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DAPHNE – Dated speleothems: Archives of the paleoenvironment

A. Mangini (1), D. Scholz (1), A. Schröder-Ritzrau (1), C. Spötl (2), D. Polag (1), M. Isenbeck-Schroeter (3), D. K. Richter (4), D. Riechelmann, S. Niggemann (5), S. Frisia (6), R. Miorandi (6), W. Aeschbach-Hertig (7), T. Kluge (7), B. Kromer (1), J. Fohlmeister (1)

(1) Heidelberger Akademie der Wissenschaften, Im Neuenheimer Feld 229, 69120 Heidelberg, Germany, (2) Institut für Geologie und Paläontologie, Leopold-Franzens-Universität Innsbruck, Innrain 52, 6020 Innsbruck, Austria, (3) Institut für Umwelt-Geochemie der Universität Heidelberg, Im Neuenheimer Feld 236, 69120 Heidelberg, Germany, (4) Institut für Geologie, Mineralogie und Geophysik, Ruhr-Universität Bochum, Universitätsstraße 150, 44801 Bochum, Germany, (5) Dechenhöhle und Höhlenkundemuseum, Dechenhöhle 5, 58644 Iserlohn, Germany, (6) Museo Tridentino di Scienze Naturali, Abteilung für Geologie, Via Calepina 14, 38100 Trento, Italy, (7) Institut für Umweltphysik, Universität Heidelberg, Im Neuenheimer Feld 229, 69120 Heidelberg, Germany

DAPHNE is a research group (Forschergruppe 668), which is funded by the Deutsche Forschungsgemeinschaft (DFG) and started working in November 2005. Several researchers and scientists from Heidelberg, Bochum, Innsbruck and Trento collaborate to study speleothems over a period of six years. The intention of DAPHNE is to understand the basic mechanisms, which control speleothem growth and composition, by the combined application of field and laboratory experiments. In particular, the impact of kinetic fractionation processes on the isotope signals recorded in speleothems will be quantified. It is planned to use the knowledge of these basic mechanisms to obtain high resolution information about the intensity of past precipitation and temperature from stalagmites.

DAPHNE is subdivided into five projects. The central project, ZP0, which also coordinates the research, provides U-series ages as well as high-resolution stable isotope and trace element profiles on stalagmites from two caves, which are investigated within DAPHNE: The Bunkerhöhle in north-western Germany and the Grotta di Ernesto in

northern Italy. Furthermore, time-series analysis is performed within ZP0. In both caves, the parameters, which have an influence on stalagmite growth and composition, such as drip rate and drip water composition, the cave atmosphere and the regional climate are monitored (sub-project 2, TP2). In addition, recent precipitates are collected in the caves and investigated. Within sub-project 1, TP1, synthetic carbonates are precipitated under controlled conditions in laboratory experiments. These experiments will allow to quantify the influence of different parameters (e.g. temperature and drip rate) on the isotope and trace element composition of stalagmites. Sub-project 3, TP3, develops a method to extract water from fluid-inclusions and aims to apply included noble gases as a paleothermometer. Finally, sub-project 4, TP4, measures the ^{14}C content in drip waters and stalagmites from both caves, which allows to estimate the variation of soil CO_2 production as well as past precipitation and temperature changes. The results of all projects will be used to model stalagmite growth and isotopic composition as a function of climate dependent parameters. In addition, transfer functions for precipitation and temperature will be developed based on these results. The poster will present a progress report and first results from all projects.