Archaeological Activities at Vleesbaai, Western Cape, South Africa – 2012

with contributions from Curtis W. Marean, Benjamin J. Schoville, Simen Oestmo, and Jayne Wilkins
Institute of Human Origins, Arizona State University, USA

Introduction

The South African Coast Paleoclimate, Paleoenvironment, Paleoecology, Paleoanthropology Project (SACP4) was established in 2005 as an international and interdisciplinary team of scientists. SACP4 has three goals: 1) develop for the south coast of South Africa a continuous and detailed paleoclimatic and paleoenvironmental sequence from 400-30 thousand-years ago (ka), 2) correlate that record to the global record for paleoclimatic change as reflected in the marine sediment and ice core records for the Northern and Southern Hemispheres, and 3) test a series of specific hypotheses about the relation between paleoclimate and paleoenvironmental change and human evolution. Until recently, this project has focused its archaeological studies on the caves and rock-shelters at Pinnacle Point. Caves and rock-shelters often hold deep sequences of sediments and thus are relied upon to develop long records of human prehistoric activity. However, they provide one side of the story of human life in the past – they represent primarily human activities "in the home". The geological and archaeological deposits at Vleesbaai provide the opportunity to extend the results from cave records to locations on the landscape where human activities would have differed and been more focused on food collection, such as hunting and plant collecting.

Background

Visits to the red coastal paleosols ("ancient soils") common along the Vleesbaai coastline began in 2008 by a small group of geologists and archaeologists associated with the SACP4 project. These observations suggested an enormous amount of potential for the paleosols and the associated Stone Age artifacts on the surface to provide information about prehistoric human behavior and ancient environments. Three subsequent field seasons have described surface artifacts in three locations (termed "Area A", "Area B", and "Area C", Figure 1) as well as produced preliminary maps of archaeological sites throughout Vleesbaai. Initially, a two-week non-invasive systematic recording of paleosol artifacts began in 2010 at Area A (described in detail in Marean et al. 2010 and Oestmo et al. 2011). A second 2-week field season in 2011 at Area B expanded the range of variation suggested by the 2010 results by non-invasively sampling a very high density portion of artifacts exposed on the surface (Oestmo et al. 2012). Additional research in 2012 included non-invasive sampling of individual artifacts at Area B and C, as well as systematic pedestrian survey in order to identify and map all visible archaeological localities and potential sources of stone for prehistoric tool making. The report presented here

Figure 1. Location of three areas sampled between 2010-12.

provides a summary of the principal findings from the three seasons of field work and outlines several goals for future field work.

Methods

The field-work at Vleesbaai aims to make artifacts and their spatial contexts the unit of analysis rather than focusing on "sites" of human activity. With this perspective, a greater understanding of both behavioral and post-burial processes that affect archaeological patterning may be gained. High-resolution artifact provenience data were obtained using a total station and handheld data logger using the same methods developed at the Pinnacle Point caves. Artifacts with a long axis were given provenience at either end in order to document patterning in artifact orientation and dip that informs us about post-depositional disturbance. A full lithic artifact attribute analysis was conducted in the field and artifacts returned to their initial location after recording (Figure 2). Photographs of every artifact were taken as well as standard metric measurements. In 2012, in-field edge damage recording was completed using a tripod-mounted iPad with drawing stylus in order to understand behavioral and taphonomic patterns of tool edge wear.

Figure 2. Methods for in-field recording of MSA artifacts. (top left) Artifacts were marked with pin-flags during initial survey; (top right) a field work-tent set up daily; (bottom left) two or three person team recording artifacts in June 2012; (bottom right) photographs and edge wear recorded in the field.

Determining the age of artifacts located on the surface is a notoriously difficult task. Sediments below the artifacts may be dated to provide a maximum age estimate, but finding a stratified sequence is required to confidently place the artifacts in a temporal sequence. So far, four optically stimulated luminescence (OSL) samples have been taken from dune sands near exposed surface artifacts and their ages since burial estimated. The four ages have all been consistent with Middle Stone Age (MSA; ~280-40 ka) occupation. An age of 60 ka was taken from the paleosol near Area A. Stacked paleosols near Area B have provided ages from 115±9 – 139±11 ka, suggesting the potential for MSA occupation to be preserved at Vleesbaai at least back to the warmer Marine Isotope Stage 5e time period.

A pedestrian survey of a two-person team was conducted during four weeks in June and July 2012. The survey consisted of a systematic survey using a handheld GPS unit to gatherer coarse coordinate data with the aim of producing an overview of the locations of geological and archaeological features, and taking high-resolution photographs (Digital SLR) of geological and archaeological features. For each GPS waypoint, the property, geological and archaeological details, and significance of observation were noted. The survey had four priorities: first, document the extent of the ancient land surface exposures along the targeted coastline. Second, record the location of archaeological remains associated with the ancient land surfaces. Third, locate possible raw material sources for stone tools such as cobble beds in rivers dissecting the coastal landscape or primary outcrops such as table mountain sandstone cliffs. Fourth and finally, record areas suitable for stratigraphic interpretations of the geological sequence of Vleesbaai and Visbaai.

Results

All three areas that have been sampled indicate technological similarities with MSA assemblages (Figure 3). The production of flakes and blades using prepared cores and unorganized cores are common. Retouch on flakes is rare (~3%) and quartzite is the predominant raw material (95%), although low quantities of silcrete (2%), quartz (1%), and chalcedony (<1%) were also found.

Quartzite is available in two forms along the south coast of South Africa – primary outcrops of Table Mountain sandstone and as beach cobbles. A known outcrop of fine-grained quartzite (yellow arrow in Figure 1) is located at Cape St. Blaize. Proximity and availability of raw materials influence reduction and curation. Area A is entirely cobble quartzite (100%) and Area C is comparable (99%), similar to cave aggregates at Pinnacle Point caves (e.g., PP9 [100%]). Area B has a small but significant amount of primary outcrop quartzite (10%) similar to some archaeological levels at PP13B (SBS, 10%) and PP5-6 (RBSR, 15%). The occurrence of outcrop cortex at Area B suggests transport ≥9 km if it is coming from Cape St. Blaize, however smaller exposures of outcrop quartzite were located in drainages at Vleesbaai during pedestrian survey (see below for results of pedestrian survey).

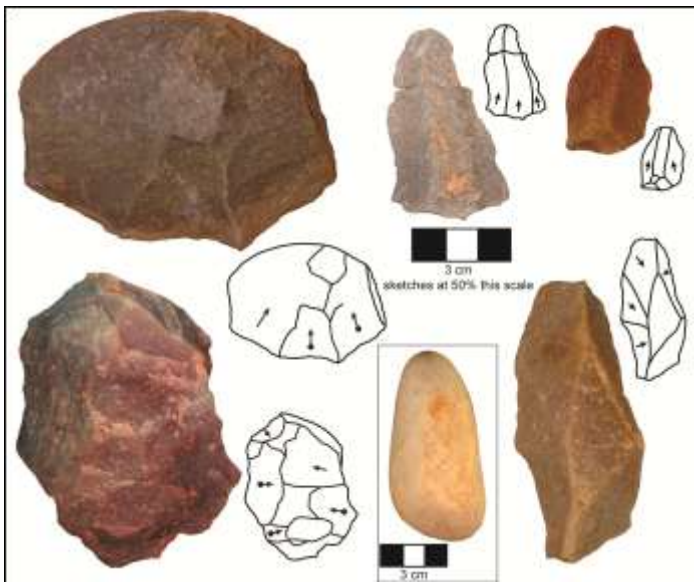

Figure 3. MSA artifacts found on the ancient landscape surface at Area A, but are typical of artifacts located throughout Vleesbaai.

Cobbles likely were not always available in the same quantity as they are now, because as sea-levels retreat during glacial periods dune sands may cover cobble beaches and raised cobble beds may become depleted from extraction activities. Understanding the variability in raw material use during the MSA occupations at Vleesbaai is a major goal for future research and a unique opportunity at Vleesbaai and Visbaai. One goal of SACP4's work is to understand how MSA technology is represented in areas outside of caves, and how that may relate to patterns of mobility and foraging during the MSA. One hypothesis being explored is that stone tools outside of caves (i.e., on the landscape) should represent the remains of debris not transported in to cave sites. Foragers seek to maximize their efficiency when transporting goods for provisioning. The decision to process materials in the field prior to transporting them depends on a number of factors including the utility of the material being processed (i.e., cracking nuts, opening shellfish, or flaking stone) before and after processing as well as the distance being transported. A comparison of the size of cores and tools at Vleesbaai with those found at Pinnacle Point provide some support for this hypothesis. Vleesbaai artifacts are larger on average, with larger maximum values. The abundance of cortex (the outer surface of a cobble that must be removed to produce sharp flakes) also indicates more processing of initial cobbles at Vleesbaai compared to Pinnacle Point. Additional research is required to elucidate the patterns of stone use and discard, but these initial tests suggest the range of behavior observed at caves are different than those out on the landscape. Vleesbaai provides an opportunity to expand our knowledge of behavioral variability during the MSA by comparing caves and open-air sites in the same resource area, during the same time period, with high-resolution climate data not available to researchers working on the vast majority of open-air sites in Africa.

Several artifacts are particularly of note (Figure 4). At Area B, three crescent-shaped 'backed blades' produced on silcrete were located. These artifacts are suggestive of the Howiesons Poort (HP) industry documented at many caves and rockshelters, but have yet to be fully described from an open-air site. A 'notched-blade' found at Area B is also suggestive of the HP. The HP is important because it indicates advanced complex technology likely related to the hafting of backed tools as arrows or darts in projectile technology (i.e., bow-and-arrow). OSL dating suggests that the HP was widespread along the south coast, but of short duration in comparison to the rest of the MSA, persisting from ~65-60 ka (Jacobs et al. 2008). The 60 ka age from paleosols near Area A would be consistent with such an occupation; however OSL samples near Area B are still being analyzed. An additional broken backed blade was located in Area C, possibly indicating occupation during this time is preserved over a large area at Vleesbaai. The presence of HP at Vleesbaai holds enormous potential for future research into landscape variability within this crucial period of human evolution.

Several interesting observations related to the four priorities were made during pedestrian survey (Figure 5). First, the naturally eroded ocean-facing soil and sand cliff that is capped by a red ancient land surface is observable sporadically in the mobile dune and coastal-vegetation landscape from the drainage that separates Danabaai town and the Nautilus Bay Phase II property to the Nautilus Bay Phase III Property. The ocean-facing soil and sand cliff is also visible in the coastal vegetation at Fransmanshoek, and sporadically in the mobile dune system at Misgunst Farm. The capping red ancient land surface is consistently located ~25-35 m above sea level (asl). Second, MSA stone tools are consistently associated with the soil and sand cliff exposures from Nautilus Bay Phase II to Misgunst Farm. At Nautilus Bay Phase I and II Later Stone Age (LSA) shell middens are located in the mobile dune system mostly below the eroded soil and sand cliff. Debris from these middens has in many places accumulated down behind the fore dune. However, there are also shell middens behind the fore dune at about ~ 2-5 m asl. There is a higher accumulation of LSA shell middens at the mouth of the drainages crosscutting Phase I and Phase II. Third, at Fransmanshoek and Misgunst farm several cobble and boulder beaches were observed. Loose cobbles and boulders were also found in the drainages that crosscut Phase I and II of the Nautilus Bay properties. These drainages also contained exposed sections of cemented river deposits. Remnants of ancient cemented cobble beaches are observable at the beach in Vleesbaai town, and along the Fransmanshoek Coastline. Fourth, the geological sequence containing ancient land surfaces are best preserved at the eastern part of the Nautilus Bay Phase I property. Here the capping red ancient surface and several buried land surfaces can be seen in the naturally eroded ocean-facing soil and sand cliff.

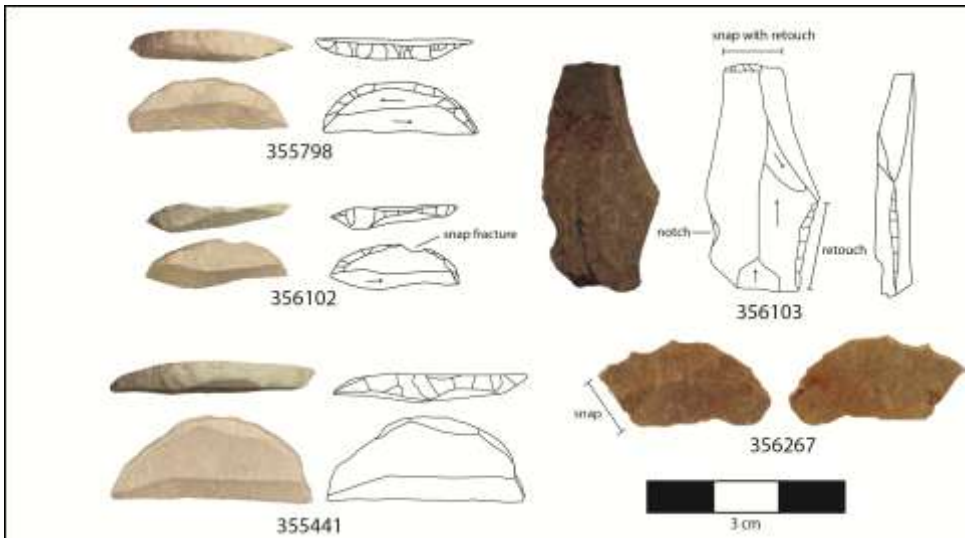

Figure 4. Howiesons Poort-like artifacts located at Area B and Area C (356267). All produced on silcrete stone that was likely heat-treated prior to flaking.

Figure 5. Locations of archaeological or geological features recorded during June-July 2012 survey.

Discussion

Fieldwork at Vleesbaai demonstrates the advantages of using a total station to piece plot all artifacts in open-air contexts. High quality documentation and data collection is possible without artifact collection and with minimal impact on the environment and the archaeological record with no artifact curation costs. Investigations at Vleesbaai are important not only for the archaeological materials preserved there, but for understanding the dynamic interplay of geogenic and climatic processes on the formation of paleosols and the taphonomic processes that preserve, distort, and erase traces of human behavior on the coastal landscape.

The extensive exposures of the ancient land surfaces with associated MSA stone tools have significant scientific and cultural-historic value. They are, as far as we know, unprecedented in South Africa. The high density of LSA shell middens is also important to note. The result of the survey have uncovered a significant glimpse of an ancient landscape featuring remnants of soil surfaces with evidence of fossilized trees and bushes, human activity including stone tool manufacturing and shellfish collecting, and geological features providing resources for human behavior such as cobble beaches.

Future Goals

- Additional OSL dating of paleosols and establishment of a chronological framework.
- Continued documentation of paleosol assemblages to assess variability across the landscape.
- Continued raw material and resource availability surveys.
- Additional in-field use wear analysis.
- Small-scale excavations to understand how extensive surface occurrences may be vertically.
- Finish coarse resolution GPS mapping Phase III of the Nautilus Bay property and the Misgunst property.
- Begin mapping with high-resolution GPS on Phase I of Nautilus Bay property. The second phase will consist of a more static and targeted survey strategy using high precision GPS equipment (TopCon HIper XT wireless RTK GPS and TDS Nomad hand held computer).
- Begin to relate open-air archaeological occurrences with paleoenvironmental and cave records from Pinnacle Point.