

Evidence for frost and ice damage of speleothems in Hallowe'en Rift, Mendip, some initial observations.

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Introduction

Hallowe'en Rift, NGR ST 5353 4809, altitude 130m aOD, has a current surveyed length, 304m with a vertical range, 25m. The cave is located in the wooded hillside to the north-east of Wookey Hole Cave, Mendip Hills, Somerset, UK.

Observations and notes

The cave passages are mostly developed in low bedding, partially filled by sandy silt with cobbles and boulders of dolomitic conglomerate with frequent fragmented calcite speleothems. The cave is phreatic in origin. Recent discoveries during 2018 have revealed some interesting morphological features and an abundance of shattered speleothems. It had been suggested that this damage had been caused by earth movements. However, after a close examination of the speleothems, it is apparent that the cause of the fracturing and damage has been through the actions of frost and/or ice during the Pleistocene.

The low bedding has substantial layers of fractured flowstone, the result of freeze/thaw episodes through a succession of glacial/interglacial periods (Lundberg and McFarlane, 2007).



Throughout the c.80m length of An Unexpected Development are fractured stalactites, stalagmites and flowstones, some are left precariously balanced. In places the floor is strewn with shattered speleothems, some of this in piles.



Kempe (2004) describes wide range of phenomena as evidence for ice related damage, including:

- Missing ceiling formations of older generations
- Sheared-off stalactites and curtains, deposited on top of floor speleothems
- Broken and deposited stalagmites
- Sheared-off stalagmites which have shifted from their base but still stand upright
- Cracked conical stalagmites
- Tilted and leaning stalagmites
- Moraine-like piles of floor flowstone
- Precariously placed ceiling deposits



Uranium-series dating

Two uranium-series dates were obtained for speleothem samples taken from Hallowe'en Rift in 2011, the oldest date, $563 \pm 170 - 74$ ka, is unfortunately, at the upper limit of the method, but likely relates to Marine Isotope Stage (MIS) 13 (Cromerian). A younger date $51.26 \pm 0.31 - 0.32$ ka, relates to MIS 3 (Middle Devensian). To fully understand the chronology of the events that took place in Hallowe'en Rift more dating of speleothems is necessary.

Comments

Hallowe'en Rift is an on-going project and further research on the frost/ice related phenomena continues. It is likely that frost/ice related speleothem damage has occurred in other Mendip caves, particularly shallow caves and a re-evaluation of these sites might be considered.

References

Kempe, S. (2004). Natural Speleothem Damage in Postojnska Jama (Slovenia), Caused by Glacial Cave Ice? A First Assessment. *Acta Carsologica* 33/1, 18. p265-289

Lundberg, J. and McFarlane, D.A. (2007). Pleistocene depositional history in a periglacial terrane: A 500 k.y. record from Kent's Cavern, Devon, United Kingdom. *Geosphere*, August 2007, p 199-219