Understanding the plastic cocktail using distributions

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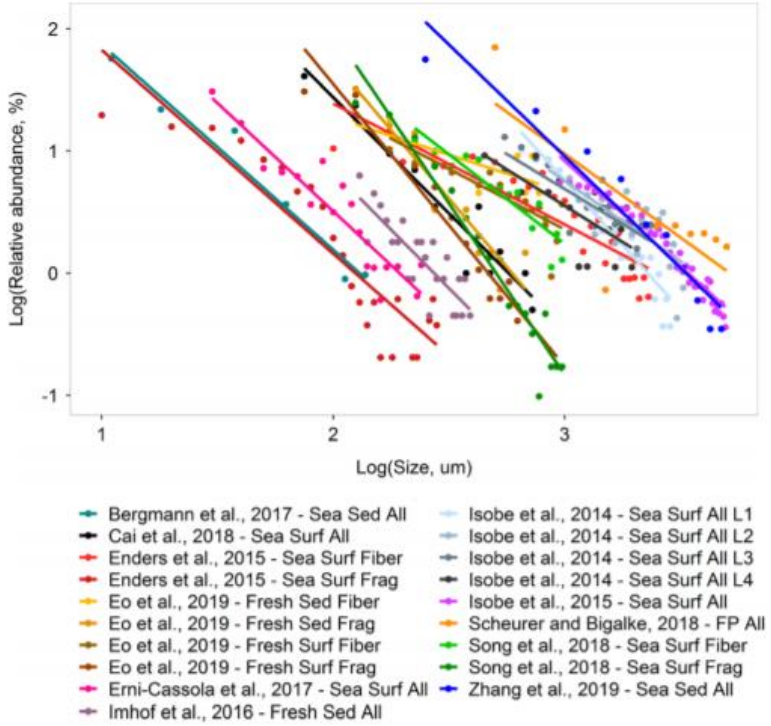
EGU

Size, shape and density of microplastics are continuous



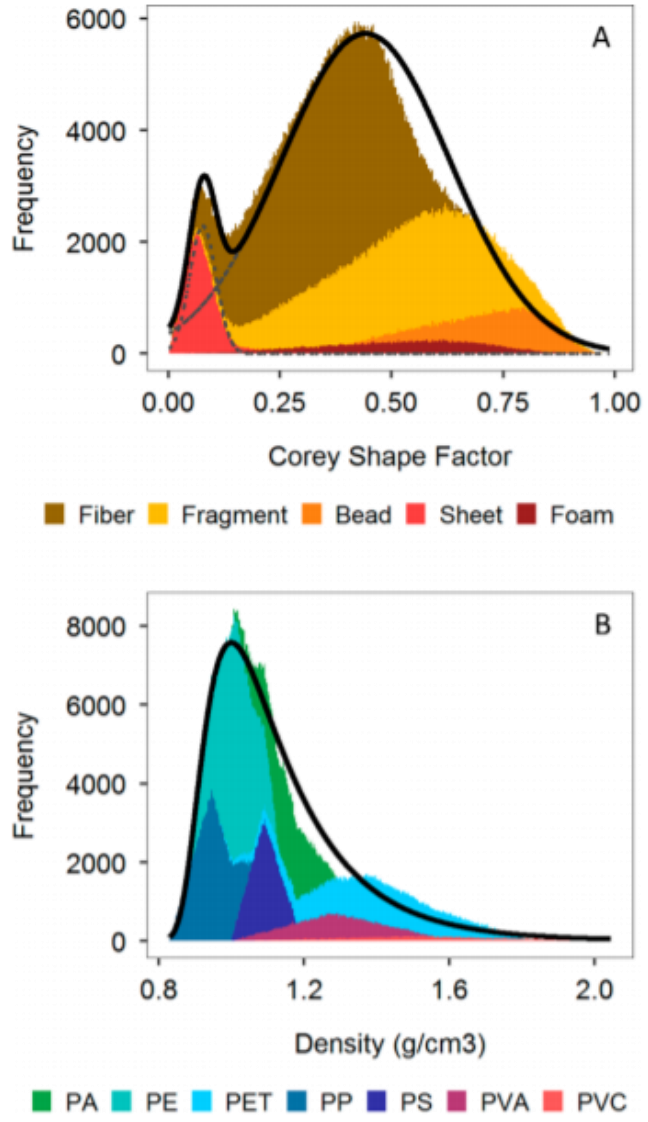
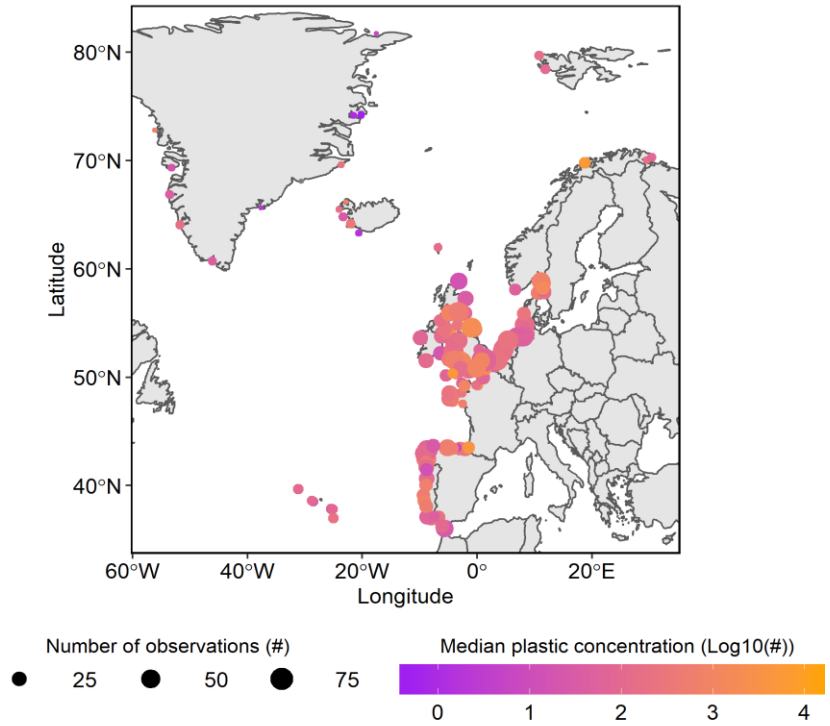


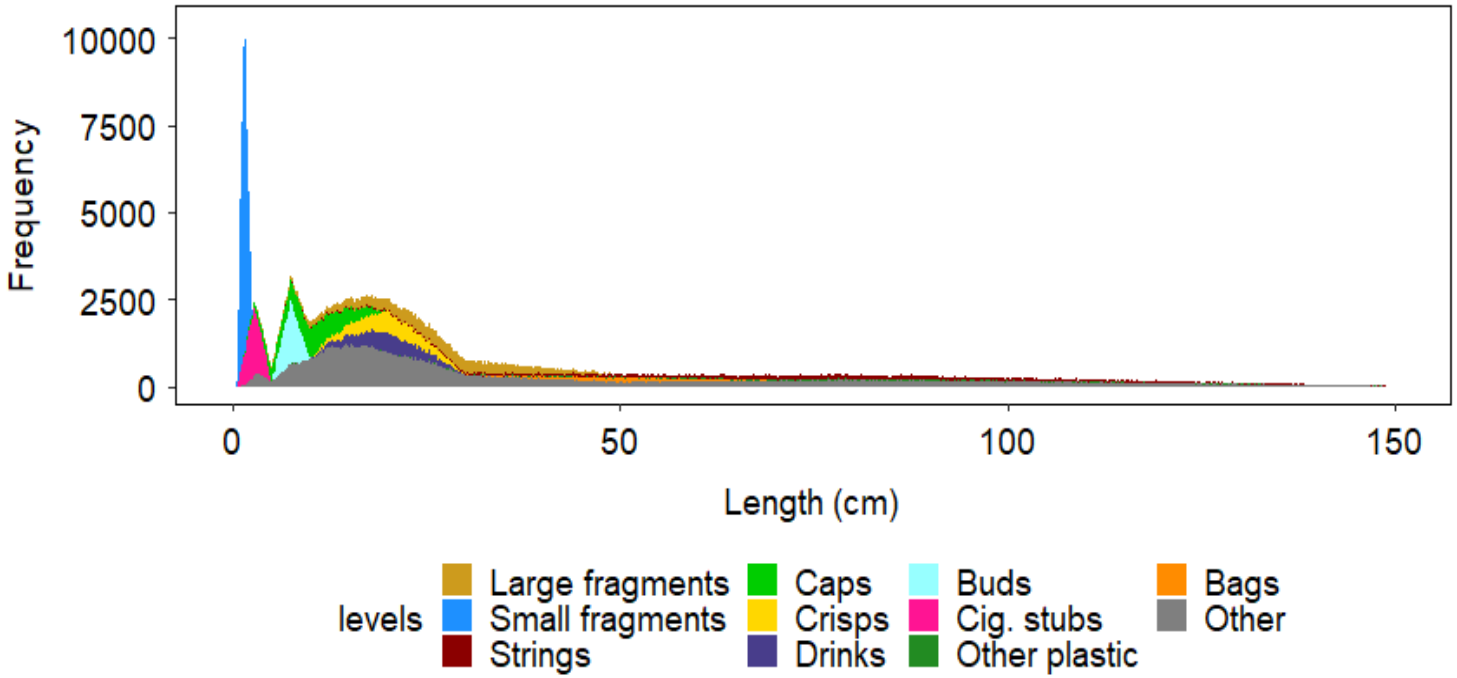
Figure 2. Distributions and fitted models for randomly generated data ($n = 10^6$). (A) Shape distribution of microplastic, expressed as Corey shape factor. A bimodal distribution was fitted through the data (solid line), which is the sum of two normal distributions (dotted lines). (B) Density distribution of microplastic, with a fitted normal-inverse Gaussian distribution (solid line).

Kooi, Merel, and Albert A. Koelmans. "Simplifying microplastic via continuous probability distributions for size, shape, and density." *Environmental Science & Technology Letters* 6.9 (2019): 551-557.

Macroplastic size distribution of OSPAR database

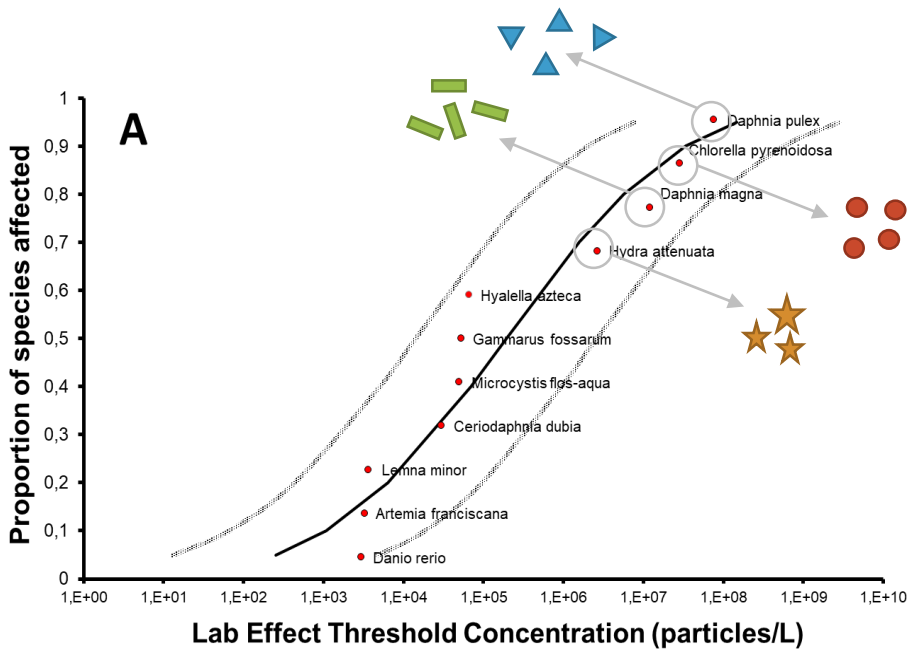


The OSPAR data from 2001 to 2017. The point size indicates the number of samples taken at a certain location, whereas the colour shows the log-transformed median concentration of the samples at each beach. In total, 168 beaches are included, with 3179 observations.

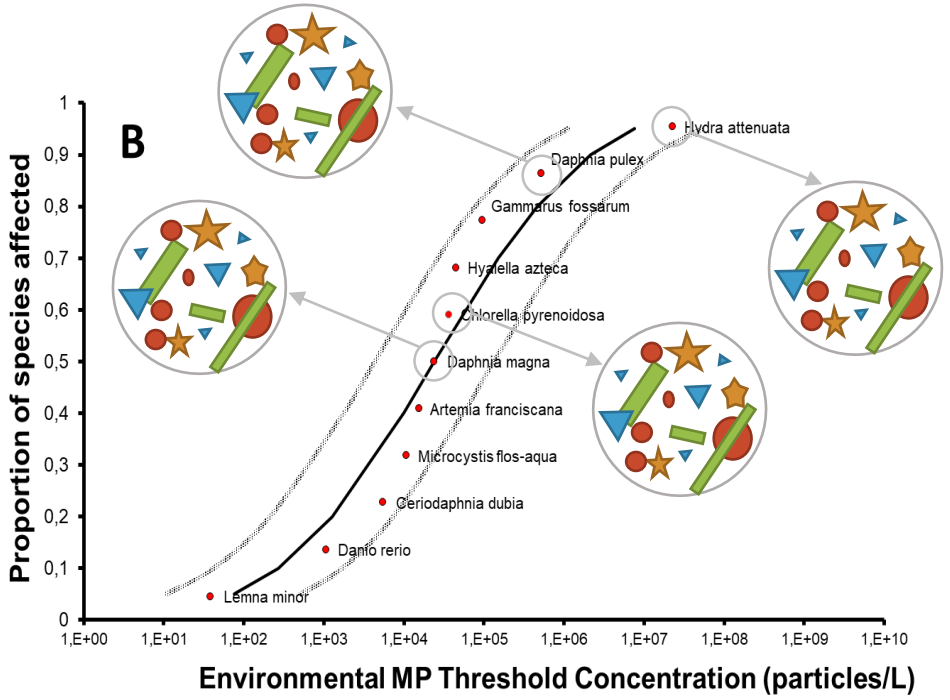


Size distribution for macroplastic beach litter, based on a Monte Carlo analyses (n = 1E6). The top 10 most abundant plastic types account for 64% of the total plastic amount, and have been colored individually, the other 65 plastic types are grouped as ‘Other’.

Risk of the microplastic mixture



An SSD for microplastics, where each species is tested for a different kind of plastic. This is common practice in plastic science, whereas you compare apples with oranges.



The same SSD for the **environmental plastic mixture**, where we corrected each effect threshold with a volume-based correction term to account for the whole microplastic spectrum (size, shape, density).

Solving the non-alignment of methods and approaches used in microplastic research in order to consistently characterize risk. Albert A. Koelmans, Paula Redondo-Hasselerharm, Nur Hazimah Mohamed Nor, Merel Kooi. In Prep.

Plastics are continuous

- Discrete classifications hamper our understanding
- Focus on the continuous properties of the material
- Applicable to monitoring, modelling, effect assays and risk assessments
- Compare studies independent of study design

So please report your findings in a (more) continuous way!

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