Microplastic and microfiber pollution in the Classical Karst Region. Springs and caves preliminary assessment

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Microplastic and microfiber pollution in the Classical Karst Region. Springs and caves preliminary assessment

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Research on microplastic (MP) and microfiber (MF) pollution in karst areas is still at the early stages. The Classical Karst Region hosts different protected habitats and species, including numerous stygobionts, such as the *Proteus anguinus*. However, existing regulations often fail to consider the ecological connections between different habitats. In this preliminary study, we collected and investigated several submerged sediment and water samples from both surface (springs) and subterranean (caves) aquatic environments of this Region. Detected MPs and MFs (5-0.1 mm) were quantified and characterized by size, shape, and color via visual identification under a microscope, with and without UV light. Spectroscopic analyses were conducted on selected particles to determine their chemical composition. All examined samples contained significant amounts of MPs and MFs. Most MPs and MFs were smaller than 1 mm and abundances increased with the decrease of the considered size. Over 70% of MPs and MFs exhibited fluorescence under UV light, predominantly with a blue hue. Fluorescent MPs and MFs were mainly transparent, while non-fluorescent ones were especially dark. Samples contained especially polyesters and copolymers. Of the analyzed MFs only 10-15% were synthetic. Of the natural and regenerated MFs, the major part was cotton. MPs and MFs pose a threat to ecosystems and water resources. Vulnerable species hosted in these habitats could assimilate them with potentially negative consequences for subterranean water safety at all the levels, such as ecological functionality, biodiversity distribution, ecosystem services and human health. Our findings confirm the presence of MPs and MFs in all examined aquatic environments, contributing to a better understanding of micro-pollutant contamination, and providing valuable insights for future research. MPs and MFs pollution monitoring in karst areas must be prioritized to support habitat conservation, species protection and water resources management, taking into account the ecological interconnections between surface and subterranean habitats.