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Microplastics in the Sea Surface Microlayer in Southampton Water, UK

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Previous work has shown that microplastics may preferentially accumulate in the sea-surface microlayer (SML) over surface water immediately below this (the sea surface microlayer is defined here as the upper 100 μm of the ocean). However, estuaries remain understudied in terms of the abundance of microplastics within this layer, and indeed throughout the estuarine water column. The accumulation of microplastics in the sea surface microlayer poses a potential risk to phytoplankton and other inhabitants of this layer. Additionally, the impacts of the SML in terms of trapping and dispersing microplastics remains poorly understood.
Our earlier work has shown an increased concentration of microfibres in the sea surface microlayer around Southampton Water (up to 93 microfibres/l, vs. < 5 microfibres/l in bulk near-surface water samples, Anderson et al., 2018). As such, it was decided to expand this sampling temporally, and investigate the role of the sea surface microlayer in the inwashing and trapping of microplastics in the upper intertidal zone, specifically in salt marshes. This sampling used a novel and rapid method (glass plate sampling) from Anderson et al. (2018) to investigate how SML microplastic abundance varies in a salt marsh creek on the western side of Southampton Water (Hythe, Hampshire) over two tidal cycles. Additional bulk water samples were taken simultaneously at 5 cm depth.
Samples were taken every fifteen minutes over the rising and falling tide, with additional samples at high water stand. This relatively high-resolution sampling allows assessment of microplastic in-wash and out-flow from the salt marsh, and its relationship with tidal state and suspended sediment concentrations, over spring and neap tides. Data are used to assess the importance of the SML as a transfer pathway for MPs into the upper intertidal zone, and the role of salt marshes as a sink or “filter” for MPs in estuarine systems.