

THEME 4:
THE EARTH'S SURFACE:
Pollution, climate,
anthropogenic effects

Session 4.63:
Climate and global geochemical
fluxes – now and in the past

CONVENED BY:

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Whether the causes are natural or anthropogenic, there is little doubt that climate is changing. What can we learn from the past and the present that can help us see into the future? This session will gather scientists from a wide range of disciplines, to discuss results from studies of the various media where information can be gained: ice, lake and sea sediment, soil, sea-water and the biominerals produced in it.

4.63.11

**Environmental controls on annual
 carbonate deposition for stalagmites
 from Brown's Folly Mine, Wiltshire,
 England**

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Stalagmite deposition rates and $\delta^{13}\text{C}$ are believed to correlate with surface temperature and bioproductivity. Stalagmites developed within Brown's Folly Mine in SW England provide a test of these assumptions because vegetative cover has changed dramatically over the past century, while temperature has remained essentially constant. An increase in annual calcite deposition through time for three laminated stalagmites from Brown's Folly Mine is interpreted as reflecting the re-establishment of surface vegetation from a sparsely vegetated mining environment in the early 1900s to a nature reserve.

The three stalagmites contain 45, 44, and 43 annual couplets, suggesting nearly simultaneous inception of growth in approximately 1943. All three stalagmites have annual growth rates of approximately 10 μm per year until the early 1970s, when annual growth rates increase abruptly to approximately 150 μm per year. This increase in growth rate is attributed to an increase in dissolved CO_2 resulting from the development of a soil horizon, coupled with increased infiltration characteristic of a forested catchment. This interpretation is supported by lower $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values in the younger couplets of the stalagmite than in the older couplets. Variability in the timing and extent of the growth rate increase between the three stalagmites may have resulted from heterogeneous distribution of vegetation and soil above the individual sampling sites.

This study demonstrates that stalagmites can successfully record changes in vegetation, and suggests that dramatic changes in the distribution of vegetation and soil can overshadow changes caused by climate as recorded by speleothem growth rate and $\delta^{13}\text{C}$.