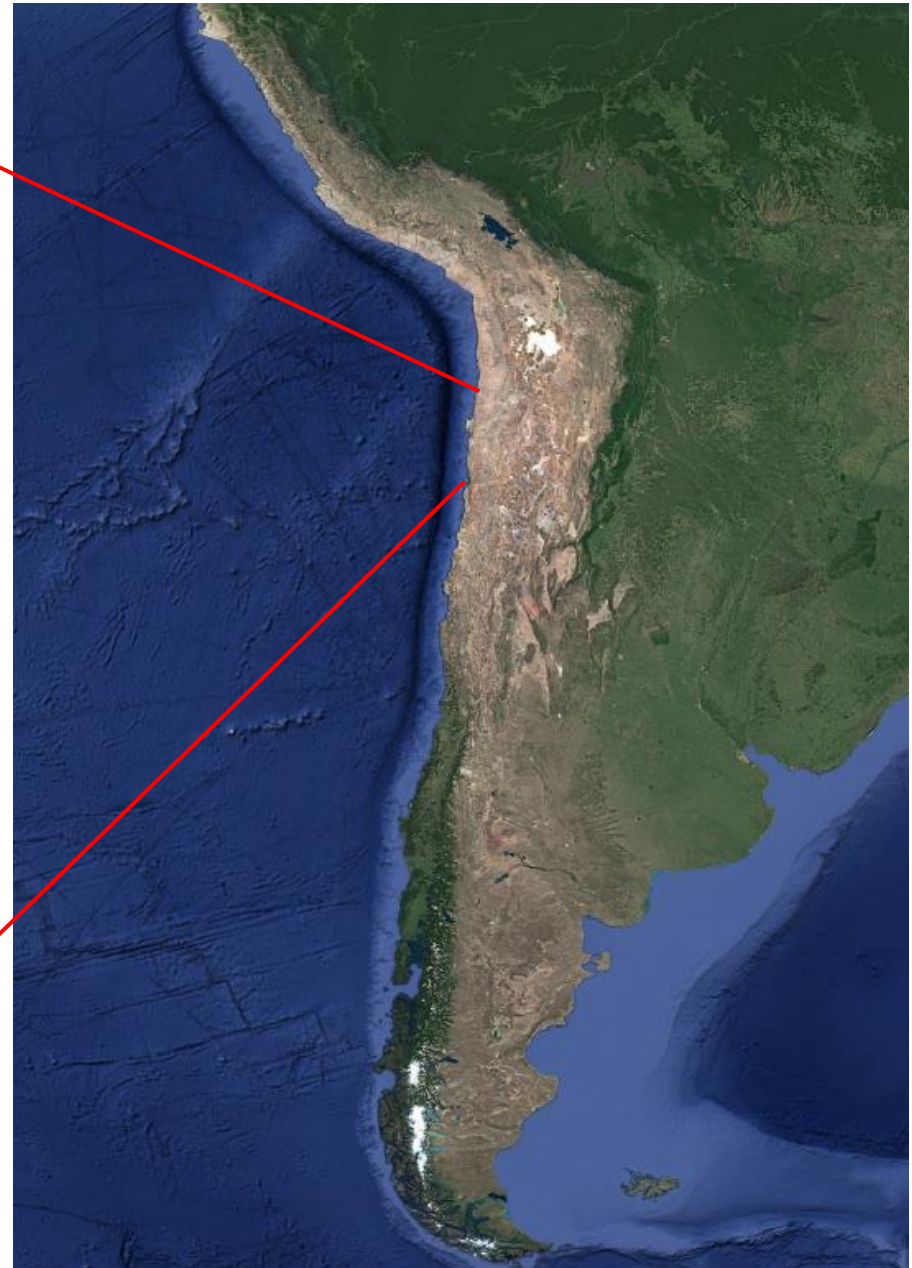
US-EPA 3051-A
Fracción biodisponible

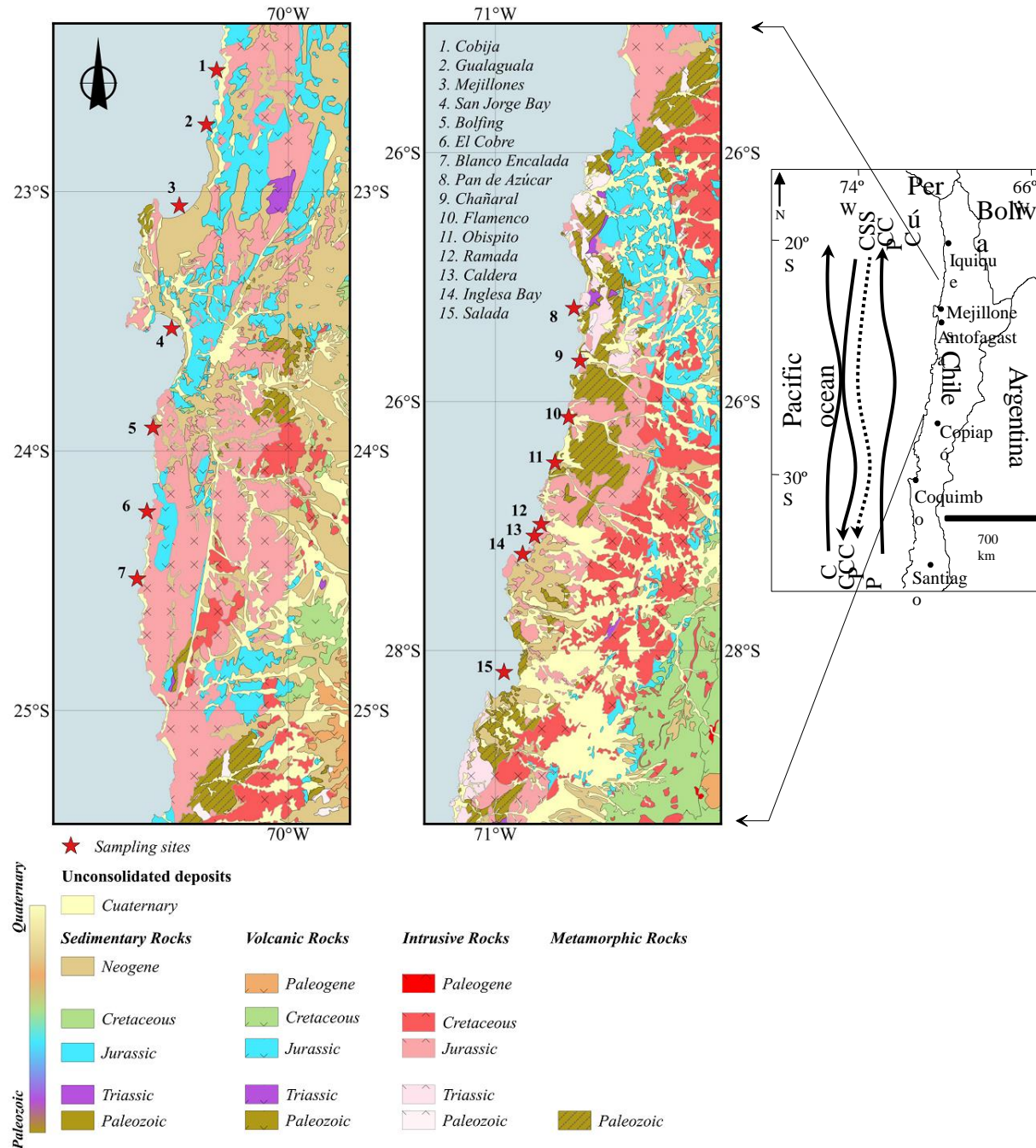
Interpretación
Comparación

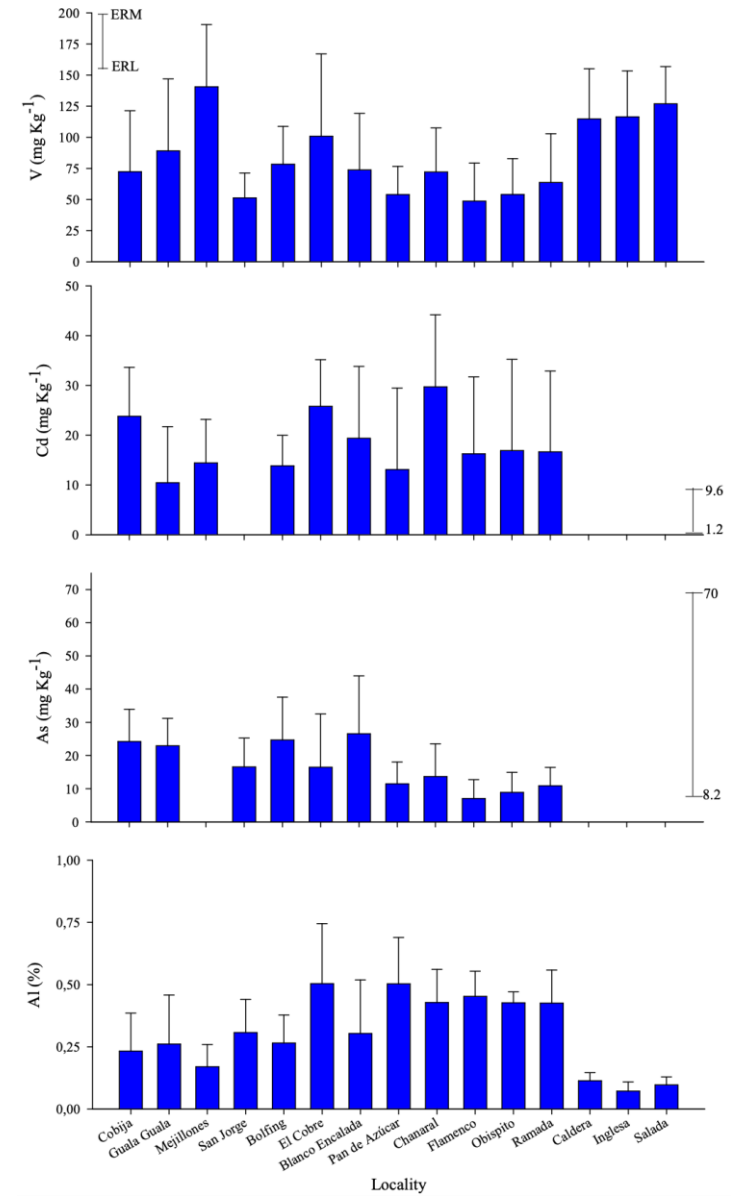
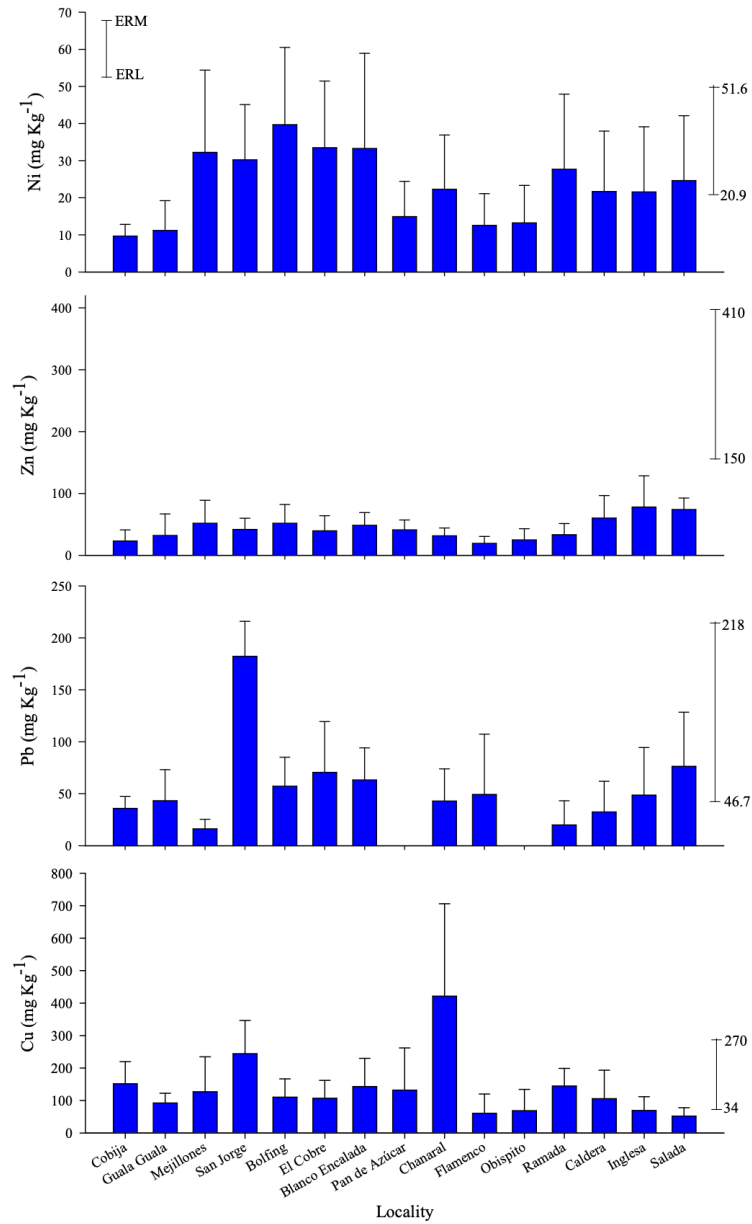


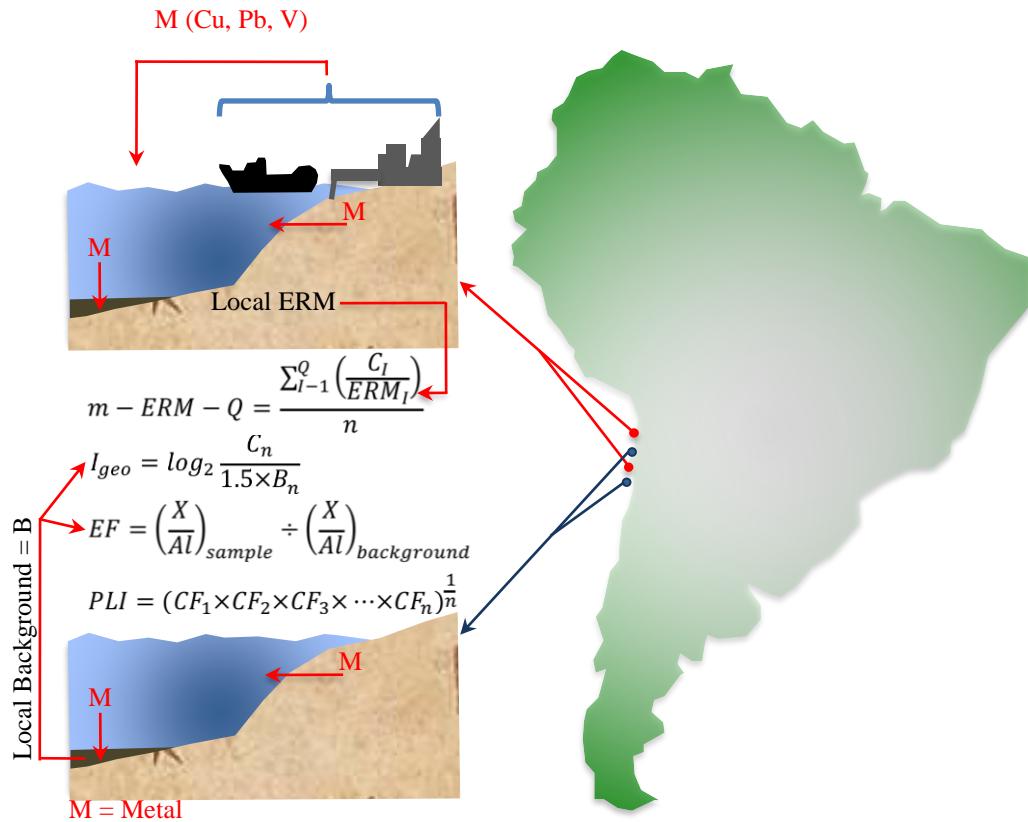


Información de metales en el norte de Chile









Factores de variabilidad

Fuentes locales/remotas

Geología local

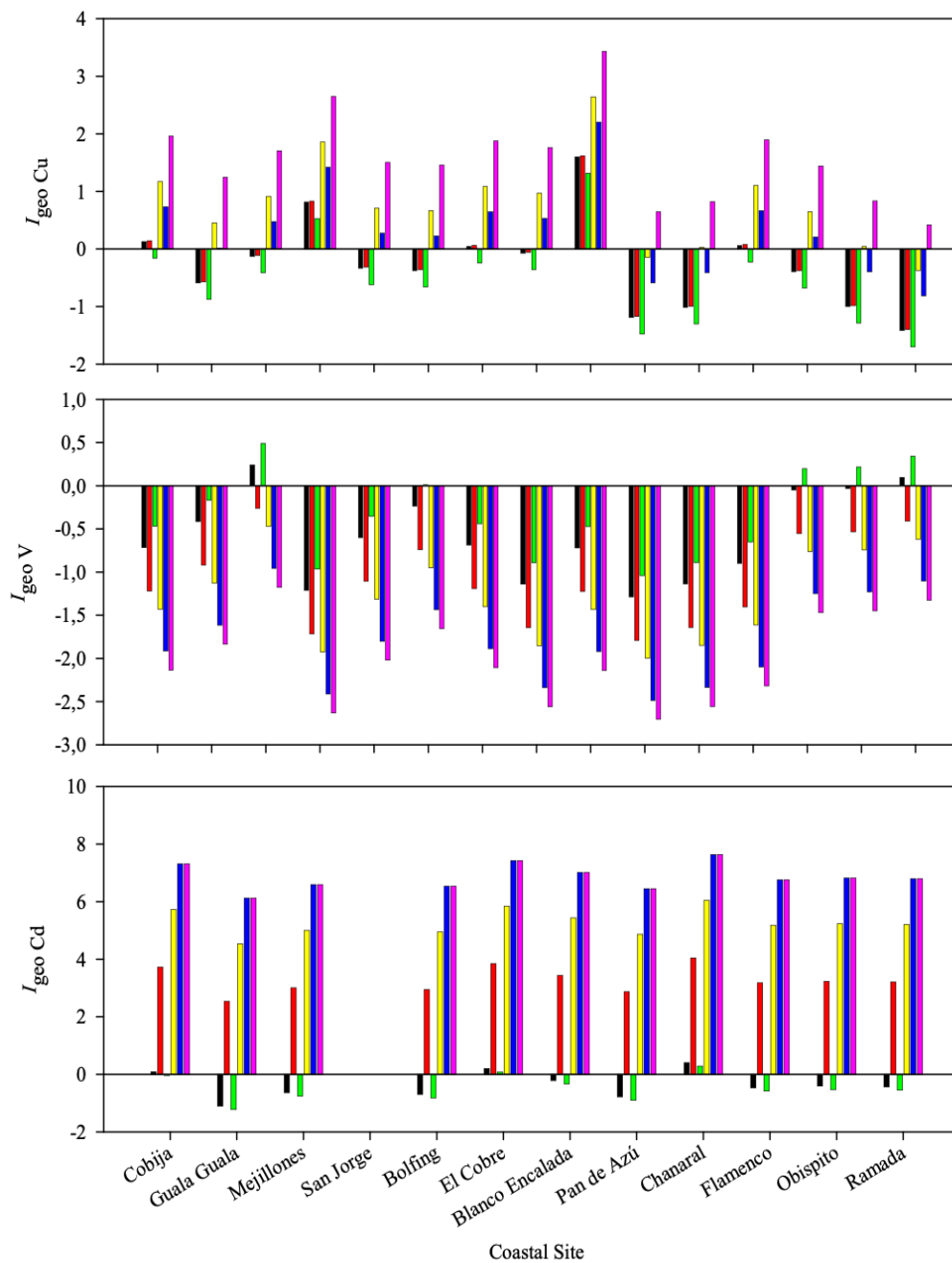
Hidrodinámica

Etc.



$$I_{geo} = \log_2 \frac{C_n}{1.5 \cdot B_n}$$

Igeo Class	Igeo value	Contamination level
0	$I_{geo} \leq 0$	Uncontaminated
1	$0 < I_{geo} < 1$	Uncontaminated/moderately contaminated
2	$1 < I_{geo} < 2$	Moderately contaminated
3	$2 < I_{geo} < 3$	Moderately/strongly contaminated
4	$3 < I_{geo} < 4$	Strongly contaminated
5	$4 < I_{geo} < 5$	Strongly/extremely contaminated
6	$5 < I_{geo}$	Extremely contaminated



Background values ¹

■ Aeolian dust

■ CENMA, 2014 ²

■ Uncontaminated bays ³

■ Turekian & Wedepohl, 1961 ⁴

■ Jurassic intrusive rocks ⁵

■ Jurassic volcanic rocks ⁶

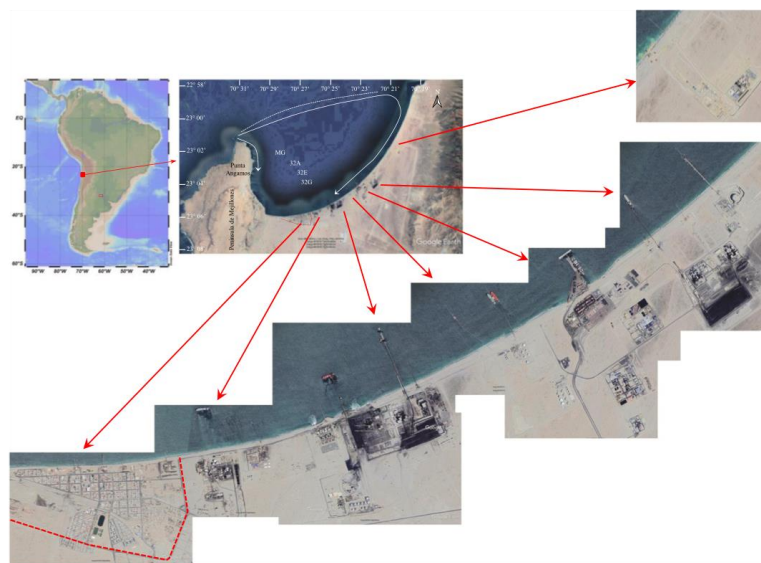
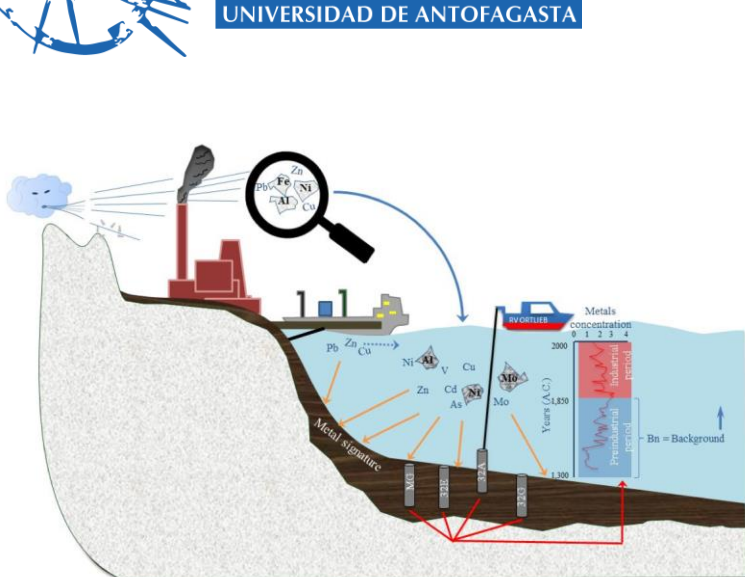


Fig. 1. Mejillones bay (~23° S), in the coastal zone of Atacama Desert. Composite picture of the human occupation of the bay's littoral (source: Google Earth Pro, altitude of 2.2 km). The red dashed line indicates the location of the residential zone. Sediment core sampling location are also indicated. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

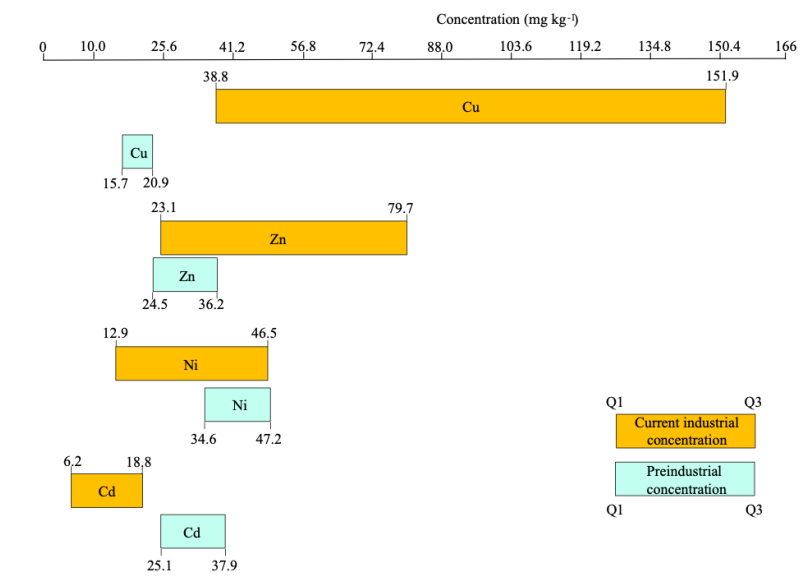
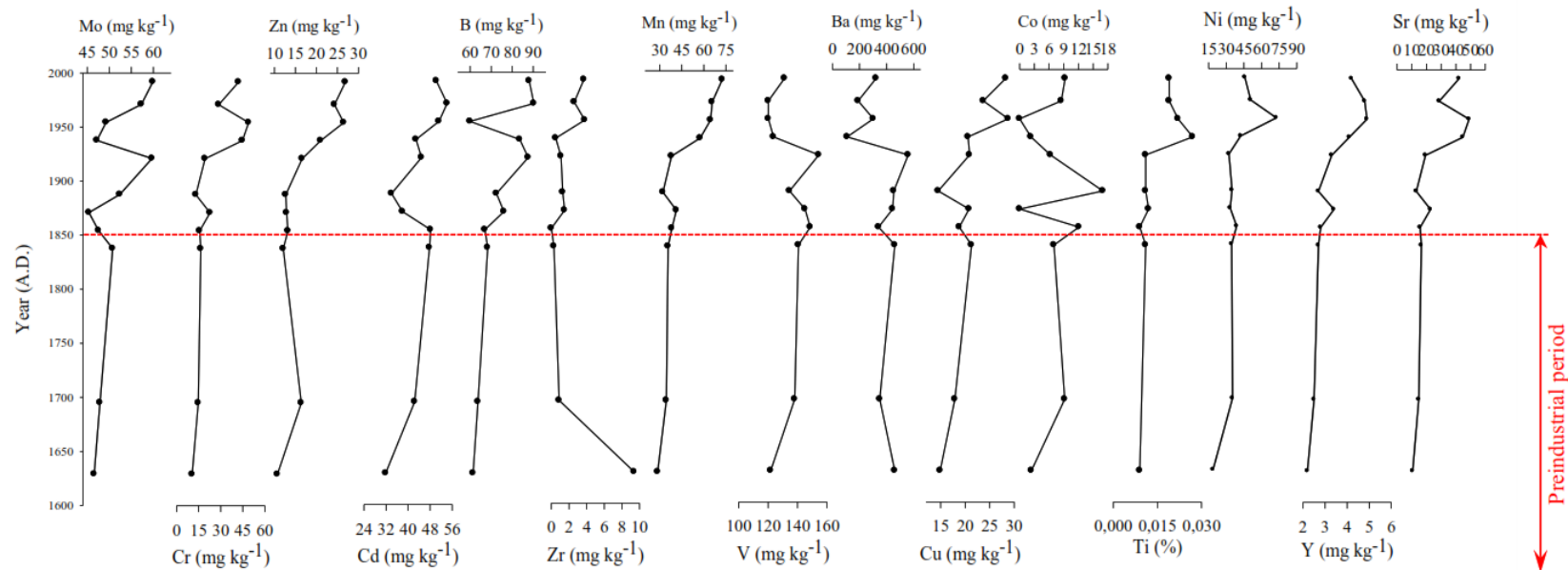
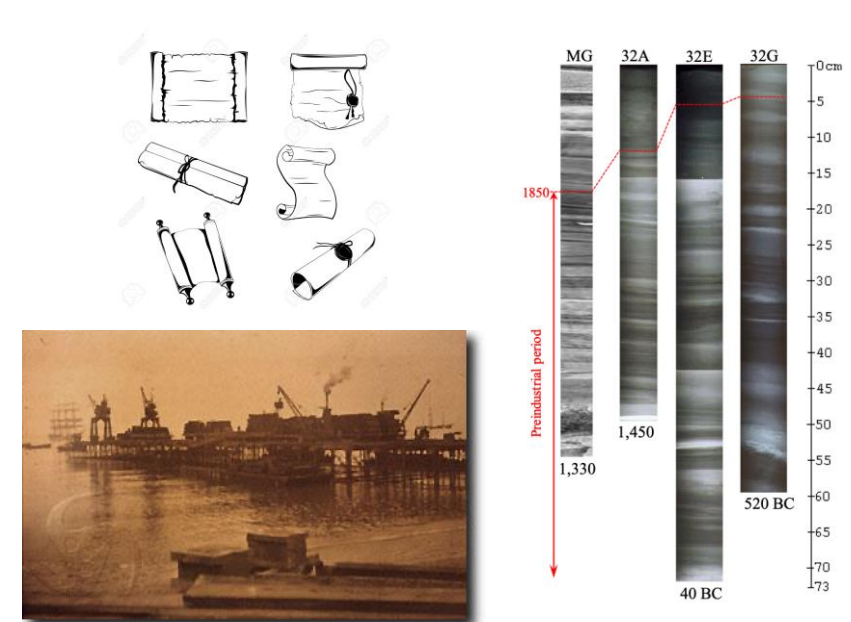


Fig. 3. Distribution of metal concentrations along the 32A sediment core. Preindustrial period is highlighted.

8. Schematic representation of the distribution of some metal concentration along the preindustrial period compared with industrial concentrations measured in ice sediments reported by Valdés (2012). Q₁ and Q₃ are Quartile 1 and Quartile 3, respectively. According to this approach, Quartile 3 could be considered as the ground value (see details in Methodology).



Variabilidad espacial

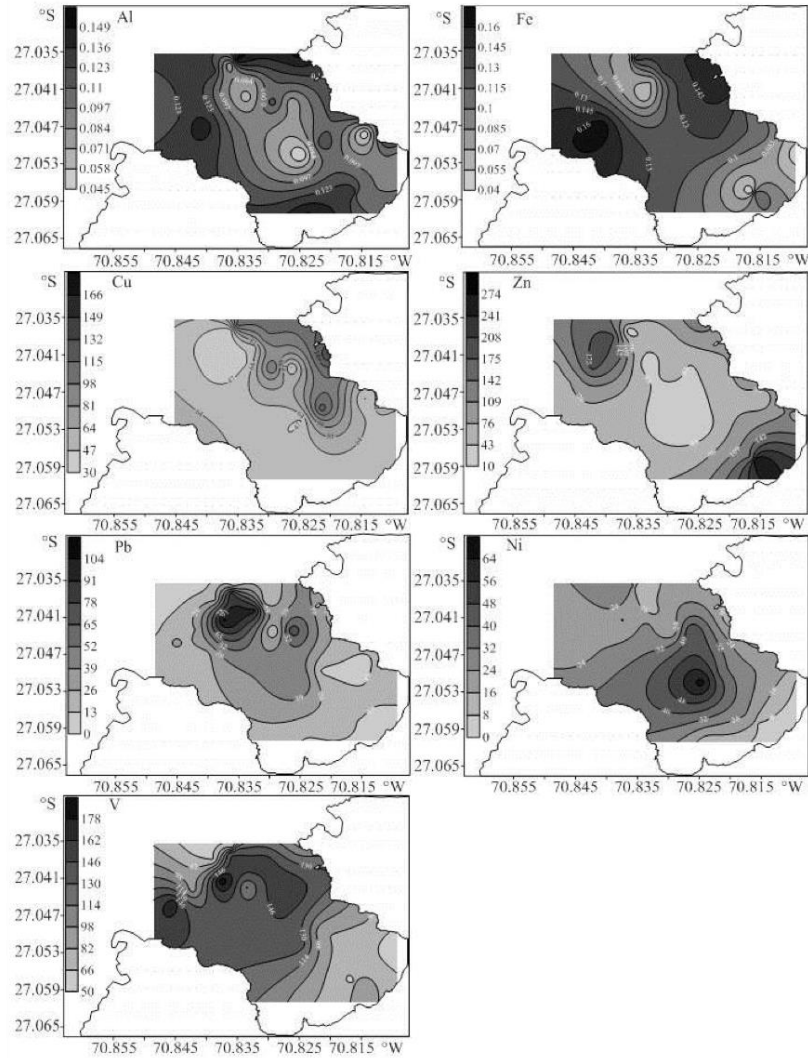


Figura 3. Mapa de distribución de metales en sedimentos superficiales de bahía Caldera. Concentración en mg kg^{-1} excepto para Al y Fe que están en porcentaje (%).

Valdés & Castillo. (2014)

Environ Monit Assess (2012) 184:5283–5294

5287

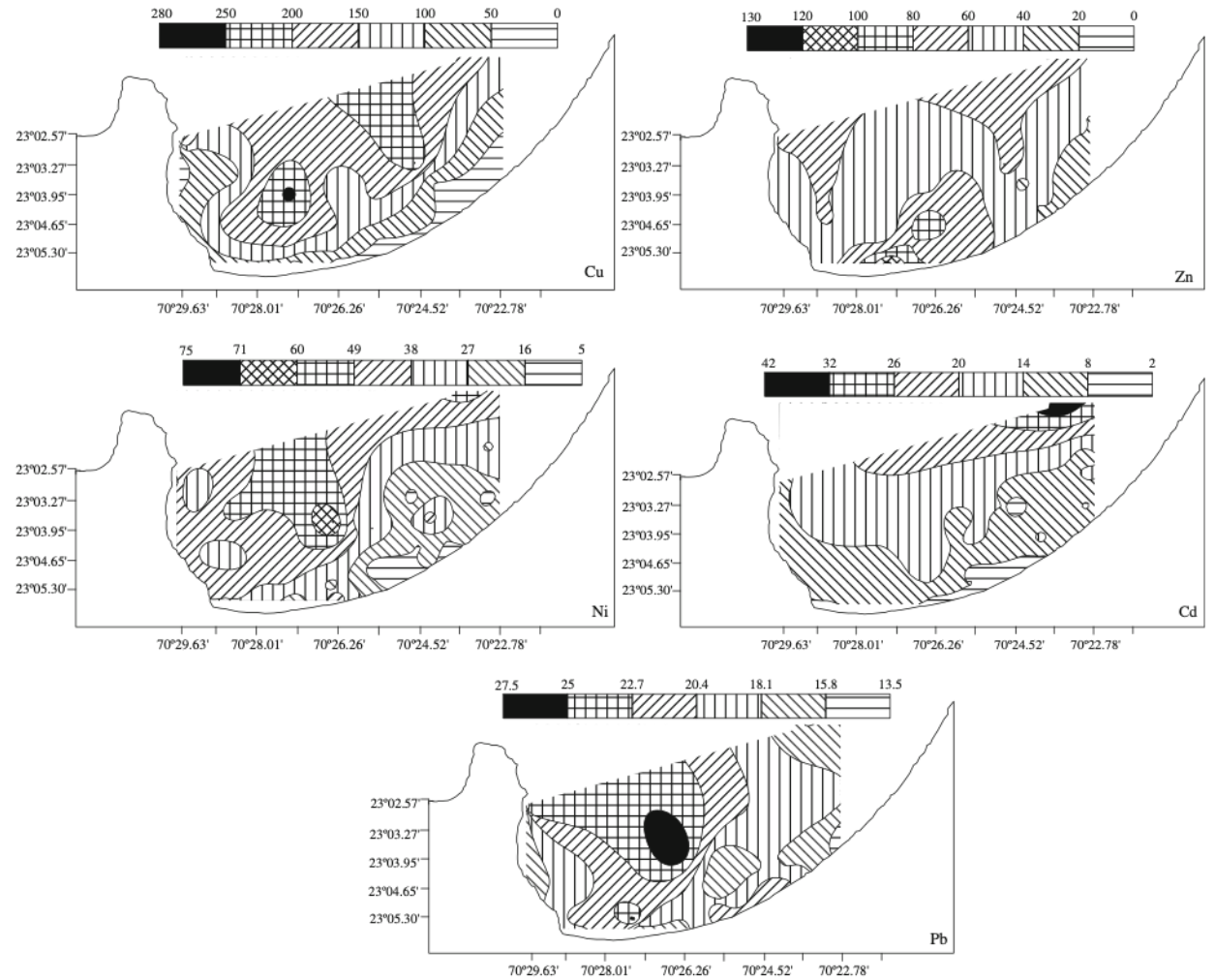


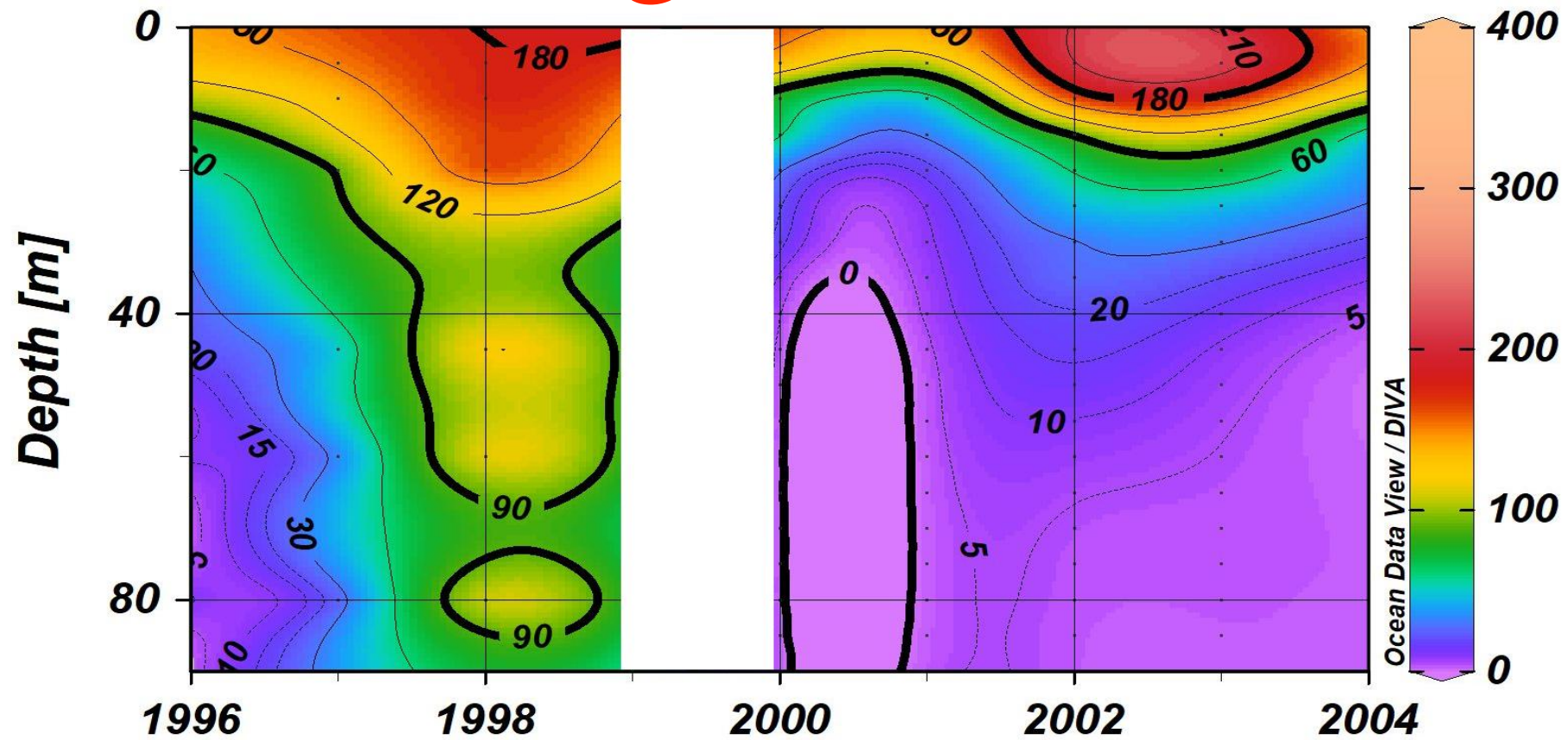
Fig. 3 Spatial distribution of metals in surface sediments of Mejillones Bay; concentrations in mg kg^{-1}

Valdés (2012)



Variabilidad temporal

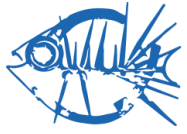
¿.....?





CONCLUSIONES

- **Trabajar de forma conjunta entre todos los organismos técnicos y científicos.**
- **Evaluar la calidad de la información respecto de la forma en que fue generada.**
- **Evaluar la factibilidad de comparar información ambiental de diferentes fuentes.**
- **Establecer los niveles preindustriales de las variables ambientales.**
- **Aumentar la resolución espacial de la información ambiental.**
- **Aumentar la resolución temporal de la información ambiental.**



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