

MICROFIBERS IN THE MARINE ENVIRONMENT: DELTA DEL EBRO AS A CASE OF STUDY

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INTRODUCTION

Global fiber production is estimated to increase to 145 million metric tons by 2030. Microfibers (MF) have become the most abundant type of anthropogenic particulate matter in microplastic pollution studies.

This study shows the alarming presence and abundance of MF in the coastline of the Occidental Mediterranean. Such MF are pumped to the saltworks where seawater is evaporated until NaCl precipitates, thus enclosing MF in these commercial Table Salts.

SAMPLING AND LABORATORY PROTOCOL

Here we present the MF concentration in Surface water from 7 sampling points around a saltwork in Els Alfacs bay, Ebro Delta (NE Spain, Western Mediterranean Sea; Figure 1). Samples were collected using a kayak (Figure 2), which enabled sampling in shallow waters close to shore. Samples were collected under low wind conditions and against wind by sampling at one side of the kayak, thus aiming at minimizing contamination from clothes and sampling equipment.

The design of the laboratory protocol has been exhaustive, thought at all times to minimize or avoid contamination during all the process. The protocol used has been designed based on the experience gathered in Schymansky et al. (2021).

A total of 2.5L of 14 samples were filtrated and processed for post-characterization. Salty solutions were filtered (0.45µm pore membrane filters) in a laminar Flow cabinet. The filters were stored in clean Petri slides. The number of MF at each Petri slide was counted by means of a binocular magnifier. In addition, the color of all MF was identified and quantified, choosing a simplified list of colors after Marti et al. (2020).



Figure 2. University student collecting and processing the samples.

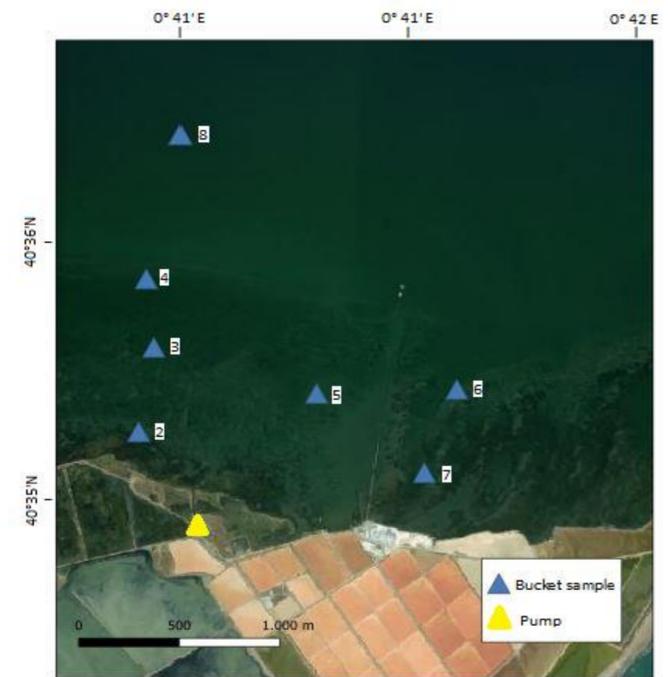


Figure 1. Geological location of the studied area (Alfacs bay, Ebro Delta, NE Spain).

RESULTS

The contribution of MF contamination during laboratory processing has been quantified in only 3.6 MF per sample as average. Thus, MF concentration in seawater oscillates from 6.9 to 154.7 MF/L (Figure 3). Sampling points near to the saltwork have the higher concentration in MF, and are up to one order of magnitude greater than other studies (e.g. Suaria et al. 2020). Such values may be directly related to anthropic pollution from the closest coastal villages.

The most predominant colors found in the samples were *Black* and *White/Transparent*, with over 23.3%-71.4% and 5%-41.7% respectively. Followed by other relevant colors as *Blue*, *Green* and *Red*.

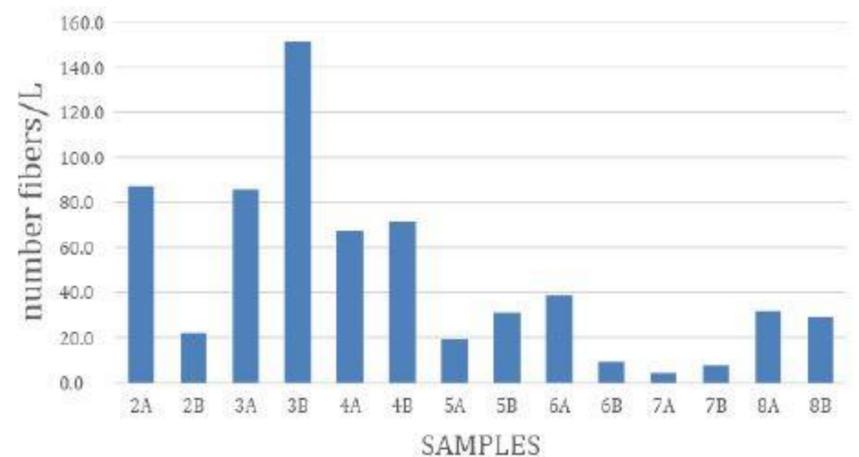


Figure 3. Concentration of microfibers per liter found in each sample.

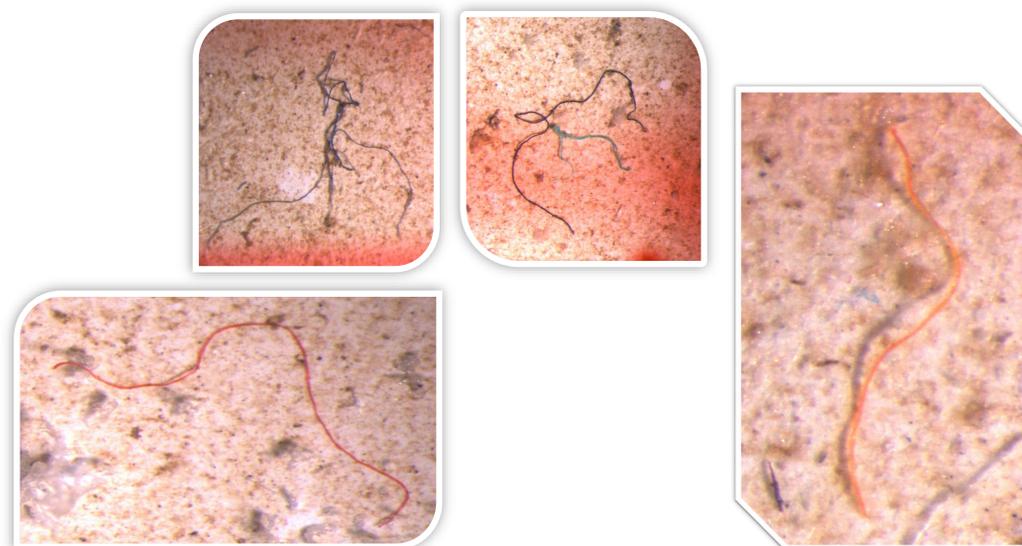


Figure 4. Photomicrographs of *Blue*, *Black*, *Green*, *Red* and *Orange* MF found in the samples.

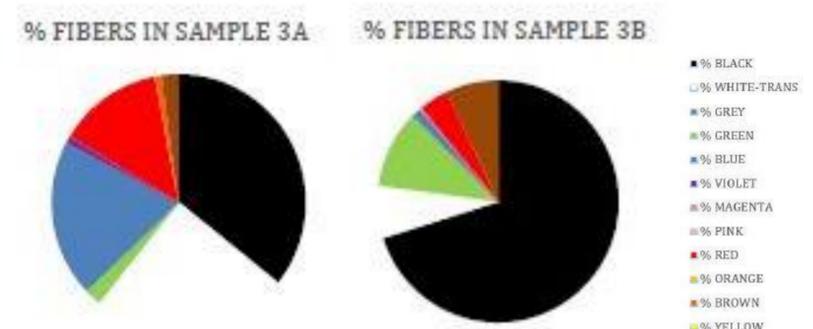


Figure 5. Percentages of each color found in the samples with the highest concentrations.

CONCLUSIONS

To date only little information is provided on the concentrations and properties of MF in shallow waters near populated areas. This study has focused on the visual analysis of the MF in Els Alfacs Bay (NW Mediterranean Sea). Our results show high concentrations of MF (i.e. up to one order of magnitude higher than other studies) deposited on the sea surface, which may be related to proximity to urbanized areas and shifting wind regimes (e.g. westerlies) transporting MF to the study area. Low circulation of surface waters in the Bay may also play a role.

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