Penhill Farm – SAHRA Progress report for 2013

Permit No.: 80/11/10/001/51
Site GPS co-ordinates: 33°35’46.90”S; 25°41’18.20”E

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Research on Penhill Farm has been conducted over four separate field seasons: one in early November 2011, the second during May 2012, the third during October and November 2012, and the fourth during June 2013. Approximately 12 weeks have been spent conducting research on this property.

Research in late November 2011 sought to ameliorate our understanding of the Penhill Farm deposits. Dating work conducted on exposed deposits at Penhill Farm in 2010 by Prof D. Granger (Purdue University, Indiana) and Dr. R. Gibbon (University of New Brunswick) (see Erlanger *et al.* 2012) indicated an age of 1.36 ± 0.36Ma. Additional survey further confirmed that these deposits were extremely rich in Earlier Stone Age (ESA) material. The Penhill deposits comprise of an exposed ‘free-face’ of fine silt/sand sediment, which is approximately 3 m’s thick. Based on geomorphological, topographical and sedimentological observations this fine deposit appears to be indicative of low energy flood-plain deposition. Within this fine deposit, approximately 2 m down from the current land surface, is a discontinuous bed of gravel, including calcrete and silcrete nodules, natural cobbles and gravels, and an extremely high concentration of well-preserved ESA artefacts. This is informally known as a ‘gravel stringer,’ an area where material of different sizes has collected horizontally within a depression along the base of a river channel or flood-plain. This ‘gravel stringer’ is clearly visible within the exposed ‘free-face’ of fine deposit. Beneath the stringer continues more fine deposit, which eventually is underlain by a lowermost unit of high-energy alluvial gravels containing few artefacts. It is assumed that these gravels continue down to bedrock which, suggested from basic surveys in the area, appears to be a conglomerate. Preliminary work showed that the gravel stringer needed to be the focus for excavations. However little was known about its distribution and where it terminated (except for what was visible in the exposed ‘free-face’). To gain a better understanding of the artefact-rich stringer a test trench was dug; the trench was 30 cm wide and 1.2 m deep. By sinking the trench and uncovering more of the stringer a more informed decision about excavation placement could be made. Furthermore, based on the material recovered from the trench, sample sizes could be estimated, along with how much digging would actually be required to obtain a large enough ESA assemblage. On opening the trench and exposing the stringer, it was clear that the same high quantity and quality of material, visible in the exposed stringer, could be found in the test trench; future excavations in May 2012 were situated near to where this test trench was dug.

In May 2012, an excavation grid was established at the site, along with a clear, detailed protocol for all future work. A 1X3 m grid was setup to target excavation of the artefact-rich stringer. This grid was mapped in detail along with other points of interest in the surrounding area. The following procedures were included in the site protocol: use of 5 cm spits, thorough sieving using both 4 and 2 mm mesh, EDM mapping of all artefacts >20 mm in size, fabric analysis (dip and orientation readings) on all cobbles and artefacts where applicable, and the collection of sediment samples at 10 cm intervals throughout the excavation. Due to time constraints only two 1X1 m squares were dug, down to a final depth of 1.25 m. The upper 30 cm’s of deposit was extremely root-rich and dark in colour (highly organic); a mix of Stone Age material also occurred, most likely colluvial in origin, worked up and down the deposit due to several bioturbation processes. From this mixed zone down to approximately 1 m, root activity continued with a general absence in artefactual material. At 1.25 m several artefacts became visible in what appeared to be a smaller, more diffuse stringer, situated above the main stringer (which occurs lower down at approximately 2 m). This smaller stringer was only visible in one of the 2 opened squares.

October and November 2012 focussed on completing all excavations and sampling of sediments in the Penhill Farm excavation. Based on material obtained during May 2012, and to ensure that excavation sample sizes would be adequate, the excavation grid was enlarged (this was only carried out after an additional 1X1 m test pit had been dug elsewhere to further confirm the horizontal distribution of the gravel stringer); the original 1X3 m grid was expanded in to 3X3 m grid. As a result a total of 10 1X1 m squares was excavated to varying depths, the deepest of which reached 2.7 m. Resuming excavations at 1.25 m, we found the fine silt/sands were mostly sterile until the start of the gravel stringer. The depth of the top of the gravel stringer varied between the squares, with a minimum depth of approximately 1.8 m and a maximum of 2.25 m. The base of the stringer also varied from 2.4 - 2.5 m. Root activity was evident down to depths >2 m, however this was not uniform across all the squares. Although to be expected, it is clear that the gravel stringer is irregular in both its thickness (<20 cm to >50 cm) and form. Once within the stringer, artefacts, calcrete, silcrete and natural gravels/cobbles were extremely abundant; calcrete and silcrete nodules also varied in size and form. Additional fragments of charcoal and bone were also recovered. Material <20 mm (Small Flaking Debris-SFD) was extremely abundant, confirming low energy conditions for the stringers formation within the flood-plain. With the discontinuation of the stringer at 2.5 m, sterile silt/sands continue further downwards. During the excavations a total of 66 sediment samples was obtained, at 10 cm intervals, in two 1X1 m squares. An additional 8 sediment samples were obtained (from within the excavation and the exposed 'free-face') to test exclusively whether pollen and phytolith remains can be found within the deposits.

Fieldwork in June 2013 was geared towards finalsing our contextual interpretation of the deposit. Based on analyses performed in the lab post the October-November 2012 field season, it was clear that our deposit interpretations needed to be revised. After more careful investigation of the deposit, in conjunction with our collaborating researchers Prof. Darryl Granger and Dr. Ryan Gibbon, it is clear that the Penhill Farm site is extremely unique in both its formation and contents. Instead of having a purely alluvial origin for the formation of the artefact-rich horizon (originally termed a stringer), it is now understood to be of colluvial origin. Within the fine overbank facies (alluvial sands and silts), we have a colluvial channel fill (cut-in structure). At the base of this fill we have a debris-flow deposit which swept in a lag of calcrete and silcrete nodules, and stone artefacts, into a cone. Based on the extremely high level of artefact preservation, and the abundance of SFD, it is clear that this debris-flow collected its contents from only a short distance away, possibly only metres upslope of its present location, and it may even represent a single depositional episode. Based on these new interpretations, an additional 2X1 m excavation was opened up. The reason for this is to map in the colluvial channel more efficiently, and to collect all of the contents from these squares. Most importantly, the date obtained by Prof D. Granger and Dr. R. Gibbon (see Erlanger *et al.* 2012) of 1.36 ± 0.36Ma, now has a questionnable association with the debris-flow horizon. By opening up additional squares for excavation several clasts will be obtained for re-dating of the actual debris-flow deposit (using the Cosmogenic Nuclide Burial Dating Method).

Overall, excavations have yielded an extremely high quality ESA assemblage of approximately 10 000 artefacts. Of these, a large number of diagnostic tools was found, including ±10 LCT's (large cutting tools) and several core and flake forms; additional sporadic bone preservation is also present (primarily tooth plates which appear to be of bovine origin). The dominant raw material for the assemblage is quartzite; these are locally available in cobble form along exposed river terraces within the valley (up valley the Klein Winterhoek mountain range is comprised almost exclusively of quartzite). Additional raw materials include quartz, hornfels, crypto-crystallines and andesite. In terms of research value and potential, the Penhill Farm is proving its worth. Additional field work will be conducted in the coming months.

Reference:

Erlanger, E.D., Granger, D.E & Gibbon, R.J. 2012. Rock uplift rates in South Africa from isochron burial dating of fluvial and marine terraces. *Geology* 40(11): 1019-1022.