Abstract

Since the first fossil discovery in the late 1800s Sterkfontein has become one of the most productive palaeoanthropological sites in the world. This cave network has produced abundant fossil material that has provided insight to Plio-Pleistocene ecology, environments and hominid behaviour. Although the site is rich in fossil material, various post-depositional processes that occurred over time have made the deposits very complex and difficult to decipher. At the centre of understanding this complex site, extensive geological work has been done to place the fossil material in the best possible context. This has led to the establishment of a cave stratigraphic framework, namely the Sterkfontein Formation, which has arranged fossiliferous deposits from some of the chambers in the Sterkfontein Cave System. However, some of the lowerlying chambers were not included within this stratigraphic framework and thus required investigation. After the discovery of a partial cranium of *Australopithecus* sp. in this cavern, the primary research focus was on taphonomy, palaeoecology, biostratigraphy as well as chronostratigraphy; minimal sedimentological work was undertaken. This research involved a sedimentological facies analysis in a lesser known chamber of the cave network, the Jacovec Cavern, which is one of the deepest caverns in the Sterkfontein Cave System. The examinations of the sediment yielded a detailed depositional history as well as provided the opportunity to test previously proposed karstification models. This provides a better comprehension for the formation and development of the Jacovec Cavern and its relation to the entire Sterkfontein Cave System.

The observation of sediment halt (blockage from a palaeo-karst wall) suggested the presence of two depositionally independent chambers, namely the north western Main

Jacovec Chamber and the newly-differentiated eastern (sediment-rich) Thulasizwe Chamber. Work in the Thulasizwe Chamber helped revise the proposed stratigraphy by identifying four distinct units and reconciling the previously-proposed reverse stratigraphy of the upper brecciated (Brown and Orange breccia) units. These four units begin with a basal slackwater (laminated) unit overlain by a debris flow unit followed by a fossiliferous Brown Breccia and, finally, a channel-derived Orange Breccia. The Main Jacovec Chamber contains two small sedimentary units whose depositional histories are harder to decipher. These sediments have been subject to a large degree of alteration (from both biotic and abiotic factors), which has led to the identification of cave access and phreatic stages. The lithology of the sediments (especially the presence of a distinct tuff seam) in both chambers has assisted in restricting the provenance of the sediments to localized deposits most likely coming from the south-southeast of the cave system. Furthermore, the presence of ghost rock remnants proved useful in providing a detailed karstification model (which suggests a long-lived stage of chemical dissolution before mechanical erosion and removal of cave earth) for the chamber and supports early works by Wilkinson (1985) of a deep phreatic network. This has implications for the stratigraphic interpretations on the cave system and sequence of filling.