

Seminario “Dipartimento di Eccellenza”

## Microplastic distribution in river sediments: from a real case study to laboratory insights

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Rivers, by draining urban regions and industrial areas, serve as critical pathways for transporting microplastics from land to oceans. During this transport, microplastics interact with sediments, potentially accumulating in alluvial deposits where they further fragment and release contaminants. Despite the significance of these processes, the mechanisms governing microplastic transport and deposition in rivers have rarely been examined according to fluvial sedimentology principles. To address this gap, we analysed deposits accumulated on alternate bars of the Arno River (Tuscany, Italy) following two major flood events.

Three distinct deposit types were sampled: i) plant debris, ii) clastic suspended deposits, and iii) bedload deposits. Our findings reveal that microplastics are easily trapped by floating plant debris and can also accumulate on bar tops and along riverbanks. Sand can incorporate microplastics during tractional flow and in the waning flood stages, while gravel efficiently traps them during recessional floods as water infiltrates and deposits suspended particles between clasts. Building on these results, laboratory flume experiments were conducted to investigate further the mechanisms behind microplastic-sediment interactions. The experiments focused on how these processes control microplastic trapping in riverine deposits both under settling and tractional conditions.