

Gladysvale Cave, South Africa: stratigraphy, U-series dates and correlation with the Tswaing Impact Crater rainfall record

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Gladysvale Cave is one of the more recent cave sites within the Cradle of Humankind World Heritage Site to produce hominin specimens, with the first hominin fossils being found only in 1992. Among the massive and generally poorly stratified breccias of the South African hominin bearing caves, the breccias at Gladysvale are unique in that they are distinctly stratified, well preserved and clearly exposed. ICP-MS Uranium-series dates from several flowstone horizons indicate that the internal deposits are of Late Mid Pleistocene to Holocene in age, and that the flowstones grew as the climate moved out of interglacial and interstadial periods. The dated flowstone layers show good correlation with the rainfall record from the Tswaing Impact Crater sediments, with flowstone growth coinciding with periods of increased rainfall. Stable light isotope analyses of the flowstones and breccias provides further palaeoclimatic information and the combined U-series dates and stable light isotope values point to a strong climatic control on the nature and rate of sedimentation at Gladysvale Cave. These breccias are therefore highly episodic in nature and represent snapshots in time during which conditions were conducive to breccia formation. The Gladysvale sediments may serve as a climatically forced chronostratigraphic framework for other less well stratified and dated sites within the Cradle of Humankind World Heritage Site.