Temporal evolution of toxic trace elements in common dolphins from the bay of biscay and English channel

Méndez-Fernandez P, Spitz J, Dars C, Dabin W, Mahfouz C, André JM, Chouvelon T, Authier M, Caurant F
Context

Chemical contamination secondary pressure

Contamination monitoring since 2017
Mostly male adults

### Sampling

<table>
<thead>
<tr>
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<th>Hg &amp; Cd</th>
<th>Pb</th>
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</thead>
<tbody>
<tr>
<td>n</td>
<td>201</td>
<td>96</td>
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</tbody>
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Bay of Biscay and English Channel

Mostly male adults

English Channel

Bay of Biscay
Dynamic linear model (DLM) & WAIC selection

Complet model:

\[ \text{Log [element]} \sim \text{Year} + \text{Age} + \text{Sex} + \delta^{13}\text{C or } \delta^{15}\text{N} \]

Data and code to reproduce the analyses are available at https://gitlab.univ-lr.fr/pelaverse/pelaMSFD
Results

Concentration in µg/g of dry weight

Cadmium (Cd)

Mercury (Hg)

Lead (Pb)

Raw data

Cadmium (Cd):

Mean = 7,40 + 8,87

Mercury (Hg):

Mean = 37,4 + 40,6

Lead (Pb):

Mean = 0,070 + 0,040
Results

Concentration in µg/g of dry weight

Cadmium (Cd)

Mercury (Hg)

Lead (Pb)

p-value < 0.005
0.427 µg/g/year

p-value < 0.005
1.96 µg/g/year

p-value > 0.005
- 0.001 µg/g/year
Results

Concentration in µg/g of dry weight

Cadmium (Cd)  Mercury (Hg)  Lead (Pb)

Log[Hg] ~ year + sex + age + δ¹³C

Log[Cd] ~ year + sex + age + δ¹⁵N

Log [Pb] ~ year + sex + age + δ¹⁵N
- Decrease of Pb concentrations in accordance with bibliography and lead gasoline ban at the end of 1990s in the EU

- For Hg and Cd there is less clear trends worldwide and highly depending on species, latitudes and oceans
  
  - What about Hg detoxification through Se?
Conclusion

- We observed an increase for Hg and Cd concentrations in common dolphins in last 18 years, but also an effect of ecological factors reflecting the complexity to properly assess the contamination exposure of biota and the need to also monitor changes in prey or in foraging areas.

- For Hg, despite that in theory there is a low risk for toxicity, we recommend to continue monitoring Hg in tandem with Se:Hg ratios in order to develop a more accurate indicator of what these concentrations mean in terms of compromising cetacean health.
Thank you!

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