Geoarchaeological approaches to soil and sediment from Jebel Faya, Sharjah, United Arab Emirates.

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1. Introduction

Geoarchaeology has been defined by French (2002) as 'the combined study of archaeological and geomorphological records and the recognition of how natural and human-induced processes alter landscapes.' Rapp *et al* (1998) recognise that the term has been in wide use since the 1970s to identify 'research that uses geoscience techniques in the evaluation of the archaeological record.' In this study sediment taken from the site Faya NE1, UAE was analysed for it's organic matter and carbonate content and particle size composition.

2. Site and Sediment Description

The archaeological site dates from the Palaeolithic and Neolithic periods and is located at the northen end of the eastern flank at Jebel Faya, Sharjah, UAE. The site consists of a rock shelter and the area around it, the good flint resources and the reservoirs created by natural potholes in a nearby wadi are suggested as reasons for the past human settlement of this area (Uerpmann, 2006). Excavations have been undertaken at this site annually since 2003 and the samples for this research were removed from the site in March 2008. The sediment was taken from three different profiles, and has inputs from the gravel plain and sand dunes. Profile 1 was taken 2.4m from the back wall, and is under the rock shelter roof – it forms part of the active rock shelter floor. Profile 2 was taken from the current drip zone and Profile 3 was taken in two sections and forms part of the paleo-drip zone or the ancient rock shelter drip zone.

(Photo Walkington 2008)

3. Methodology

The bulk samples were separated into those above and below 2mm by dry sieving. The samples under 2mm were separated into three groups, that to be saved (50%) and 25% for both PSA and LOI. The organic matter was determined by LOI, the crucible weight was taken, then the crucible and sample weight were recorded. The sample was placed in the furnace at 500°C for 12hrs in triplicate. The carbonate content was then determined by placing the sample back in the furnace at 850°C for two hours. After cooling the weight was recorded (Heiri *et al,* 2001). In order to obtain the PSA the sample was weighed and then wet sieved to separate the sample above and below 63mμ. The particles below 63mμ were analysed using a CILAS 920 granulometre. The remaining sediment was oven dried at 105° overnight and then placed in a sieve tower to obtain the composition of particles from 0-4 phi. Using the total sample weight it is possible to obtain a percentage for each of the size fractions

4. Results and Discussion

Profile one: due to the limited number of samples taken any 'results' drawn from profile one need to be made with extreme caution. LOI results indicate that there is no organic matter of any significance present in the samples, as the percentage present never rises above 4%. There is a level of CO3 present in the samples, which shows a dip initially to just above 15%, peaking at 22%.

Profile two: the OM content results show that again there is no organic matter of significance in this profile. This is true of the entire profile except for three samples towards the base of the profile, which show a slightly elevated level of OM present. This is mirrored by the CO3 levels which are at their lowest for the same three readings. This could suggest a wetter period where organic matter is accumulated and CO3 maybe leached.

Profile three: as depicted in Fig 1 the results for this profile benefit from the inclusion of some magnetic susceptibility readings taken at a separate site visit in 2007 (Walkington, 2008 Pers. Comm). When looking at these three variables together it is possible to identify quite clear wetter and arid phases. At point A on the graph there is a high reading for magnetic susceptibility and low CO3 results, this could indicate an arid phase, as high magnetic results generally indicate aridity and there is a small peak in the C03 readings, suggesting accumulation of CO3. At point B there is a significant drop in both the magnetic and C03 readings and peak in the organic matter content. This could indicate a wetter phase. Finally, at point C there is a possible arid phase as the OM results drop to their lowest reading and there is a peak in the C03 readings. Furthermore the readings for the three variables in the first 60cm section mirror the readings in the section between 180-240cm. Point 1 shows a low organic reading, as does point a lower down in the section. Points 3 and c show an increase in magnetic susceptibility and points 2 and b indicate a drop in C03 followed by a sharp increase. These readings may illustrate the present day land surface at the top of the profile (0-60cm) and the palaeo-land surface (180-240). This hypothesis is supported by the fact that in the field a boulder appears at 180cm, suggestion a collapse of the rock shelter wall in the past.

5. Conclusion

- The most significant results and conclusions can be drawn from the more extended second and third profiles, profile one is simply too small for any definitive conclusions to be drawn.
- The readings for OM and C03 content when taken together can suggest different past climatic phases, and are even more informative when taken with a third variable such as magnetic susceptibility. When this variable was added to the LOI results for profile three it was possible to suggest the placement of a palaeo-land surface within the profile.
- Further work can and is to be undertaken with the sediment samples taken from this site including particle size analysis, which will help inform provenance and transport of the sediment. This is to be continued as further work for an independent study by E Rushton under the continued supervision of Dr Helen Walkington.

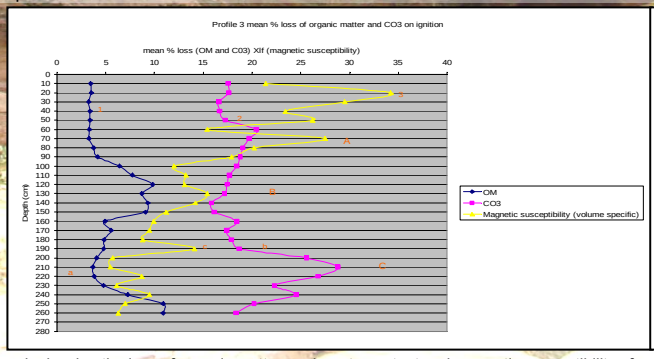

Fig2 Graph showing the loss of organic matter, carbonate content and magnetic susceptibility of profile three.

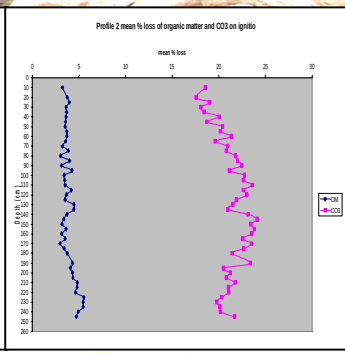

Fig1 Profile 2 mean % loss of OM and C03 on ignition

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