

## Science Highlights: Open Call Online References

*A.D. Wanamaker Jr., J.D. Scourse, C.A. Richardson, P.G. Butler, D.J. Reynolds and I. Ridgway*

- Came, R.E., Eiler, J.M., Veizer, J., Azmy, K., Brand, U. and Weidman, C.R., 2007: Coupling of surface temperatures and atmospheric CO<sub>2</sub> concentrations during the Palaeozoic era, *Nature*, **449**: 198-202.
- DeLong, K.L., Quinn, T.M. and Taylor, F.W., 2007: Reconstructing twentieth-century sea surface temperature variability in the southwest Pacific: A replication study using multiple coral Sr/Ca records from New Caledonia, *Paleoceanography*, **22**: PA4212, doi:10.1029/2007PA001444.
- Eiriksson, J., Larsen, G., Knudsen, K.L., Heinemeier, J. and Simonarson, L.A., 2004: Marine reservoir age variability and water mass distribution in the Iceland Sea, *Quaternary Science Reviews*, **23**: 2247-2268.
- Ghosh, P., Adkins, J., Affek, H., Balta, B., Guo, W.F., Schauble, E.A., Schrag, D. and Eller, J.M., 2006: C-13-O-18 bonds in carbonate minerals: A new kind of paleothermometer, *Geochimica et Cosmochimica Acta*, **70**: 1439-1456.
- Halfar, J., Steneck, R.S., Joachimski, M., Kronz, A. and Wanamaker, A.D., Jr., 2008: Coralline red algae as high-resolution climate recorders, *Geology*, **36**: 463-466.
- Helama, S., Schöne, B.R., Kirchhefer, A.J., Nielsen, J.K., Rodland, D.L. and Janssen, R., 2007: Compound response of marine and terrestrial ecosystems to varying climate: Pre-anthropogenic perspective from bivalve shell growth increments and tree-rings, *Marine Environmental Research*, **63**: 185-199.
- Jones, D.S., 1980: Annual cycle of shell growth increment formation in two continental shelf bivalves and its paleoecologic significance, *Paleobiology*, **6**: 331-340.
- Marchitto, T.M., Jones, G.A., Goodfriend, G.A. and Weidman, C.R., 2000: Precise temporal correlation of Holocene mollusk shells using sclerochronology, *Quaternary Research*, **53**: 236-246.
- National Research Council (NRC), 2006: Surface temperature reconstructions for the last 2,000 years, National Academies Press, 145.
- Schöne, B.R., Oschmann, W., Rossler, J., Castro, A.D.F., Houk, S.D., Kröncke, I., Dreyer, W., Janssen, R., Rumohr, H. and Dunca, E., 2003: North Atlantic Oscillation dynamics recorded in shells of a long-lived bivalve mollusk, *Geology*, **31**: 1037-1040.
- Schöne, B.R., Fiebig, J., Pfeiffer, M., Gleß, R., Hickson, J., Johnson, A., Dreyer, W. and Oschmann, W., 2005: Climate records from a bivalve *Methuselah* (*Arctica islandica*, Mollusca; Iceland), *Palaeogeography, Palaeoclimatology, Palaeoecology*, **228**: 130-148.
- Scourse, J., Richardson, C., A., Forsythe, G., Harris, I., Heinemeier, J., Fraser, N., Briffa, K. and Jones, P., 2006: First cross-matched floating chronology from the marine fossil record: data from growth lines of the long-lived bivalve mollusc *Arctica islandica*, *The Holocene*, **16**: 967-974.
- Strom, A., Francis, R.C., Mantua, N.J., Miles, E.L. and Peterson, D.L., 2004: North Pacific climate recorded in growth rings of geoduck clams: A new tool for paleoenvironmental reconstruction. *Geophysical Research Letters*, **31**, doi: 10.1029/2004GL019440.
- Wanamaker, A.D., Jr., Heinemeier, J., Scourse, J.D., Richardson, C., A., Butler, P.G., Eiriksson, J. and Knudsen, K.L., 2008a: Very long-lived molluscs confirm 17<sup>th</sup>

- century AD tephra-based radiocarbon reservoir ages for north Icelandic shelf waters, Submitted.
- Wanamaker, A.D., Jr., Kreutz, K.J., Schöne, B.R., Pettigrew, N., Borns, H.W., Introne, D.S., Belknap, D., Maasch, K.A. and Feindel, S., 2008b: Coupled North Atlantic slope water forcing on Gulf of Maine temperatures over the past millennium, *Climate Dynamics*, doi:10.1007/s00382-007-0344-8.
- Weidman, C.R. and Jones, G.A., 1993: A shell-derived time history of bomb  $^{14}\text{C}$  on Georges Bank and its Labrador Sea implications, *Journal of Geophysical Research-Oceans*, **98**: 14577-14588.
- Weidman, C.R., Jones, G.A. and Lohmann, K.C., 1994: The long-lived mollusk *Arctica islandica*: a new paleoceanographic tool for the reconstruction of bottom temperatures for the continental shelves of the northern North Atlantic Ocean, *Journal of Geophysical Research-Oceans*, **99**: 18305-18314.
- Witbaard, R., Duinveld, G.C.A. and de Wild, P.A.W.J., 1997: A long-term growth record derived from *Arctica islandica* (Mollusca, Bivalvia) from the Fladen Ground (Northern North Sea), *Journal of the Marine Biological Association of the United Kingdom*, **77**: 801-816.
- Witbaard, R., Jansma, E. and Klaassen, U.S., 2003: Copepods link quahog growth to climate, *Journal of Sea Research*, **50**: 77-83.

*O. Marchal and W. Curry*

- Curry, W.B. and Oppo, D., 2005: Glacial water mass geometry and the distribution of  $\delta^{13}\text{C}$  of  $\Sigma\text{CO}_2$  in the Western Atlantic Ocean, *Paleoceanography*, **20**: PA1017, doi:10.1029/2004PA0011021.
- Duplessy, J.-C., Shackleton, N.J., Matthews, R.K., Prell, W., Ruddiman, W.F., Caralp, M. and Hendy, C.H., 1984:  $^{13}\text{C}$  record of benthic foraminifera in the last interglacial ocean: Implications for the carbon cycle and the global deep water circulation, *Quaternary Research*, **21**: 225-243.
- Gebbie, G. and Huybers, P., 2006: Meridional circulation during the Last Glacial Maximum explored through the combination of South Atlantic  $\text{d}^{18}\text{O}$  observations and a geostrophic inverse model, *Geochemistry, Geophysics, Geosystems*, **7**: Q11N07, doi:10.1029/2006GC001383.
- Huybers, P., Gebbie, G. and Marchal, O., 2007: Can paleoceanographic tracers constrain meridional circulation rates, *Journal of Physical Oceanography*, **37**: 394-407.
- Kroopnick, P.M., 1985: The distribution of  $^{13}\text{C}$  of  $\text{TCO}_2$  in the world oceans, *Deep-Sea Research*, **32**: 57-84.
- LeGrand, P. and Wunsch, C., 1995: Constraints from paleotracer data on the North Atlantic circulation during the last glacial maximum, *Paleoceanography*, **10**: 1011-1045.
- Lynch-Stieglitz, J., Curry, W.B., and Slowey, N., 1999: A geostrophic transport estimate for the Florida Current from oxygen isotope composition of benthic foraminifera, *Paleoceanography*, **14**: 360-373.
- Lynch-Stieglitz, J., Adkins, J.F., Curry, W.B., Dokken, T., Hall, I.R., Herguera, J.C., Hirschi J.J.-M., Ivanova, E.V., Kissel, C., Marchal, O., Marchitto, T.M., McCave, I.N., McManus, J.F., Mulitza, S., Ninnemann, U., Peeters, F., Yu, E-F. and Zahan, R., 2007: Atlantic meridional overturning circulation during the Last Glacial Maximum, *Science*, **316**: 66-69.

- Marchal, O. and Curry, W.B., 2008: On the abyssal circulation in the glacial Atlantic, *Journal of Physical Oceanography*, DOI:10.1175/2008JPO3895.1
- Rutberg, R.L. and Peacock, S.L., 2006: High-latitude forcing of interior ocean  $d^{13}C$ , *Paleoceanography*, 21(2): PA2012, doi:10.1029/2005PA001226.
- Winguth, A.M.E., Archer, D., Maier-Reimer, E. and Mikolajewicz, U., 2000: Paleonutrient data analysis of the glacial Atlantic using an adjoint ocean general circulation model, In: P. Kasibhatla, et al., (Eds.) *Inverse methods in global biogeochemical cycles*, Geophysical Monograph, American Geophysical Union, 114: 171-183.

### Science Highlights: Speleothem Research Online References

*J.W. Partin, K.M. Cobb, J.L. Banner*

#### Data URL's

Soreq Cave, Israel:

[ftp://ftp.ncdc.noaa.gov/pub/data/paleo/speleothem/israel/soreq\\_peqiin\\_2003.txt](ftp://ftp.ncdc.noaa.gov/pub/data/paleo/speleothem/israel/soreq_peqiin_2003.txt)

Heshang Cave, China:

<ftp://ftp.ncdc.noaa.gov/pub/data/paleo/speleothem/china/heshang2008.txt>

Dongge Cave, China:

<ftp://ftp.ncdc.noaa.gov/pub/data/paleo/speleothem/china/dongge2005.txt>

Qunf Cave, Oman:

<ftp://ftp.ncdc.noaa.gov/pub/data/paleo/speleothem/asia/oman/qunf2007.txt>

Snail Shell and Bukit Assam Caves, N. Borneo:

<ftp://ftp.ncdc.noaa.gov/pub/data/paleo/speleothem/pacific/gunung-buda2007.txt>

Botuverá Cave, Brazil: Wang X., personal communications

Cold Air Cave, S. Africa:

<ftp://ftp.ncdc.noaa.gov/pub/data/paleo/speleothem/africa/cold-air-cave2003.txt>

#### References

- Bar-Matthews, M., Ayalon, A., Gilmour, M., Matthews, A. and Hawkesworth, C.J., 2003: Sea-land oxygen isotopic relationships from planktonic foraminifera and speleothems in the Eastern Mediterranean region and their implication for paleorainfall during interglacial intervals, *Geochimica Et Cosmochimica Acta*, **67**: 3181-3199.
- Cheng, H., Edwards, R.L., Hoff, J., Gallup, C.D., Richards, D.A. and Asmerom, Y., 2000: The half-lives of uranium-234 and thorium-230, *Chemical Geology*, **169**: 17-33.
- Dansgaard, W., 1964: Stable isotopes in precipitation, *Tellus*, **16**(4): 436-468.
- Edwards, R.L., Chen, J.H. and Wasserburg, G.J., 1987: U-238 U-234-Th-230-Th-232 Systematics and the Precise Measurement of Time over the Past 500000 Years, *Earth and Planetary Science Letters*, **81**: 175-192.
- Fleitmann, D., Burns, S.J., Mudelsee, M., Neff, U., Kramers, J., Mangini, A. and Matter, A., 2003: Holocene forcing of the Indian monsoon recorded in a stalagmite from Southern Oman, *Science*, **300**: 1737-1739.
- Holmgren, K., Lee-Thorp, J.A., Cooper, G.R.J., Lundblad, K., Partridge, T.C., Scott, L., Sitaldeen, R., Talma, A.S. and Tyson, P.D., 2003: Persistent millennial-scale climatic variability over the past 25,000 years in Southern Africa, *Quaternary Science Reviews*, **22**: 2311-2326.

- Hu, C.Y., Henderson, G.M., Huang, J.H., Xie, S., Sun, Y. and Johnson, K.R., 2008: Quantification of Holocene Asian monsoon rainfall from spatially separated cave records, *Earth and Planetary Science Letters*, **266**: 221-232.
- Johnson, K.R., Hu, C.Y., Belshaw, N.S. and Henderson, G.M., 2006: Seasonal trace element and stable-isotope variations in a Chinese speleothem: The potential for high-resolution paleomonsoon reconstruction, *Earth and Planetary Science Letters*, **244**: 394-407.
- Mickler, P.J., Banner, J.L., Stern, L., Asmerom, Y., Edwards, R.L. and Ito, E., 2004: Stable isotope variations in modern tropical speleothems: Evaluating equilibrium vs. kinetic isotope effects, *Geochimica Et Cosmochimica Acta*, **68**: 4381-4393.
- Partin, J.W., Cobb, K.M., Adkins, J.F., Clark, B. and Fernandez, D.P., 2007: Millennial-scale trends in Warm Pool hydrology since the Last Glacial Maximum, *Nature*, **449**: 452-455.
- Rozanski, K., Araguas-Araguas, L. and Gonfiantini, R., 1993: Isotopic patterns in modern global precipitation, In: P.K. Swart, et al., (Eds), *Climate Change in Continental Isotopic Records*, Washington, DC, American Geophysical Union: 1-36.
- Treble, P., Shelley, J.M.G. and Chappell, J., 2003: Comparison of high resolution sub-annual records of trace elements in a modern (1911-1992) speleothem with instrumental climate data from southwest Australia, *Earth and Planetary Science Letters*, **216**: 141-153.
- Wang, X., Auler, A.S., Edwards, R.L., Cheng, H., Ito, E. and Solheid, M., 2006: Interhemispheric anti-phasing of rainfall during the last glacial period, *Quaternary Science Reviews*, **25**: 3391-3403.
- Wang, Y.J., Cheng, H., Edwards, R.L., An, Z.S., Wu, J.Y., Shen, C.C. and Dorale, J.A., 2001: A high-resolution absolute-dated Late Pleistocene monsoon record from Hulu Cave, China, *Science*, **294**: 2345-2348.
- Wang, Y.J., Cheng, H., Edwards, R.L., He, Y.Q., Kong, X.G., An, Z.S., Wu, J.Y., Kelly, M.J., Dykoski, C.A. and Li, X.D., 2005: The Holocene Asian monsoon: Links to solar changes and North Atlantic climate, *Science*, **308**: 854-857.
- Wang, Y.J., Cheng, H., Edwards, R.L., Kong, X.G., Shao, X.H., Chen, S.T., Wu, J.Y., Jiang, X.Y., Wang, X.F. and An, Z.S., 2008: Millennial- and orbital-scale changes in the East Asian monsoon over the past 224,000 years, *Nature*, **451**: 1090-1093.

*Y. Scheidegger, T. Kluge, R. Kipfer, W. Aeschbach-Hertig and R. Wieler*

- Aeschbach-Hertig, W., Peeters, F., Beyerle, U. and Kipfer, R., 1999: Interpretation of dissolved atmospheric noble gases in natural waters, *Water Resources Research*, **35**: 2779-2792.
- Aeschbach-Hertig, W., Peeters, F., Beyerle, U. and Kipfer, R., 2000: Palaeotemperature reconstruction from noble gases in ground water taking into account equilibration with entrapped air, *Nature*, **405**: 1040-1044.
- Davis, B.A.S., Brewer, S., Stevenson, A.C., Guiot, J. and Data contributors, 2003: The temperature of Europe during the Holocene reconstructed from pollen data. *Quaternary Science Reviews*, **22**: 1701-1716.
- Fleitmann D., et al., 2007: Holocene ITCZ and Indian monsoon dynamics recorded in stalagmites from Oman and Yemen (Socotra), *Quaternary Science Reviews*, **26**(1-2): 170-188.

- Genty, D., Plagnes, V., Causse, C., Cattani, O., Stievenard, M., Falourd, S., Blamart, D., Ouahdi, R. and Van-Exter, S., 2002: Fossil water in large stalagmite voids as a tool for paleoprecipitation stable isotope composition reconstitution and paleotemperature calculation, *Chemical Geology*, **184**: 83-95.
- Kipfer, R., Aeschbach-Hertig, W., Peeters, F. and Stute, M., 2002: Noble gases in geochemistry and cosmochemistry. In: D. Porcelli, et al, (Eds), *Reviews in Mineralogy and Geochemistry*, Mineralogical Society of America, Geochemical Society, **47**: 615–700.
- Kluge, T., Marx, T., Scholz, D., Niggemann, S., Mangini, A. and Aeschbach-Hertig, W., in press: A new tool for palaeoclimate reconstruction: Noble gas temperatures from fluid inclusions in speleothems, *Earth and Planetary Science Letters*, **269**: 407-414.
- McDermott, F., 2004: Paleo-climate reconstruction from stable isotope variations in speleothems: a review, *Quaternary Science Reviews*, **23**: 901-918.
- Scheidegger, Y., 2005: Stalagmiten als mögliche Klimaarchive, Unpublished diploma thesis, ETH Zürich.
- Scheidegger, Y., Badertscher, S.V., Driesner, Th., Wieler, R., Heber, V.S. and Kipfer, R. 2007: Microscopical speleothem calcite investigations proofing the existence of two different types of fluid inclusions, *Geophysical Research Abstracts* (EGU, Vienna).
- Schwarcz H.P. and Harmon, R.S., 1976: Stable isotope studies of fluid inclusions in speleothems and their paleoclimatic significance, *Geochimica et Cosmochimica Acta*, **40**: 657-665.

*D. Matthey, J.P. Latin and M. Ainsworth*

- Baker, A., Ito, E., Smart, P.L. and McEwan, R.F., 1997: Elevated and variable values of C-13 in speleothems in a British cave system, *Chemical Geology*, **136**(3-4): 263-270.
- Bar-Matthews, M., Ayalon, A., Matthews, A., Sass, E. and Halicz, L., 1996: Carbon and oxygen isotope study of the active water-carbonate system in a karstic Mediterranean cave: Implications for paleoclimate research in semiarid regions, *Geochimica Et Cosmochimica Acta*, **60**(2): 337-347.
- Cruz, F.W., Karmann, I., Viana, O.Jr., Burns, S.J., Ferrari, J.A., Vuille, M., Sial, A.N. and Moreira, M.Z., 2005: Stable isotope study of cave percolation waters in subtropical Brazil: Implications for paleoclimate inferences from speleothems, *Chemical Geology*, **220**(3-4): 245-262.
- Fairchild, I.J., Smith, C.L., Baker, A., Fuller, L., Spötl, C., Matthey, D., McDermott, F. and EIMF., 2005: Modification and preservation of environmental signals in speleothems, *Earth Science Reviews*, **75**: 153-195.
- IAEA/WMO, 2004: Global Network of Isotopes in Precipitation, *The GNIP Database*, Accessible at: <http://isohis.iaea.org>
- Matthey, D., Lowry, D., Duffet, J., Hodge, E. and Frisia, S., 2008: A 56 year seasonally resolved oxygen and carbon isotope record from a modern Gibraltar speleothem: reconstructed dripwater and relationship to local precipitation, *Earth and Planetary Science Letters*, **269**: 80-95.
- McDermott, F., 2004: Palaeo-climate reconstruction from stable isotope variations in speleothems: a review, *Quaternary Science Reviews*, **23**(7-8): 901-918.
- Mickler, P.J. Banner, J. L., Stern, L., Asmerom, Y., Edwards, R. L. and Ito, E., 2004: Stable isotope variations in modern tropical speleothems: Evaluating equilibrium

vs. kinetic isotope effects, *Geochimica Et Cosmochimica Acta*, **68**(21): 4381-4393.

Spötl, C., Fairchild, I.J. and Tooth, A.F., 2005: Cave air control on dripwater geochemistry, Obir Caves (Austria): Implications for speleothem deposition in dynamically ventilated caves, *Geochimica Et Cosmochimica Acta*, **69**(10): 2451-2468.

*P.C. Treble, I.J. Fairchild and M.J. Fischer*

Allan, R. and Ansell, T. 2006: A new globally-complete monthly historical gridded mean sea level pressure data set (HadSLP2): 1850-2004, *Journal of Climate*, **19**: 5816-5842.

Allan, R.J. and Haylock, M.R., 1993: Circulation features associated with the winter rainfall decrease in southwestern Australia, *Journal of Climate*, **6**: 1356-1367.

Fairchild, I., Borsato, A., Tooth, A., Frisia, S., Hawkesworth, C.J., Huang, Y., McDermott, F. and Spiro, B., 2000: Controls on trace element (Sr-Mg) compositions of carbonate cave waters: implications for speleothem climatic records, *Chemical Geology*, **166**: 255-269.

Fischer, M. and Treble, P., in press: Calibrating climate- $\delta^{18}\text{O}$  regression models for the interpretation of high-resolution speleothem  $\delta^{18}\text{O}$  time series, *Journal of Geophysical Research* (Atmospheres doi:10.1029/2007JD009694).

Indian Ocean Climate Initiative (IOCI), 2002: Climate variability and change in south west Western Australia, Department of Environment, Water and Catchment Protection, Perth, 34 pp. ([www.wrc.wa.gov.au/ioci/new.htm](http://www.wrc.wa.gov.au/ioci/new.htm)).

McDonald, J., Drysdale, R. and Hill, D., 2004: The 2002–2003 El Niño recorded in Australian cave drip waters: Implications for reconstructing rainfall histories using stalagmites, *Geophysical Research Letters*, **31**: L22202, doi:10.1029/2004GL020859.

O'Neil, J.R., Clayton, R.N., and Mayeda, T.K., 1969: Oxygen isotope fractionation in divalent metal carbonates, *Journal of Chemical Physics* **31**: 5547-5558.

Spötl, C., Fairchild, I., and Tooth, A., 2005: Cave air control on dripwater geochemistry, Obir Caves (Austria): Implications for speleothem deposition in dynamically ventilated caves, *Geochimica et Cosmochimica Acta*, **69**: 2451–2468.

Treble, P., Shelley, J., and Chappell, J., 2003: Comparison of high-resolution sub-annual records of trace elements in a modern (1911-1992) speleothem with instrumental climate data from southwest Australia, *Earth and Planetary Science Letters*, **216**: 141-153.

Treble, P., Chappell, J., Gagan, M. Harrison, T. and McKeegan, K., 2005: In situ measurement of seasonal  $\delta^{18}\text{O}$  variations and analysis of isotopic trends in a modern speleothem from southwest Australia, *Earth and Planetary Science Letters*, **233**: 17-32.

*C. Mühlinghaus, D. Scholz and A. Mangini*

- Dreybrodt, W., 1999: Chemical kinetics, speleothem growth and climate, *Boreas*, **28**: 347 - 356.
- Kaufmann, G. and Dreybrodt, W., 2004: Stalagmite growth and palaeo-climate: an inverse approach, *Earth and Planetary Science Letters*, **224**: 529 - 545.
- Kilian, R., Biester, H., Behrmann, J., Baeza, O., Fesq-Martin, M., Hohner, M., Schimpf, D., Friedmann, A. and Mangini, A., 2006: Millennium-scale volcanic impact on a superhumid and pristine ecosystem, *Geology*, **34**: 609 – 612.
- Mühlinghaus, C., Scholz, D. and Mangini, A., 2007: Modelling stalagmite growth and  $\delta^{13}\text{C}$  as a function of drip interval and temperature, *Geochimica et Cosmochimica Acta*, **71**: 2780 - 2790.
- Mühlinghaus, C., Scholz, D. and Mangini, A., submitted: Fractionation of stable isotopes in stalagmites under disequilibrium conditions, *Geochimica et Cosmochimica Acta*.
- Schimpf, D., 2005: Datierung und Interpretation der Kohlenstoff- und Sauerstoffisotopie zweier holozäner Stalagmiten aus dem Süden Chiles (Patagonien), *Master's thesis, Ruprecht-Karls-University, Heidelberg*.

*R. Boch and C. Spötl*

- Baker, A., Genty, D., Dreybrodt, W., Barnes, W.L., Mockler, N.J., and Grapes, J., 1998: Testing theoretically predicted stalagmite growth rate with recent annually laminated samples: Implications for past stalagmite deposition, *Geochimica et Cosmochimica Acta*, **62**: 393-404.
- Baker, A., Proctor, C.J. and Barnes, W.L., 2002: Stalagmite lamina doublets: A 1000 year proxy record of severe winters in northwest Scotland?, *International Journal of Climatology*, **22**: 1339-1345.
- Boch, R., 2008: Stalagmites from Katerloch Cave, Austria: Growth dynamics and high-resolution records of climate change, PhD thesis (unpublished), University of Innsbruck, 223 pp. (download: [http://www.uibk.ac.at/geologie/pdf/phd\\_ronny\\_boch.pdf](http://www.uibk.ac.at/geologie/pdf/phd_ronny_boch.pdf))
- Broecker, W.S., Olson, E.A. and Orr, P.C., 1960: Radiocarbon measurements and annual rings in cave formations, *Nature*, **185**: 93-94.
- Frisia, S., Borsato, A., Fairchild, I.J., and McDermott, F., 2000: Calcite fabrics, growth mechanisms and environments of formation in speleothems from the Italian Alps and southwestern Ireland, *Journal of Sedimentary Research*, **70**: 1183-1196.
- Frisia, S., Borsato, A., Preto, N. and McDermott, F., 2003: Late Holocene annual growth in three Alpine stalagmites records the influence of solar activity and the North Atlantic Oscillation on winter climate, *Earth and Planetary Science Letters*, **216**: 411-424.
- Genty, D. and Quinif, Y., 1996: Annually laminated sequences in the internal structure of some Belgian stalagmites - importance for Paleoclimatology, *Journal of Sedimentary Research*, **66**: 275-288.
- Kaufmann, G., 2003: Stalagmite growth and palaeo-climate: the numerical perspective, *Earth and Planetary Science Letters*, **214**: 251-266.
- Kendall, A.C. and Broughton, P.L., 1978: Origin of fabrics in speleothems composed of columnar calcite crystals, *Journal of Sedimentary Petrology*, **48**: 519-538.
- Mattey, D., Lowry, D., Duffet, J., Fisher, R., Hodge, E. and Frisia, S., 2008: A 53 year seasonally resolved oxygen and carbon isotope record from a modern

- Gibraltar speleothem: reconstructed drip water and relationship to local precipitation, *Earth and Planetary Science Letters*, **269**: 80-95.
- Meyer, M., Faber, R. and Spötl, C., 2006: The WinGeol Lamination Tool: new software for rapid, semi-automated analysis of laminated climate archives, *The Holocene*, **16**: 753-761.
- Railsback, L.B., Brook, G.A., Chen, J., Kalin, R. and Fleisher, C.J., 1994: Environmental controls on the petrology of a late Holocene speleothem from Botswana with annual layers of aragonite and calcite, *Journal of Sedimentary Research*, **A64**: 147-155.
- Yadava, M.G., Ramesh, R. and Pant, G. B., 2004: Past monsoon rainfall variations in peninsular India recorded in a 331-year-old speleothem, *The Holocene*, **14**: 517-524.
- S. Frisia, S. Badertscher, A. Borsato, J. Susini, O.M. Göktürk, H. Cheng, R.L. Edwards, J. Kramers and D. Fleitmann*
- Badertscher, S., Fleitmann, D., Frisia, S., Borsato, A., Cheng, H., Edwards, R.L., Göktürk, O.M., Tüysüz, O. and Kramers, J., in prep.: Santorini eruption recorded in a stalagmite from Sofular Cave, Northern Turkey.
- Borsato A., Frisia, S., Fairchild I.J., Somogyi A. and Susini J., 2007: Trace element distribution in annual stalagmite laminae mapped by micrometer-resolution X-ray fluorescence: implications for incorporation of environmentally significant species, *Geochimica et Cosmochimica Acta*, **71**: 1494-1512.
- Frisia, S., Borsato, A., Preto, N. and McDermott, F., 2003: Late Holocene annual growth in three Alpine stalagmites records the influence of solar activity and the North Atlantic Oscillation on winter climate, *Earth and Planetary Science Letters*, **216**: 411-424.
- Friedrich, W.L., Kromer, B., Friedrich, M., Heinemeier, J., Pfeiffer, T. and Talamo, S., 2006: Santorini eruption radiocarbon dated to 1627-1600 B.C., *Science*, **312**: 548.
- Frisia, S., Borsato, A., Fairchild, I.J. and Susini, J., 2005: Variations in atmospheric sulphate recorded in stalagmites by synchrotron micro-XRF and XANES analyses, *Earth and Planetary Science Letters*, **235**: 729-740.
- Frisia, S., Borsato, A. and Susini, J., 2008: Synchrotron radiation applications to past volcanism archived in speleothems: an overview, *Journal of Volcanology Geothermal Research*, doi: 10.1016/j.jvolgeores.2007.11.010
- Frogner Kockum, P.C., Herbert, R.B. and Gislason, S.R., 2006: A diverse ecosystem response to volcanic aerosols, *Chemical Geology*, **231**: 57-66.
- Oppenheimer, C., 2003: Ice core and palaeoclimatic evidence for the timing and nature of the great mid-13th century volcanic eruption, *International Journal of Climatology*, **23**: 417-426.
- Pearson, C., Manning, S., Coleman, M. and Jarvis, K., 2005: Can tree-ring chemistry reveal absolute dates for past volcanic eruptions? *Journal of Archaeological Science*, **32**: 1265-1274.
- Verosub, K.L. and Lippman, J., 2008: Global impacts of the 1600 eruption of Peru's Huaynaputina volcano, *EOS*, **89**: 141-142.
- Wynn, P., Fairchild, I.J., Baker, A., Baldini, J.U.L. and McDermott, F., 2008: Isotopic archives of sulphate in speleothems, *Geochimica et Cosmochimica Acta*, doi: 10.1016/j.gca2008.03.002.



Zielinski, G.A., 2000: Use of paleo-records in determining variability within the volcanism-climate system, *Quaternary Science Reviews*, **19**: 417-438.

Z. Siklósy, A. Demeny, S. Pilet, Sz. Leel-Ossy and C-C. Shen

Bánik, J., Csicsák, J. and Berta, Zs., 2002: Experience on application of continuous drain trench during the remediation of tailings ponds in Hungary. In: Broder J. M., et al. (Eds), *Uranium Mining and Hydrogeology III*, 913-921.

Borsato, A., Frisia, S., Fairchild, I.J., Somogyi, A. and Susini, J., 2007: Trace element distribution in annual stalagmite laminae mapped by micrometer-resolution X-ray fluorescence: implications for incorporation of environmentally significant species, *Geochimica et Cosmochimica Acta*, **71**: 1494–1512.

Elless, M.P. and Lee, S.Y., 1998: Uranium solubility of carbonate-rich uranium-contaminated soils, *Water Air Soil Pollution*, **107**: 147-162.

Fairchild I.J., Smith C.L., Baker A., Fuller L., Spotl C., Matthey D., McDermott F. and E.I.M.F., 2006: Modification and preservation of environmental signals in speleothems, *Earth-Science Reviews*, **75**(1-4): 105–153.

Finch, R. and Murakami, T., 1999: Systematics and paragenesis of uranium minerals. In: Burns P.C., et al. (Eds), *Uranium: Mineralogy, geochemistry and the environment. Reviews in mineralogy* **38**, Mineralogical Society of America, 91-180.

Frisia, S., Borsato, S., Susini, J. and Somogyi A., 2005: Climate forcings and their influence on Alpine history as reconstructed through the application of synchrotron-based X-ray microfluorescence on layered stalagmites, *Archaeometry*, **47**( 2): 209–219.

Hamato, H., Landsberger, S., Harbottle, G. and Panno, S., 1995: Studies of radioactivity and heavy metals in phosphate fertilizer, *Journal of Radioanalytical and Nuclear Chemistry*, **194**(2): 331-336.

Perrette, Y., Poulenard, J., Saber A-I., Fanget, B., Guittonneau, S., Ghaleb, B. and Garaudee, S., 2008: Polycyclic Aromatic Hydrocarbons in stalagmites: Occurrence and use for analyzing past environments, *Chemical Geology*, **251**: 67–76.

Sachs, S., Geipe, G., Mibus, J. and Bernhard, G., 2005: Impact of humic acid on the uranium migration in the environment. In: Merkel, B.J., et al. (Eds.) *Uranium Mining and Hydrogeology IV*, 107-116.

Siklosy, Z., Demeny, A., Vennemann, T.W., Kramers, J., Lauritzen, S.E. and Leel-Ossy, Sz., 2007: Middle bronze age climate change recorded in a Hungarian stalagmite: triggering by volcanic activity? *Geophysical Research Abstracts*, **9**: 1607-7962/gra/EGU2007-A-00777.

H. Cheng, D. Fleitmann, R.L. Edwards, S.J. Burns and A. Matter

Alley, R.B., Mayewski, P.A., Sowers, T., Stuiver, M., Taylor, K.C. and Clark, P.U., 1997: Holocene climatic instability: A prominent, widespread event 8200 yr ago, *Geology*, **25**: 483-486.

- Alley, R.B. and Agustsdottir, A.M., 2005: The 8k event: cause and consequences of a major Holocene abrupt climate change, *Quaternary Science Reviews*, **24**: 1123-1149.
- Barber, D.C. et al., 1999: Forcing of the cold event of 8,200 years ago by catastrophic drainage of Laurentide lakes, *Nature*, **400**: 344-348.
- Burns, S.J., Matter, A., Frank, N. and Mangini, A., 1998: Speleothem-based paleoclimate record from northern Oman, *Geology*, **26**: 499-502.
- Fleitmann, D., Burns, S.J., Mudelsee, M., Neff, U., Kramers, J., Mangini, A. and Matter, A., 2003b: Holocene forcing of the Indian monsoon recorded in a stalagmite from Southern Oman, *Science*, **300**: 1737-1739.
- Fleitmann, D., Burns, S.J., Neff, U., Mangini, A. and Matter, A., 2003a: Changing moisture sources over the last 330,000 years in Northern Oman from fluid-inclusion evidence in speleothems, *Quaternary Research*, **60**: 223-232.
- Fleitmann, D., Burns, S.J., Neff, U., Mudelsee, M., Mangini and Matter, A., 2004: Palaeoclimatic interpretation of high-resolution oxygen isotope profiles derived from annually laminated speleothems from Southern Oman, *Quaternary Science Reviews*, **23**: 935-945.
- Fleitmann, D. et al., 2007: Holocene ITCZ and Indian monsoon dynamics recorded in stalagmites from Oman and Yemen (Socotra), *Quaternary Science Reviews*, **26**: 170-188.
- Rasmussen, S.O. et al., 2006: A new Greenland ice core chronology for the last glacial termination, *Journal of Geophysical Research-Atmospheres*, **111**: D06102, doi: 10.1029/2005JD006079.
- Rohling, E.J. and Palike, H., 2005: Centennial-scale climate cooling with a sudden cold event around 8,200 years ago, *Nature*, **434**: 975-979.
- Spurk, M., Leuschner, H.H., Baillie, M.G.L., Briffa, K.R. and Friedrich, M., 2002: Depositional frequency of German subfossil oaks: climatically and non-climatically induced fluctuations in the Holocene, *The Holocene*, **12**: 707-715.
- Teller, J.T. and Leverington, D.W., 2004: Glacial Lake Agassiz: A 5000 yr history of change and its relationship to the delta O-18 record of Greenland, *Geological Society of America Bulletin*, **116**: 729-742.

- Auler, A.S., Rubbioli, E. and Brandi, R., 2001: *As grandes cavernas do Brasil*, Grupo bambui de pesquisas espeleológicas, Belo Horizonte, Brazil.
- Auler, A.S. and Smart, P.L., 2001: Late Quaternary paleoclimate in semiarid northeastern Brazil from U-series dating of travertine and water-table speleothems, *Quaternary Research*, **55**: 159–167.
- Broecker, W.S., 2003: Does the trigger for abrupt climate change reside in the ocean or in the atmosphere?, *Science*, **300**: 1519-1522.
- Chiang, J.C.H. and Bitz, C.M., 2005: Influence of high latitude ice cover on the marine Intertropical Convergence Zone, *Climate Dynamics*, **25**: 477-496.
- Chiang, J.C.H., Biasutti, M. and Battisti, D.S., 2003: Sensitivity of the Atlantic Intertropical Convergence Zone to Last Glacial Maximum boundary conditions, *Paleoceanography*, **18**: 1094, doi:10.1029/2003PA000916.
- Crowley, T.J., 1992: North Atlantic deep water cools the southern hemisphere, *Paleoceanography*, **7**: 489-499.
- Cruz, F.W. Jr., Burns, S.J., Karmann, I., Sharp, W.D., Vuille, M., Cardoso, A.O., Ferrari, J.A., Dias, P.L.S. and Viana, O. Jr., 2005: Insolation-driven changes in atmospheric circulation over the past 116,000 years in subtropical Brazil, *Nature*, **434**: 63-66.
- Cruz, F.W. Jr., Burns, S.J., Jercinovic, M., Karmann, I., Sharp, W.D. and Vuille, M., 2007: Evidence of rainfall variations in southern Brazil from trace element ratios (Mg/Ca and Sr/Ca) in a Late Pleistocene stalagmite, *Geochimica et Cosmochimica Acta*, **71**: 2250-2263.
- EPICA Community Members, 2006: One-to-one coupling of glacial climate variability in Greenland and Antarctica, *Nature*, **444**: 195-198.
- Grootes, P.M. and Stuiver, M., 1997: Oxygen 18/16 variability in Greenland snow and ice with  $10^3$ - to  $10^5$ -year time resolution, *Journal of Geophysical Research*, **102**: 26455-26470.
- Jouzel, J., et al., 2007: Orbital and millennial Antarctic climate variability over the past 800,000 years, *Science*, **317**: 793-796.
- Liebmann, B., Vera, C.S., Carvalho, L.M.V., Camilloni, I.A., Hoerling, M.P., Allured, D., Barros, V.R., Báez, J. and Bidegain, M., 2004: An observed trend in Central South American Precipitation, *Journal of Climate*, **17**: 4357-4367.
- Lindzen, R.S. and Hou, A.Y., 1988: Hadley circulations for zonally averaged heating centered off the equator, *Journal of the Atmospheric Sciences*, **45**, 2416–2427.
- McDermott, F., Schwarcz, H. and Rowe, P.J., 2005: Isotopes in speleothems, In: Leng, M.J. (ed.), *Isotopes in Palaeoenvironmental Research*, Springer, The Netherlands, 185-225.
- NGRIP members, 2004: High-resolution record of Northern Hemisphere climate extending into the last interglacial period, *Nature*, **431**: 147-151.
- Peterson, L.C., Haug, G.H., Hughen, K.A. and Rohl, U., 2000: Rapid changes in the hydrologic cycle of the tropical Atlantic during the last glacial, *Science*, **290**: 1947-1951.
- Ropelewski, C.F. and Halpert, M.S., 1987: Global and regional scale precipitation patterns associated with the El Niño/southern oscillation, *Monthly Weather Review*, **115**: 1606–1626.
- Stocker, T.F. and Johnsen, S.J., 2003: A minimum thermodynamic model for the bipolar seesaw, *Paleoceanography*, **18**: 1087, doi:10.1029/2003PA000920.
- Timmermann, A. et al., 2007: The influence of a weakening of the Atlantic meridional overturning circulation on ENSO, *Journal of Climate*, **20**: 4899-4919.

- Vuille, M. and Werner, M., 2005: Stable isotopes in precipitation recording South American summer monsoon and ENSO variability: observations and model results, *Climate Dynamics*, **25**: 401-413.
- Wang, X., Auler, A.S., Edwards, R.L., Cheng, H., Cristalli, P.S., Smart, P.L., Richards, D.A. and Shen, C.-C., 2004: Wet periods in northeastern Brazil over the past 210 kyr linked to distant climate anomalies, *Nature*, **432**: 740-743.
- Wang, X., Auler, A.S., Edwards, R.L., Cheng, H., Ito, E., Wang, Y., Kong, X. and Solheid, M., 2007: Millennial-scale precipitation changes in southern Brazil over the past 90,000 years, *Geophysical Research Letters*, **34**: L23701, doi:10.1029/2007GL031149.
- Wang, Y., Cheng, H., Edwards, R.L., An, Z.S., Wu, J.Y., Shen, C.-C. and Dorale, J.A., 2001: A high-resolution absolute-dated late Pleistocene monsoon record from Hulu Cave, China, *Science*, **294**: 2345-2348.
- Wang, Y., Cheng, H., Edwards, R.L., He, Y.Q., Kong, X.G., An, Z.S., Wu, J.Y., Kelly, M.J., Dykoski, C.A. and Li X.D., 2005: The Holocene Asian Monsoon: links to solar changes and North Atlantic climate, *Science*, **308**: 854-857.
- Wang, Y., et al., 2008: Millennial- and orbital-scale changes in the East Asian monsoon over the past 224,000 years, *Nature*, **451**: 1090-1093.
- Yuan, D., Cheng, H., Edwards, R.L., Dykoski, C.A., Kelly, M.J., Zhang, M., Qing, J., Lin, Y., Wang, Y., Wu, J., Dorale, J.A., An, Z.S. and Cai, Y., 2004: Timing, duration, and transitions of the last interglacial Asian Monsoon, *Science*, **304**: 575-578.
- Zhang, R. and Delworth, T.L., 2005: Simulated tropical response to a substantial weakening of the Atlantic thermohaline circulation, *Journal of Climate*, **18**: 1853-1860.