

## PCBs still sticking around

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Due to their ability to accumulate in fatty tissues, persistent organic pollutants (POPs) are an issue of growing environmental concern (Jones & de Voogt, 1999). Although long-term monitoring programs have been initiated to quantify marine POP concentrations, the data collected are often scattered in space and time, hampering a thorough environmental risk assessment of these chemicals (Lohmann *et al.*, 2007). In this paper, we used generalized additive mixed models (GAMMs) to predict spatiotemporal trends of POP concentrations from a fragmentary dataset. Using this method, trends were extracted from a large, but incomplete set ( $n = 1833$ ) of polychlorinated biphenyl (PCB) concentrations measured between 1991 and 2010 in the sediment of the Belgian Continental Zone (BCZ) and the Western Scheldt Estuary. A model including time (year and month) and geographical area, periodicity and the octanol-organic carbon partitioning coefficient (Koc) as predictor variables explained 47% of the observed variability. The inferred spatiotemporal time trends indicated that the concentrations in 1991 were on average two to four times higher than today ( $0.56 \pm 0.46\text{ng/g}$ ), which is a similar decrease compared to other coastal and estuarine regions (Webster *et al.*, 2011). However, in the Scheldt Estuary, PCB concentrations were five times higher than in the BCZ and did not show this decrease but instead remained stable around  $2.79 \pm 3.99\text{ng/g}$ . These results demonstrate that international efforts to cut down emissions of persistent and toxic POPs have been effective to reduce concentrations in open water ecosystems but had little to no effect in intensely urbanized areas. A possible explanation for this difference is the proximity of the Antwerp harbor suggesting that the most upstream parts of our study area may be subject to industrial inputs. Alternatively, the historically accumulated PCBs in the Western Scheldt Estuary sediment may currently function as a secondary source to the surface water and biota.

### References

Jones K.C. and P. de Voogt. 1999. Persistent organic pollutants (POPs): state of the science. *Environmental Pollution* 100:209-221.

Lohmann R., K. Breivik, J. Dachs and D. Muir. 2007. Global fate of POPs: Current and future research directions. *Environmental Pollution* 150:150-165.

Webster L., M. Russell, P. Walsham, L.A. Phillips, I. Hussy, G. Packer, E.J. Dalgarno and C.F. Moffat. 2011. An assessment of persistent organic pollutants in Scottish coastal and offshore marine environments. *Journal of Environmental Monitoring* 13:1288-1307.