Michael Besmer wins Otto Jaag Water Protection Prize 2017

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Michael Besmer has been awarded the 2017 Otto Jaag Water Protection prize for his thesis on "Monitoring short-term dynamics of bacterial concentrations in natural and engineered aquatic ecosystems". The prize recognises excellent PhD theses and masters dissertations completed at ETH Zurich in the fields of water protection and hydrology. For his thesis, Michael Besmer developed a new analytical process in automated flow cytometry for use in the quality control of drinking water systems, which he put through a series tests and then successfully deployed.

Bacteria can have a detrimental effect on drinking water quality and infrastructure, and even endanger health. Proper microbiological monitoring of drinking water is therefore crucial for ensuring high-quality drinking water and an optimised and safe means of producing drinking water. Since changes in bacteria counts and the bacterial composition often occur within very small timescales ranging from seconds to days, they can only be recorded and monitored using new, high-resolution measurement techniques. Knowledge of such short-term microbiological dynamics plays an important role in gaining a better understanding of natural and technical aquatic ecosystems and being able to manage them effectively.

Quality assurance of drinking water in respect of microbial contamination has always been a time-consuming and inexact process until now. While working on his doctoral thesis within Frederik Hammes' research group, Michael Besmer developed a robotic system to undertake the sampling and fluorescent tagging of bacteria for flow cytometry. This opened up the possibility of monitoring with a high temporal resolution — at 15-minute intervals and in real time over periods of weeks and months. Michael deployed the new analysis methods in locations with widely differing boundary conditions — in karst springs, watercourses and distribution networks — in order to be able to systematically determine the possibilities and limitations of the techniques. This has enabled him to identify the processes that

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are responsible for variable concentrations of microorganisms in drinking water. His research demonstrates quantitatively how, for example, rainfall events or varying pump rates can increase levels of microorganism contamination.

Michael Besmer is now putting this innovation to practical use in a spin-off company, onCyt Microbiology, offering fully automated monitoring of bacteria concentrations in technical systems and advising clients who want to ascertain and understand the short-term bacterial composition dynamics in their systems.

Related Links

Spin-off onCyt

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