Centennial Growth Rate Variability of Two Alpine Holocene Speleothems

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The possible influence of climate on speleothem growth phases and rates has frequently been emphasized. In this study we used high-precision U/Th dating to explore growth rate dynamics of two Holocene stalagmites at a resolution of 220 a. The stalagmites are from two adjacent caves in the northwestern Alps, Betten Cave and Schratten Cave, separated by 400 m of altitude. Both speleothems share a common growth phase between 6,550 and 200 a BP. Growth rate variations range between < 20 and 100 µm a^{-1} and occur on millennial time scales. These variations, however, show no coherent pattern between the two stalagmites, reflecting strong site-specific controls. These stalagmites also show distinct initial $\delta^{234}U$ values of ~ 2,100 ‰ and ~ 4,200 to 4,700 ‰, respectively, pointing towards significant differences in the geochemistry of the host rock at these two sites. On millennial time scales, however, the stalagmites' growth patterns weakly correlate with changes in the alpine paleoclimate as recorded by other archives. This high-resolution study suggests that on centennial time scales local (hydro)geological parameters may mask the link between climate and growth rate in stalagmites in regions of complex topography.