Macroplastic concentrations in the water column of rivers increase with higher discharge

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Riverine macroplastic pollution (>0.5 cm) negatively impacts ecosystems and human livelihoods. Monitoring data are crucial for understanding this issue and designing effective interventions. Macroplastic pollution floating on the river surface and plastic deposited on riverbanks are studied relatively often. Data on riverine plastics in the water column remain scarce. In this study we utilize trawl nets at different depths to sample plastic pollution in the water column at the entry point of the river Rhine to the Netherlands. We show that plastic concentrations in the water column increased during higher discharge. The combination of higher macroplastic concentrations and higher discharge leads to considerably higher plastic transport during high discharge events. Moreover, the results indicate that the vertical distribution of macroplastic pollution changes during different flow conditions. Significantly higher concentrations of macroplastic can be seen near the riverbed during low discharge conditions, while no significant differences in concentration are observed between the bottom, middle and surface samples during high discharge conditions. These findings provide first insights into the key role of hydrology in explaining macroplastic transport in the water column. These insights can be used to improve future monitoring and intervention strategies.