



Matrix-restrained vs. conduit-influenced flow recession at the Hammerbach karst spring (Austria)

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In the years following a flood event in August 2005, the Hammerbach karst spring in Austria displayed hydraulic and physicochemical responses to recharge events that appear to be markedly different from those observed before. As likely cause of these changes the reduction of the conduit diameters resulting from redistribution of sediments during the flood event has been proposed (Birk et al., EGU2014-7550). According to Kovács et al. (J. Hydrol., 2005) the baseflow recession of mature karst aquifers generally is matrix restrained, i.e. controlled by the drainage from the low-permeability matrix but not by the conduit properties. It thus appears that the changed behavior of the Hammerbach karst spring corresponds to a shift from a matrix-restrained to a conduit-influenced flow regime. This contribution is aimed at understanding how such a shift of the flow regime may affect the recession behavior. On the one hand, conceptual recession models and the corresponding mathematical models are theoretically explored; on the other hand, the recession of the Hammerbach spring observed in the years after the flood event is analysed and compared to that before the flood event 2005. It is shown that – given some reasonable assumptions – a shift from an exponential recession under matrix-restrained conditions to a linear recession in a conduit-influenced flow regime may theoretically be expected and that the field data indeed appears to show a tendency towards such changes in the recession behaviour.