EXPERIMENTAL STUDY OF CONTAMINANT TRANSPORT IN THE UNSATURATED FRACTURED ROCK

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The purpose of the research was to study solute transport in the unsaturated zone of fractured rock. The main goal of the study was to determine the mechanism of solute (pollutants) transport, since fractured and karstified rocks are important aquifers in Slovenia. Better knowledge of the mechanism of pollutant transfer would enable us to determine vulnerability and protected areas for water resources. In-situ experiments were done on the experimental field site at Sinji Vrh in Slovenia, which consists of surface set-up and a research tunnel, 15 m below the surface. An agrometeorological station and injection boreholes were installed on the surface. A special construction (1,5 m long segments) for collecting water seeping from the ceiling of a research tunnel was developed. Holes for injecting the tracers were located on the basis of a precise cartography of discontinuities on the surface outcrops and within the research tunnel. The tracer experiments were made to obtain different paths of solutes and the distribution of residence time of the tracer. Laboratory experiments were performed in order to obtain sorption characteristics of tracers. The results of laboratory and in-situ experiments will be used in a transport model. Field experiments were performed in wet and dry time periods with the purpose of determining flow parameters depending on fractured rock saturation. The experiment in a wet time period indicated fast conduits, while the experiments in dry time period proved that water has to fill up the voids (fractures) and only then is percolation threshold reached.