

EGU24 Press Release: Sink to source: Does what we put into our plumbing end up back in the water supply?

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When you see an advertisement for a detergent promising to brighten your clothes, something called a fluorescent whitening compound, or optical brightener, is probably involved. Such material absorbs UV light and emits visible blue light via fluorescence. The result? Brighter whites, vibrant colors. Yes, your clothes are glowing.

As it turns out, these brighteners can make their way into the water supply. Luka Vucinic, a lecturer and environmental engineer at Glasgow Caledonian University in London, considers the problem of pollutants like fluorescent whitening compounds, microplastics, and other indicators of fecal contamination in karst aquifers, and will present his team's findings next week during the European Geosciences Union (EGU) General Assembly 2024.

When limestone and dolomite dissolve, they can form spectacular caves and sinkholes characteristic of a karst terrain. Karst aquifers can also feature interconnected fractures that create conduits that channel water. These aquifers are a major source of drinking water around the world. Unfortunately, they're also exceptionally vulnerable to pollution. Features that connect Earth's surface directly with an aquifer can funnel pollutants into water supplies.

Ireland relies heavily on karst groundwater, and also has more than 500,000 homes using on-site domestic wastewater treatment systems that process water from toilets, washing machines, showers and dishwashers. After a pitstop in a septic tank, the systems disperse wastewater into the ground. To obtain an integrated picture of what's going into—and coming out of—these karst aquifers, Vucinic and colleagues evaluated a range of contaminants emerging from springs.

In areas with large numbers of on-site domestic wastewater treatment systems within 200 meters of at least one direct pathway into the underlying aquifer, the team detected high concentrations of fluorescent whitening compounds and microplastics. When fluorescent whitening compounds, which definitely come from humans, and microplastics rise and fall together in water samples, that covariation indicates that microplastic contamination is probably coming from wastewater. Indeed, this is the first study to show such a link in samples from karst springs, Vucinic said.



Researchers who study other aquatic environments may be able to use the same approach to test for this link elsewhere. The methods used for detecting fluorescent whitening compounds are inexpensive and relatively easy to apply, Vucinic explained. "This could be especially attractive for monitoring human wastewater contamination of karst aquifers worldwide, especially in developing countries."

More Information

When reporting on this story, please mention the EGU General Assembly 2024, which is taking place from 14-19 April 2024. This poster will be presented in session [HS8.2.14](#) on Wednesday, 17 April, 16:45-16:55 CEST in Room 2.44. If reporting online, please include a link to the abstract:

<https://meetingorganizer.copernicus.org/EGU24/EGU24-11063.html>

Caption: [Household products like toothpaste and laundry detergents produce pollutants like microplastics and fluorescent whitening compounds \(FWCs\).](#)

Credit: Luka Vucinic

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More information

The European Geosciences Union (EGU) is Europe's premier geosciences union, dedicated to the pursuit of excellence in the Earth, planetary, and space sciences for the benefit of humanity, worldwide. It is a non-profit interdisciplinary learned association of scientists founded in 2002 with headquarters in Munich, Germany. The EGU publishes a number of diverse scientific journals, which use an innovative open access format, and organises a number of topical meetings, and education and outreach activities. Its annual General Assembly is the largest and most prominent European geosciences event, attracting over 18,000 scientists from all over the world. The meeting's sessions cover a wide range of topics, including volcanology, planetary exploration, the Earth's internal structure and atmosphere, climate, energy, and resources. The [EGU General Assembly 2024](#) is taking place in Vienna, Austria and online from 14-19 April 2024. For information and press registration, please click [here](#).



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