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All that glitters is not plastic: the case of open-ocean fibres

Giuseppe Suaria[1], Aikaterini Achtypi[1], Vonica Perold[2], Stefano Aliani[1], Andrea Pierucci[3], Jasmine Lee[4], and Peter Ryan[2]

[1]Consiglio Nazionale delle Ricerche, Istituto di Scienze Marine, Italy (giuseppe.suaria@sp.ismar.cnr.it)
[2]FitzPatrick Institute, University of Cape Town, Rondebosch, 7701, South Africa
[3]Department of Life and Environmental Sciences, Universita' di Cagliari, 09126, Italy
[4]School of Biological Sciences, Monash University, Clayton, Victoria 3800, Australia

Textile fibres are ubiquitous contaminants of emerging concern. Traditionally ascribed to the 'microplastics' family, their widespread occurrence in the natural environment is commonly reported in plastic pollution studies, with the misleading belief that they largely derive from wear and tear of synthetic fabrics. Their synthetic nature has been largely used to motivate their persistence in the environment, thus explaining their presence in virtually all compartments of the planet, including sea-ice, deep-seas, soils, atmospheric fall-out, foods and drinks. As of today however, an extensive characterization of their polymeric composition has never been performed, even though the evidence that most of these fibres are not synthetic, is slowly emerging. By compiling a dataset of more than 916 seawater samples collected in six different ocean basins, we confirm that microfibres are ubiquitous in the world seas, but mainly composed of natural polymers. The chemical characterization of almost 2000 fibres through μFTIR techniques revealed that in striking contrast to global production patterns, only 8.2% of marine fibres are actually synthetic, with the rest being predominantly of animal (12.3%) or vegetal origin (79.5%). These results demonstrate the widespread occurrence of cellulosic fibres in the marine environment, emphasizing the need for full chemical identification of these particles, before classifying them as microplastics. On the basis of our findings it appears critical to assess origins, impacts and degradation times of cellulosic fibers in the marine environment, as well as to assess the wider implications of a global overestimation of microplastic loads in natural ecosystems.