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# The seasonal cycle of micro and meso-plastics in surface waters in a coastal environment (Ría de Vigo, NW Spain)

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## Abstract

In this study, micro and mesoplastics were determined for the first time in seawater in Ría de Vigo (Spain) identifying their concentration, size, shape and polymer composition. Besides, temporal variations at an annual scale were also established.

The Ría de Vigo is well known for the important industry related to marine activities (fishing, mollusc culture, shipyards and tourism). Three sampling stations were selected along the transverse axis of Ría and were monthly sampled for one year. Seawater samples were collected using a manta trawl and analyzed with ATR-FTIR, and Raman spectroscopy to determine plastic polymer type.

32 samples were collected identifying 854 plastic particles; 677 macroplastics and 177 mesoplastics. The mean concentration across all sites was  $25.4 \pm 13.4$  items·km<sup>2</sup>. The microplastics abundance was greater than that of mesoplastics (79%, and 21%, respectively). Around 30% of plastics analyzed were Polyethylene (PE), 19% were acrylates, 18% were Polypropylene (PP) and 10% were Polystyrene (PS). The main shapes of both micro and mesoplastics were fibers followed by paint sheets being black the main colour in both cases. The results showed high seasonal variability for micro and mesoplastics but similar spatial distribution. This seasonal heterogeneity can have effects on a future monitoring program. Furthermore, it was demonstrated that pollution by mesoplastics cannot be estimated through the microplastics abundances.

**Keywords:** seawater, annual cycle

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