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Eawag Seminar Invitation

Karst groundwater resources and ecosystems – from a global and holistic perspective to current research in alpine karst systems

Speaker **Prof. Dr. Nico Goldscheider, Karlsruhe Institute of Technology – KIT, Germany**

When **February 24, 2022, 16:00 – 17:00, CET**

Where **Online via Zoom, contact seminars@eawag.ch for access details.**

Abstract Karst regions offer a variety of natural resources, such as freshwater for human use and unique ecosystems at the land surface and underground that are characterized by high biodiversity, including rare and endemic species. Therefore, karst systems require interdisciplinary research and a holistic approach to groundwater and ecosystem protection. Karst aquifers can be described as a network of drainage conduits, interacting with a matrix of fissured carbonate rock. Major challenges in the characterization and utilization of karst groundwater systems include their high degree of heterogeneity, vulnerability to contamination and variability of water availability and quality. According to our recently accomplished World Karst Aquifer Map (WOKAM), 15.2% of the global land surface consists of karst areas, and 1.18 billion people live on karst. About 40% of all karst areas occur in mountains, which also show higher recharge and less intense land use than surrounding lowlands and are, consequently, particularly important in terms of drinking water resources.

Interdisciplinary research on alpine karst hydrogeology is demonstrated by means of our long-term study site Hochifen-Gottesacker, Austro-German Alps. In this geologically-complex karst systems, fold structures control the underground drainage pattern, as revealed by numerous tracer tests. The first application of the continuous time random walk (CTRW) model to large-scale tracer tests made it possible to simulate the obtained long-tailed tracer breakthrough curves better than conventional approaches. The conceptual model of underground drainage was transferred into a hydraulic model that considers both the infiltration and storage function of the unsaturated zone and the conduit drainage network. The mode is able to simulate the discharge dynamics observed at three major karst springs. In the field of water quality, the application of novel monitoring techniques revealed new insights into the variability of fecal bacteria, organic carbon and suspended particles, which can be used as a basis for an early-warning system (EWS) for karst spring water contamination.