

The Snowmastodon site: investigation of the yellow-banded silt

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Abstract

In October 2010, bones of a juvenile mammoth were found during the excavation of a small reservoir near the town of Snowmass Village, Colorado. Excavation efforts led by Denver Museum of Nature and Science recovered more than 5000 bones, from 26 Pleistocene taxa including, mammoths, mastodons, giant ground sloths, extinct bison, and many smaller mammals.

At this site, there is a silt unit with a unique yellowish color that delineates the approximate transition between mastodons and mammoths. This unique color suggests that there are chemical and mineralogical between this and adjacent units. The yellowish color may be due to oxidized Fe and/or Mn species, which may indicate that the unit was deposited in shallow water conditions. Faunal remains, including tiger salamanders and snakes, support this idea.

Introduction

The Snowmastodon Site near Snowmass Village, Colorado offers a unique opportunity to study the climate and ecology of the Rocky Mountains during the last interglacial period (50 to 150 ka BP).

Vertebrate remains were found above and below a sedimentary unit called the yellow-banded silt that is found throughout the site. The unique yellowish color of this unit and its depositional environment are not fully understood. In order to obtain understand the origin of these characteristics, multiple samples of this unit were collected in trenches excavated to expose the site stratigraphy.



Figure 1. Photograph of mastodon bones in plaster jackets found at the Snowmastodon Site

Methodology

Samples of the yellow-banded silt were collected from eight different stations in the lake basin. One 5cm thick sample of this unit at each station was collected for later processing.

Analyses performed to the samples:

X-ray diffraction- examine the mineralogical composition

Energy dispersive X-ray fluorescence- quantify elemental concentration

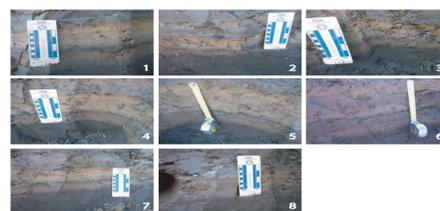


Figure 2. Photographs of the eight stations from which samples were taken of the yellow-banded silt

Results

Percentage of abundance of chemical elements in the yellow-banded silt and adjacent units

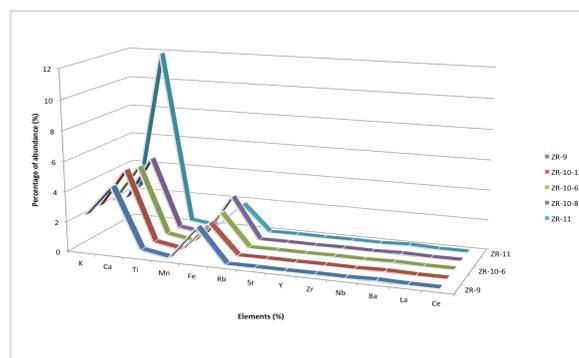


Figure 3. Percentage of abundance of chemical elements in the yellow-banded silt samples (ZR-10-1, ZR-10-6, ZR-10-8) and the units above (ZR-11) and below (ZR-9). Based on our results, there is very little difference in chemical concentrations between the yellow-banded silt and adjacent units.

Results of the x-ray fluorescence analysis does not reveal significant differences in the amounts of Fe between the yellow-banded silt and the adjacent units (Figure 3)

Percentage of abundance of minerals in the yellow-banded silt

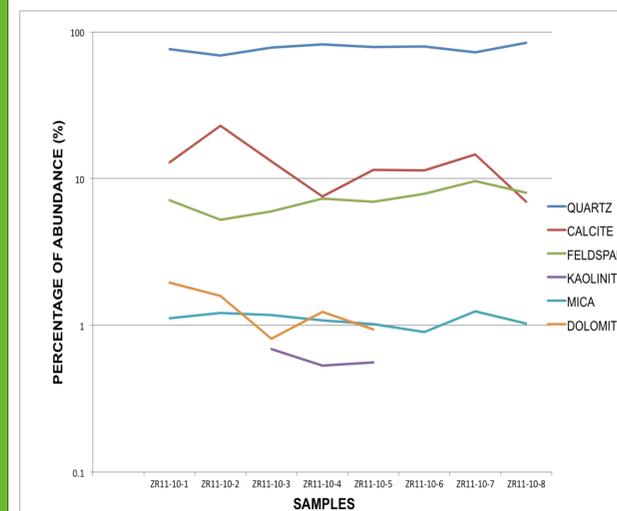


Figure 4. Concentrations of minerals present in the yellow banded silt. Quartz is the most abundant mineral in this unit.

Results of the x-ray diffraction analysis (XRD) showed that quartz is the most abundant mineral (see Fig. 4). All the samples were high in quartz, but sample 8, which was located near the shoreline is the especially high in quartz. Other minerals found are calcite, feldspars, kaolinite, mica, and dolomite.

Conclusions

Yellowish color:

Differences in the amounts of iron and other elements in the yellow-banded silt are not responsible for its unique yellowish color. We hypothesize that the unique yellowish color is due to the oxidized iron species (Fe_2O_3 rather than FeO), which may indicate that deposition of this unit occurred in shallow waters. Further chemical analysis is necessary to determine if this is the case.

Depositional environment:

The findings of sedge plants and bones belonging to small animals such as tiger salamanders are indicators that the water depths were shallow when this unit was deposited.

Acknowledgements

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For further information

Please contact cristina.lugo@upr.edu for more information. For information about the discoveries of the Snowmastodon site visit the webpage from Denver Museum of Nature & Science www.dmns.org.

