

How are microplastics incorporated in fluvial sedimentary structures

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It's predicted there will be ~1.3 billion-tonnes of microplastics (MPs) in the environment by 2040, with rivers transporting 95% into the ocean; this is much higher than previously thought. MPs pose a threat to aquatic ecosystems and could become part of the sedimentary record. Current research into MPs in river environments concentrates on calculating flux, through river flow and flooding but not the migration or storage potential of MPs. Without flume experiments to model the movement and storage of MPs within fluvial bedforms it's impossible to understand the legacy of plastic pollution.

Flume experiments were run in a 0.5*0.5*8m flume with experiment using 0.4mm sand seeded with fragments and pellets at low and high flow rates. Data was collected via photography and videos. At the end of each flume run aerial photography was taken to model the bedforms. Cores were taken within the photographed area to assess where MPs sit within the bedforms.

The rate of bedform and MP migration varies between the runs due to flow speed as expected. The fragments migrate slower than the pellets while moving downstream. MPs that sit in front of the bedform allow bedforms to migrate over them, after this MPs either stay within the sand-bed or are pulled into the water flow and move downstream irrespective of the bedform. Where this doesn't happen, the MPs roll over longitudinal-like ripples. These results further our understanding of how MPs travel through fluvial sand-based systems like some of our largest rivers systems.