ARCHAEOLOGICAL GEOLOGY AT THE SCOTT MILLER, MAGNA, BUNKER, AND MR. PEAT SITES, SAN LUIS VALLEY, COLORADO

Deacon Aspinwall, Adam Williams, Kyle Bufis, Patrick Ortiz, Jaime Sutton and Jared Beeton, Earth Sciences Program, Adams State University, Alamosa, Colorado

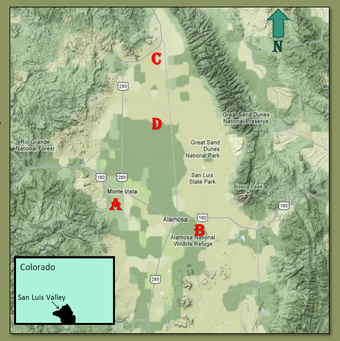

Figure 1. Approximate locations of paleo-wetlands investigated in the San Luis Valley.
A) Scott Miller
B) Mr. Peat
C) Magna
D) Bunker

Abstract

On going goarchaeological investigations were conducted in the summers of 2012 and 2013 to assess the potential for buried archaeological artifacts and to reconstruct the paleo-environment at four sites in the San Luis Valley of Colorado. All four sites have yielded mammoth remains, cultural artifacts, and contain peaty wetland deposits. Subsurface stratigraphic analysis and radiocarbon dating at Scott Miller suggest that the site was first a fluvial system depositing stratified sandy silts and evaporate sands. Thick peat deposits overlying these layers represent a localized rising of the water table sometime before ~11,530 rcybp. Woody peats representing boggy, saturated conditions alternate with organic silts representing marshy environments until sometime after ~9,120 rcybp. Mammoth bones were recorded as surface finds and embedded in the fluvial sediments underlying the peat. At the Mr. Peat site fluvial sands underlie peat deposits dating from ~13,400 to 11,300 rcybp. A similar landscape is recorded at the Magna site where mammoth bones were found in sediments underlying stratified peat deposits. Additional organic and bone samples from the Scott Miller and Magna sites have been submitted for radiocarbon age determination and will provide further temporal control. The Bunker Site is a ephemeral stream bed with paleosols, mammoth tooth and bone fragments, and lithic flakes scattered at the surface. Consideration of temporal and spatial patterns of landscape evolution at these sites is crucial for accurately interpreting the archaeological record and searching for buried archaeological deposits dating to specific cultural periods.

Geographic Setting

The SLV sits between the San Juan and Sangre de Cristo Mountains, both rising above 14,000ft (Figure 1); there is a decreasing precipitation gradient from west to east. Both mountain ranges have had an extensive history of glaciers that have provided outwash to the SLV but neither contains significant perennial snow today. The Scott Miller, Mr. Peat, and Magna study sites were once paleo-wetlands that have largely gone dry. The Bunker Site is next to a paleo-stream channel on the valley floor that is now dry. Peat, silt, and clay are common deposits in the wetlands and all three sit on alluvial fans from the mountains surrounding the SLV. The Mr. Peat site is located ten miles east, the Scott Miller Site is about 28 miles west, the Villa Grove Site is 53 miles north, and the Bunker Site is about 30 miles north of Alamosa.
Feeding the wetlands on the valley floor is the high water table that is found throughout the SLV; human water use and drying conditions have lowered the water table. Common vegetation in the SLV and the four sites consist of rabbit brush (Chrysothamnus *nauseousu*), greasewood (Sarcobatus *vermiculatus*), and sage brush (Arteniisia *tridentata*).

Scott Miller

The paleo-wetland is located within a semi-arid desert landscape, on the eastern edge of an alluvial fan spreading out from the volcanic San Juan Mountains within the Rio Grande Rift Valley (Figure 1-A). The wetland is no longer a permanent wetland, but may still have seasonal saturation despite the diversion of water for irrigation. This project was conducted in collaboration with United States Fish and Wildlife Service. Stratigraphic data were collected at three locations (Figure 2). Below is a table representing Trench 1 (Figure 3), as it exhibited the most complete stratigraphic sequence. Samples from this trench were submitted for radiocarbon analysis.

Layer	Age (cal yr B.P.)	Thickness (cm)	Structure and Description
Woody Peat 1	<9120	At least 25	Highly organic in nature, with obvious plant and root remains, large root casts, and gradational boundaries. Structure is friable, being held together by roots.
Organic Silt	9120±40	43	Faint stratification with an abrupt lower contact. Root casts present. Size and nature of the particles indicate a paleoplaya where windblown sediments would have settled and stratified in the bottom of the wetland. This is supported by the presence of lunette dunes downwind from the wetland system.
Evaporite Silt	11530 ± 50	14	Massive, faintly stratified, with slightly oxidized root casts. Lenses of organic rich clays. A fluctuating water table may have caused seasonally dry playas.
Woody Peat 2	Unknown*	6	Massive, stratified silty layers with few fine organic-rich clay layers. Oxidized root casts and krotovina common. The thick accumulation of peat represents a high water table.
Fluvial Sediments	Unknown	At least 32	Massive, faintly stratified. Oxidized root casts and much less organic matter.

* A radiocarbon date of 101 ± .3 yr B.P. is dismissed as incorrect as it is directly beneath the Evaporate Silt layer dated to ~11530 yr B.P. This may be a sampling error or an error from the radiocarbon lab.

Mr. Peat

The Mr. Peat site (Figure 1-B) is a paleo-wetland with peat layers overlying fluvial sands that trend west along the valley floor. Because of the ages of the existing strata and the many scattered bones of Bison *antiquus* and mammoth, this site is of interest to archaeologists studying early people and fauna in the San Luis Valley. The Mr. Peat site was mined for its peat deposits in the 1970s and 80s.
Our team dug seven pits (Figure 5) and did a transect of the fluvial sand layers to better understand the stratigraphy and archaeological potential of the site. The basic stratigraphy of the Mr. Peat wetland deposit is comprised of four main units, all of which are present at the surface in different areas (Figure 6). All ages at Mr. Peat are from Schumann and Machette (2007).

Layer	Age (cal yr B.P)	Thickness Range (cm)	Structure and Description
Organic Silt	~7,000-4000	12-80	Low density, light to dark gray in color. Commonly exposed at the surface as sub-polygonal irregular shapes. Contains lots of organic matter, carbonate balls, root casts, and occasional bones and tooth fragments. The silt is lumpy and blocky with no visible stratification or structure.
Woody Peat	~12,000-11,300	10-31	Stratified dark-orange to reddish-brown to brownish black, mostly composed of obvious plant and wood remains. Also exhibits the same small crystals observed in the mucky peat.
Mucky Peat	~13,400-11,000	10-36	Abundant in weakly stratified plant root, stem, and moss fragments with occasional small elongated crystals, possibly calcite or gypsum. Texture is predominately clayey silt.
Silt Lens	Unknown	Negligible	Occasional and sporadic occurrence between the Woody Peat and Mucky Peat.
Fluvial Sand	~34,000-14,000	Unknown-At least 50	Variable grain sizes from a silty sand to a sandy gravel, and frequently includes oxidized root casts and some cobbles (5cm-7cm). Interpreted to have been formed from the floodplain of a paleostream. Changes in texture indicate a meandering system. In several areas, large rounded cobble stones were present which could illustrate the actual stream bed.

Magna

The Magna Site (Figure 1-C) was a groundwater fed spring in the early 20th century that has since dried up. A University of Colorado field school completed preliminary work in the early 1970s to describe the area and excavate a mammoth; our main research was conducted in the trench that the school left behind (Magna-1). The land surrounding the trench is mostly composed of sparse vegetation and modern, small sand dunes in the middle of a mostly undeveloped housing subdivision.
Two trenches were dug at the Magna site (Figure 8) for a geoarcheological analysis. Stratigraphic layers at the site (Magna-1) include a surficial peat layer, a thin organic clay layer, and cobbly clay layer from which Mammoth remains were excavated. These cobbly clays were likely deposited in a saturated, wetland environment. The precise level at which the skeleton was found in the poorly-sorted cobbly clay is unclear from the 1972 report. The second trench (Magna-2) was taken from the upland landscape ~10 m northwest of the pit. At Magna-2, a different stratigraphy was recorded and appears to be the dominant stratigraphy in the area. Here, fluvial fine sands and silty clays with significantly less structure were recorded and the cobbly clay layer was either missing or more deeply buried. The extent of the target layer for this study, the buried cobbly-clay layer, is unknown. Below is a table describing the strata from Magna-1 including radiocarbon ages from this study.

Layer	Age (14C yr B.P.)	Thickness (cm)	Structure and Discription
Peat	3,040 ±20	35	Dark color, rich in organics and many roots. Blocky texture. Roots may hold layer together.
Organic Clay	6,030 ±25	2	Small, strong subangular blocky parting to friable. Roots present.
Poorly Sorted Cobbly Clay	Unknown	At least 46	Medium to large, strong subangular blocky with oxidized root casts.

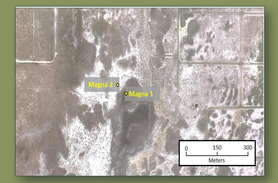

Figure 8. Magna site trench localities.

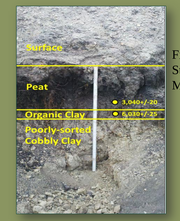

Figure 9. Stratigraphy at Magna site.

Bunker

The Bunker Site (Figure 1-D) is an ephemeral stream bed with scattered surficial mammoth tooth enamel and bone remains along with lithic flakes. In August of 2013, the site was investigated with the goal of finding the source layer for the mammoth remains and determining the evolution of the landscape. The stream had seasonal water until the mid-20th century.
Four test trenches were dug near the edges of the stream channel to investigate the depositional sequence. This yielded two periods of landscape stability and evidence of a fluctuating water table, as discovered at the other sites. Some thin layers of peat and wetland deposits were found at the surface. The source layer for the mammoth bones has not yet been found, however research is on going. No samples have been collected for carbon dating.

Figure 10. Bunker test locations.

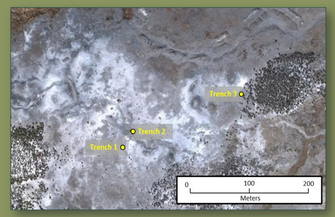

Figure 2. Scott Miller site with trench localities.

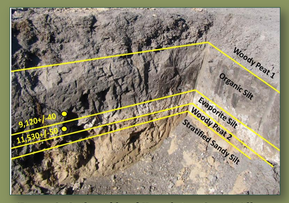

Figure 3. Soil profile of Trench 1 at Scott Miller site.

Figure 4. Points found at the Scott Miller site provided by RMC Consultants, Inc. and U.S. Fish and Wildlife Service.

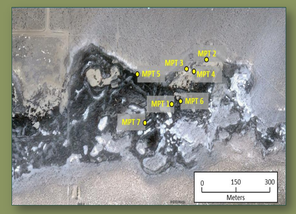

Figure 5. Trench localities at Mr. Peat site.

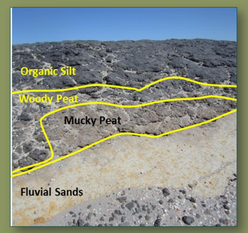

Figure 6. Stratigraphy of Mr. Peat site.

Discussion

The primary purpose of this research was to analyze the potential for finding buried, in-situ, pre-Clovis cultural deposits at 4 sites in the San Luis Valley. Changes in climate, fluctuating water table, wind processes, and human diversion of water drainages provide some challenges, but the body of evidence compiled suggests continued investigations at these sites is warranted. The amount of and temporal range of the artifacts and surficial mammoth remains found at the Scott Miller site suggest prolonged periods of human usage, suggesting the area was primarily used for hunting and later homesteading. A similar story can be inferred at the Mr. Peat site, although in-situ mammoth remains have not been recorded. At the Magna site, datable radiocarbon material still needs to be found in-situ in the cobbly clay layer, which is the layer in which a mammoth was excavated.
Because the Fish and Wildlife Service, The Denver Museum of Nature and Science, and students from Adams State University are committed to continuing investigations, there is a high potential to find more archaeological evidence and work toward a better understanding of the geologic story and how it all fits into early human habitation of the San Luis Valley.
With a growing theory that humans may have been here prior to Clovis time, it is important to continue geoarcheological investigations. Pleistocene megafauna remains, and cultural artifacts. In the summer of 2014, research will continue in order to provide further temporal control of Pleistocene and early-Holocene sediments. This research includes finding additional sites associated with paleo-wetland deposits and radiocarbon dating alluvial fan deposition along the borders of the San Luis Valley.

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