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ABSTRACT BOOK

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The Geoscience paradigm:
resources, risks and future perspectives



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COVER IMAGE:

Pillow-lavas and pillow-breccias covered by red-green radiolarian cherts and reddish marly limestones (Middle-Upper Jurassic) in the Timpa delle Murge ophiolitic sequence (Pollino Massif, Basilicata) (Photo courtesy of G. Prosser).

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New threats in the Trieste Karst (Italy): pollution by microplastics in groundwaters and springs

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Microplastic (MP) pollution in karst systems is still poorly studied, especially in underground environments and aquifers, despite groundwater in karst aquifers constitutes about a quarter of the global drinking water sources. In this preliminary study we collected and investigated different water samples from the Trieste Karst, Italy, considering three caves and a spring.

MPs were subjected to organic matter removal with 1:1 30% hydrogen peroxide solution and extracted from water samples by filtration. MPs on filters were counted and characterized by size, color and shape via visual identification under a microscope, with and without UV light, exploiting fluorescence given by fluorescent whitening additives contained in plastic materials. Finally, spectroscopic analyses were carried out on random particles observed on each filter.

The concentration of MPs in cave waters varied from 47.2 to 96 items/L, with a mean value of 75.3 items/L, instead, in the water of the spring it was of 50.9 items/L. Fibre represented the most abundant shape (68.8%), followed by fragment (26.8%), bead (pellet and sphere) (2.3%), film (1.8%) and foam (0.3%). Most MPs (79.6%) were smaller than 1 mm. The majority of the MPs were fluorescent under UV light (65%) and have 69.4% blue fluorescence, 17.7% green fluorescence, 6.4% red fluorescence and 6.9 % other colours. Most of fluorescent particles were transparent (57.4%). However, black (48.3%) and blue (23.0%) microplastics were more common among the non-fluorescent ones.

Our results highlight the presence of MPs in spring and cave waters of the Trieste Karst and provide useful information for future research. Karst aquifers are open systems, subjected to possible contamination by surface pollutants. The examined area is crossed by highways, roads and railways, therefore, most of the particles found in water samples could come from these sources of pollution, transported by water and or air. MPs in karst systems can be consumed by animals, damage ecosystems and contaminate water resources, therefore, surface and underground environments should therefore be monitored and protected. Analyses on a greater range of surface and subterranean waters are required and karst areas conservation should become a priority for the management of water resources.