



Four years of the speleothem Forschergruppe DAPHNE (DAteD sPeleothems: arcHives of the paleoEnvironmEnt) – a review

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The first three years were mainly used for the investigation of the principle mechanisms controlling speleothem growth and their stable isotope records. For this purpose, we performed an extensive monitoring program in two caves north and south of the alpine watershed (Bunker Höhle and Ernesto Cave) in parallel with experiments with synthetic carbonates and modelled the record of stable isotopes in stalagmites. Whereas the monitoring program in situ records the natural processes, the laboratory experiments allows varying the same parameters systematically under controlled conditions. On the basis of ^{14}C -measurements on selected samples with precise Th/U-chronology we obtained information on processes occurring in the unsaturated soil zone above the caves. This allowed quantifying the influence of the CO_2 production in the soil on the $\delta^{13}\text{C}$ signals in speleothems. In parallel we developed a method for measuring noble gases included in fluid inclusions to derive direct information about cave temperatures from noble gas concentrations. During the second part of DAPHNE, the focus is on modelling of the transport of stable isotope signals ($\delta^{18}\text{O}$, $\delta^{13}\text{C}$) through the soil zone, better understanding the forcing of past climate variability, in close collaboration with climate modellers, and reconstructing Holocene precipitation and temperature from the stable isotope signals of speleothems from a European Transect. I will give an overview about model results and their application.