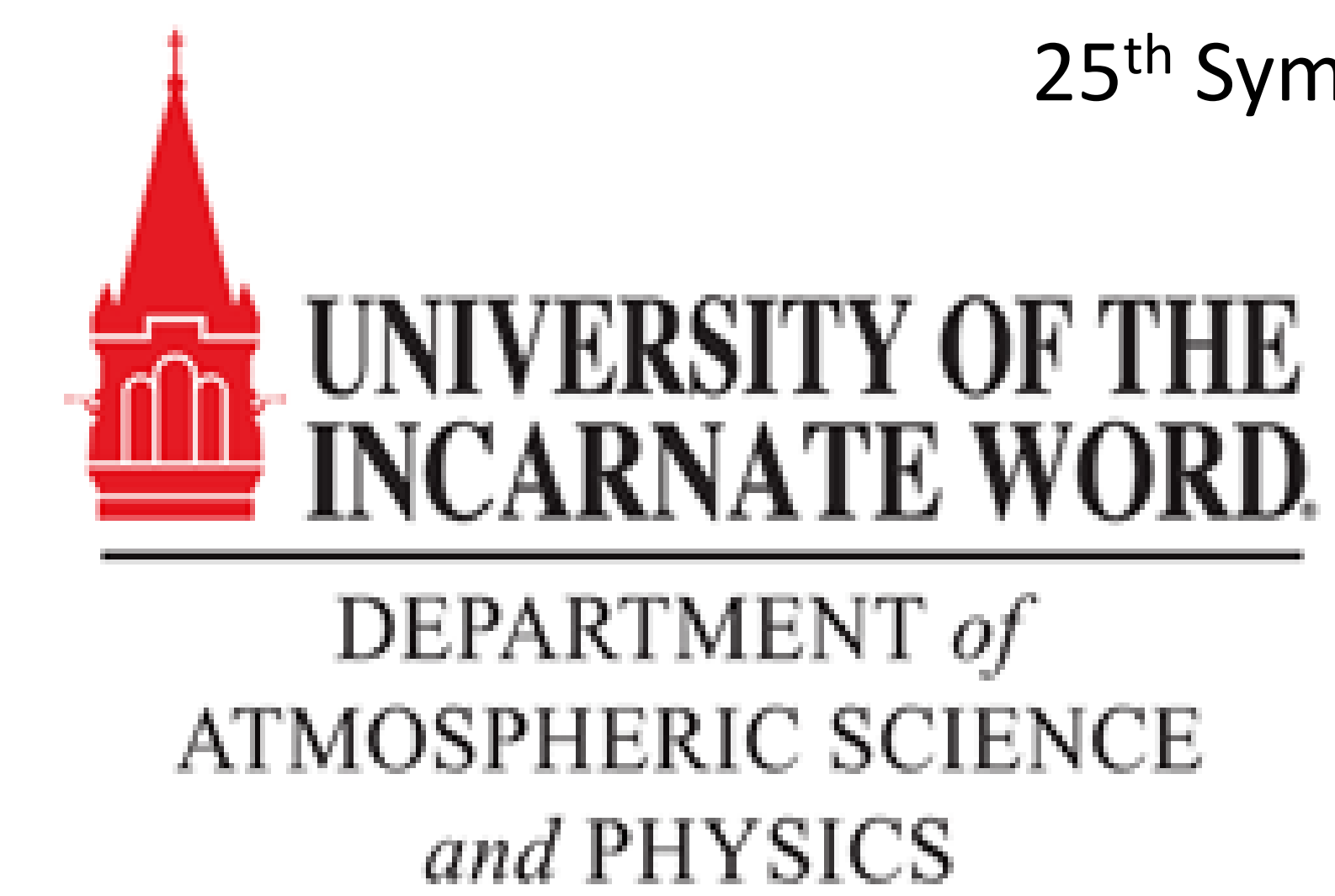


Teaching Aids in the Discussion of Climatology



Gerald J. Mulvey¹, Ph. D., CCM #571



Introduction

Introductory classes in climatology face a number of challenges. These courses are taken by both geophysical science majors and non-majors. Climate has been described as: “The slowly varying aspects of the atmosphere–hydrosphere–land surface system. It is typically characterized in terms of suitable averages of the climate system over periods of a month or more, taking into consideration the variability in time of these averaged quantities. Climatic classifications include the spatial variation of these time-averaged variables.” (ref 1)

To college freshmen, a discussion of statistical representations of meteorological variables can be “dry” and uninteresting. To spark students engagement, instructors use a combination of techniques including current meteorological event descriptions and videos, climate change model experiments, and use of proxy techniques to illuminate climate trends. Current students have been saturated with a wide variety of static and video media and so the use of videos and static images presented can be seen as unrealistic. To bring the study of climate to life and challenge the students, physical teaching aids are required. The best teaching aids are ones with a direct connection to the instructor. These can be microscopic or substantial.

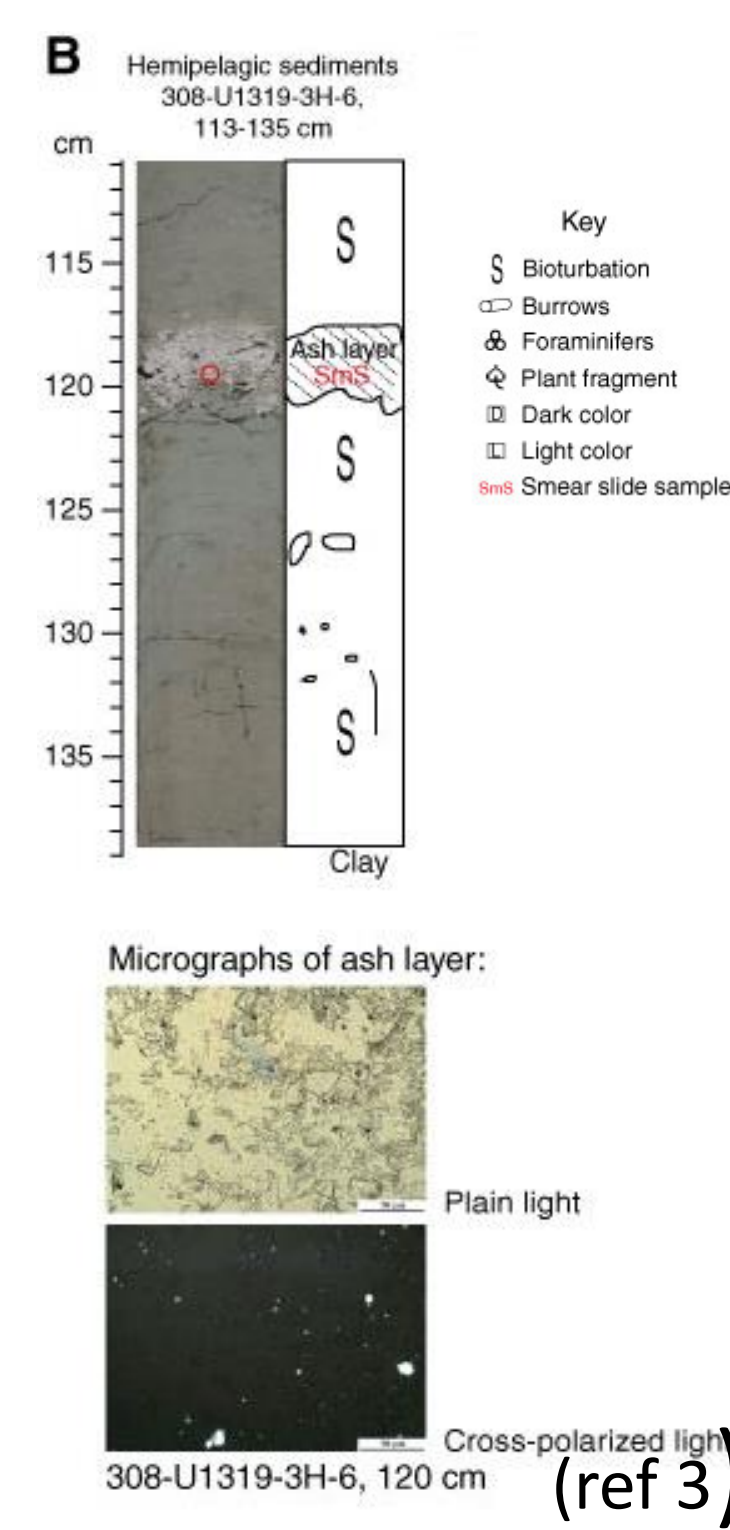
Examples of such aids are tree cookies, ocean sediment core smear samples, coral and barnacle specimens and field trip samples:



Tree “cookies” are a direct link to every day observables and can be used as examples of short duration proxies for temperature and moisture conditions



Coral extent and current health are links to current and past ocean temperatures.



Ocean sediment cores provide a source of multidisciplinary data on the longer term climate changes and some potential causes. (Samples are readily available)



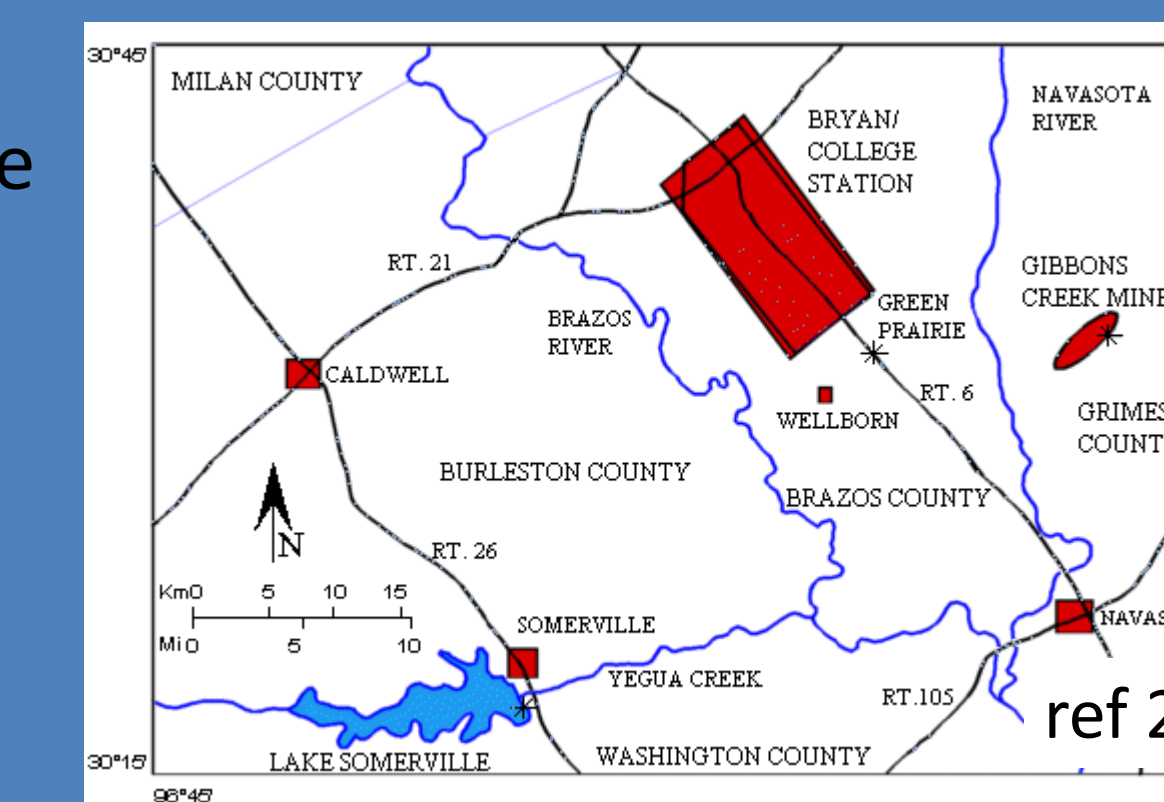
The biogeography of barnacles species are being studied as indicators of climate and climate change (ref 4)

Field Trip Samples

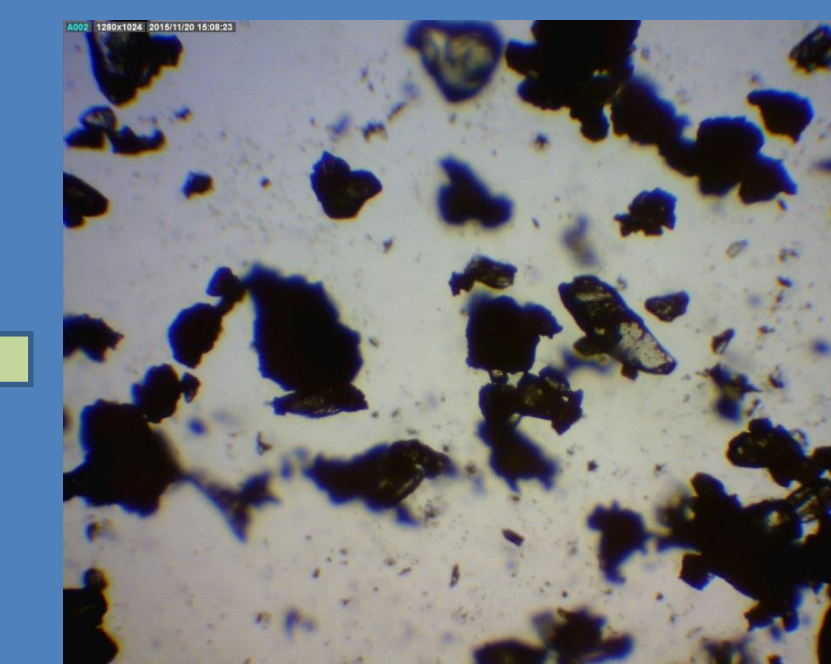
Stratigraphy observed and samples collected during field trips provide clear evidence of the climatic shifts that have occurred.

Field trip was a guided exploration of the Paleocene-Eocene Calvert Bluff Formation (Wilcox Group) and the Eocene Manning Formation (Jackson Group) of Lake Somerville spillway section in east-central Texas near College Station. The field trip took the form of a sequence of observations discussions and expert interpretation of the vertical and horizontal geology and stratigraphy of the exposed cliff face. (ref 2)

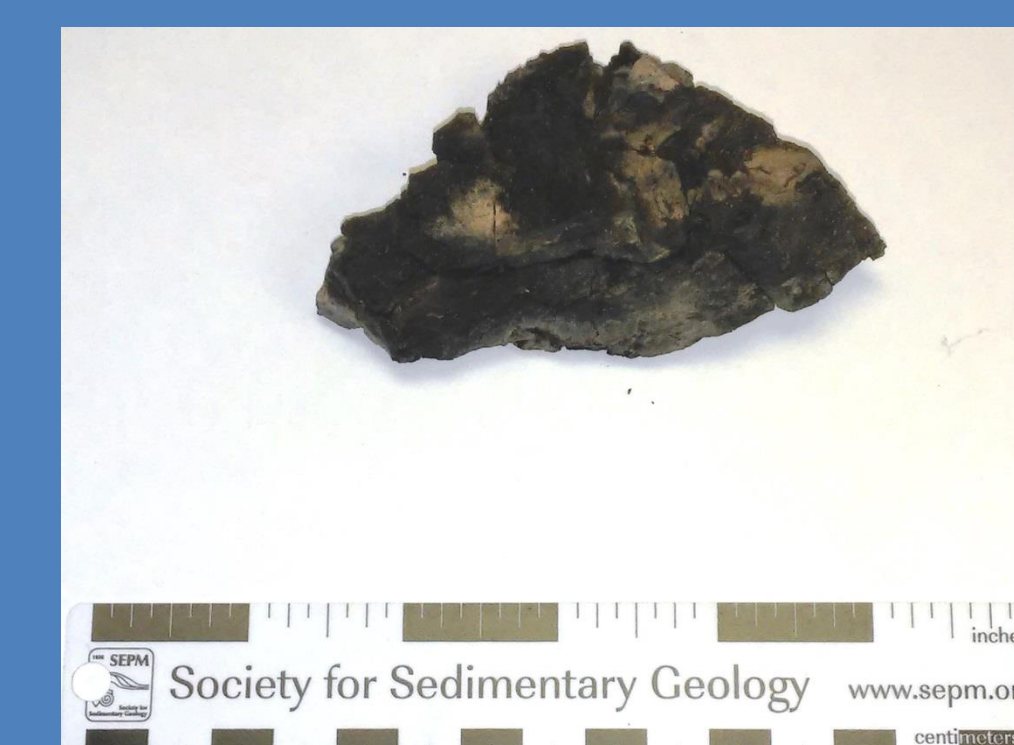
Field Trip Location



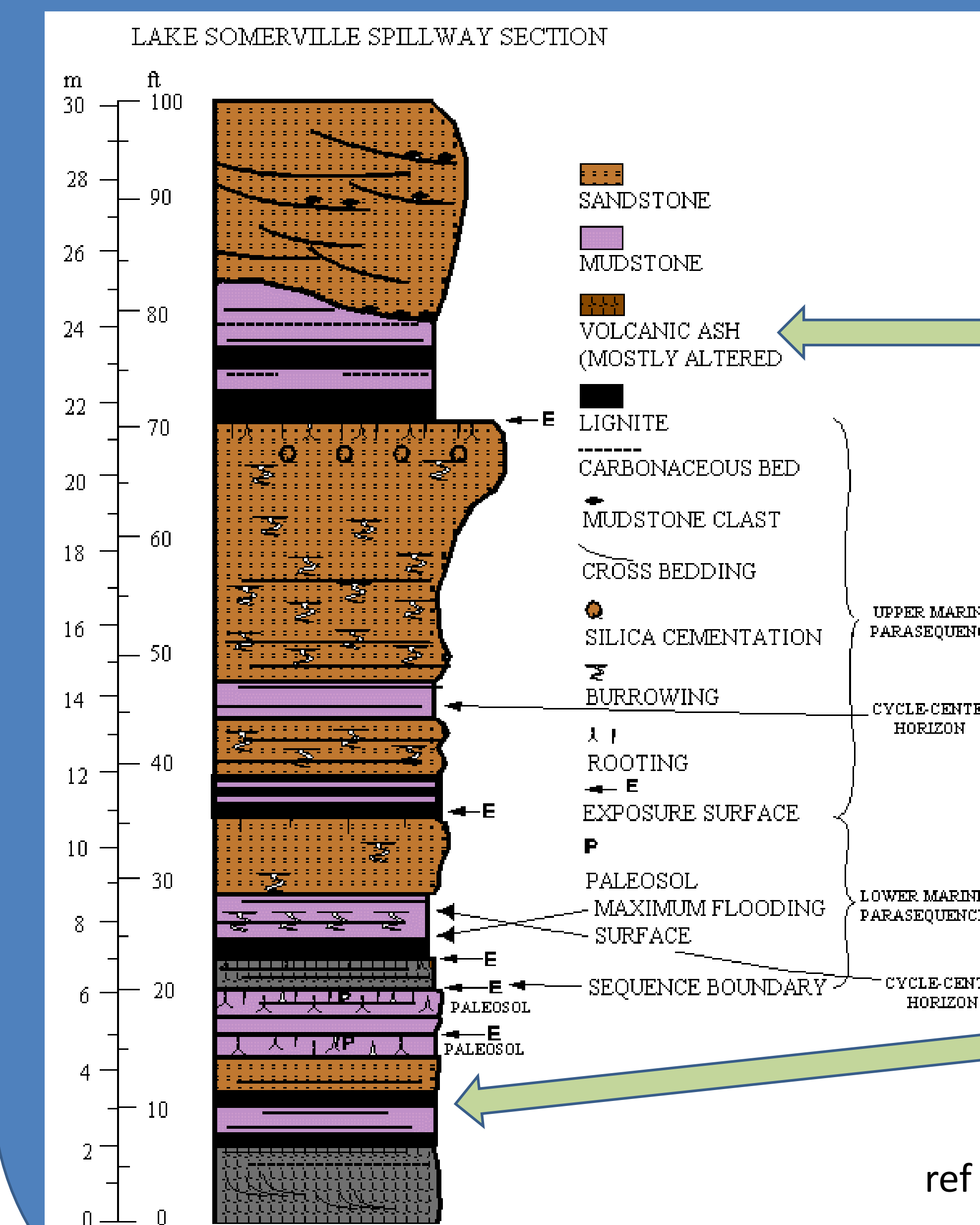
Samples collected during the June 24, 2015 field trip



Volcanic Ash Microphotograph



Lignite Sample collected June 24, 2015



The bottom lignite layer has been attributed to swamp environment present during accumulation

Acquisition of specimens can be done inexpensively, if one uses a sharp eye.

Summary

Engagement technique to expose students to the excitement of discovery through authentic experiences scientific is a strong stimulation for learning and retention of the material.

¹University of the Incarnate Word, San Antonio, TX mulvey@uiwtx.edu

Recognition

The author would like to thank the American Meteorological Society and the National Science Foundation for their support. This poster is a direct result of the MSI-REaCH (Reconstruction Earth's Climate History) workshop held at the Gulf Coast Repository at Texas A&M University in College Station, Texas on June 21-27, 2015.

References

1. *Glossary of Meteorology*, American Meteorological Society, 2014
2. *Coal Geology of the Paleocene-Eocene Calvert Bluff Formation (Wilcox Group) and the Eocene Manning Formation (Jackson Group) in east-central Texas: 1995 Field Trip for The Society for Organic Petrology*, Peter D. Warwick and Sharon S. Crowley, U.S. Geological Survey, Open-File Report 95-595
3. *Integrated Ocean Drilling Program Expedition 308 Preliminary Report: Gulf of Mexico Hydrology, Overpressure and fluid flow processes in the deepwater Gulf of Mexico: Slope stability, seeps and shallow water flow*, 30 May – 8 July 2005, doi:10.2204/iodp.pr.308.2005 (http://publications.iodp.org/preliminary_report/308/pre.html)
- Biogeography of Intertidal Barnacles in Different Marine Systems of Taiwan – Potential Indicators for Global Climate Change, (2012) Benny Chan and Pei-Fen Lee, ch. 7, pp. 119 – 136, *Agricultural and Biological Sciences - Global Advances in Biogeography*, ed. Lawrence Stevens, InTech