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Monitoring of cave environments is essential to understand the processes taking place in the soil, karst and cave zone and the interpretation of speleothem archives is increasingly based on monitoring data. A five year monitoring programme of Bunker Cave (NW Germany) included monthly sampling of rain, soil and drip water. The delta18O ratios of the drip waters reflect the mean annual delta18O composition of rain water. The weak seasonal pattern in drip water delta18O composition is overlain by a trend to increasing values (approximately 0.3‰ in the monitoring period between 2007 and 2011). Up to the year 2009, rain water delta18O values show an increasing trend. In 2010, the lowest yearly mean delta18O ratio of rain water (-9.20‰ was observed, probably due to cool summer air temperatures and significant amounts of snow fall during winter months 2010. A decrease of the drip water delta18O in the future will expectedly allow to stack both data series and to identify time delay between rain water and drip water series and allow for the quantification of the approximate transfer time of rain water from soil surface into the cave. The Mg2+-concentration of one drip site correlates positively with drip rate. High Mg2+-concentrations occur especially after dry periods (low drip rate) when increased rainfall amounts refill the karst reservoir and drip rate increase again. Also, the soil water Mg2+-concentrations are higher after dry phases without any soil water samples. This is due to an increased solution of Mg from the soil zone during dry phases, suggesting longer soil water residence time. The increasing infiltration at the onset of wetter periods transports accumulated Mg from the soil zone into the cave. Unlike Mg2+, SO42–concentrations correlate negative with the drip rate. Because SO42–concentration is an indicator for the drip water residence time in the hostrock, high sulphate concentrations indicate a long residence time occurring during low drip rates and vice versa. The source of the sulphate is the hostrock carbonate. Depending on drip water residence time, the oxidation of pyrite controls the amount of sulphate in the drip waters. Sulphate and Mg2+-concentrations function as proxies for weathering and residence times in the karst and soil zone, while delta18O can reveal information about the transfer time of rain water through soil and karst zones.