Integrating diverse technology platforms into geologic field and laboratory courses

Poster (Friday, April 20, 2018)

Chad Heinzel Elizabeth Kelly Morgan Streff Rachel Beck Ryan Butcher Blake Borchers, Mike Barron, Noah Brockshus, Evan Eades, Clifton Foy, James Janssen, Pierce Matt all from the University of Northern Iowa UNI

Diverse technological platforms are capable of enhancing learning opportunities, but they may also quickly become a distraction to core education objectives. For the past 10 years, the University of Northern (UNI) Iowa's Dept. of Earth and Environmental Sciences has sought effective means of increasing its students' geospatial reasoning and 21st century skills. Geographic Information Systems (GIS) thinking and applied skills are continuing to be a powerful tool for learning and research. GIS has been embedded into a variety of, Earth and Environmental Sciences, classes: grades 6-12th (summer workshops), Intro. to Geology, upper-level Geology and teacher professional development. Successes have ranged from enhanced topographic perceptions, ability to accurately collect field samples to a greater understanding of the importance of effectively communication geologic data. Recent University of Northern Iowa geochemistry/laboratory upgrades (XRD, XRF and ICP-MS), now provide opportunities for the second line of technological/education inquiry. These new analytical machines offer new pathways of discovery towards understanding minerals, rocks, water and ceramics; as well as opportunities to explore the inter-relationships between environmental and cultural material. A new geologic laboratory methods course guides students through proper safety measures, physical and chemical laboratory techniques, identifying technique advantages and disadvantages and effective communication of scientific research.

Integrating diverse technology platforms into geologic field and laboratory courses

Poster (Friday, April 20, 2018)

Chad Heinzel Elizabeth Kelly Morgan Streff Rachel Beck Ryan Butcher Blake Borchers, Mike Barron, Noah Brockshus, Evan Eades, Clifton Foy, James Janssen, Pierce Matt all from the University of Northern Iowa UNI

Diverse technological platforms are capable of enhancing learning opportunities, but they may also quickly become a distraction to core education objectives. For the past 10 years, the University of Northern (UNI) Iowa's Dept. of Earth and Environmental Sciences has sought effective means of increasing its students' geospatial reasoning and 21st century skills. Geographic Information Systems (GIS) thinking and applied skills are continuing to be a powerful tool for learning and research. GIS has been embedded into a variety of, Earth and Environmental Sciences, classes: grades 6-12th (summer workshops), Intro. to Geology, upper-level Geology and teacher professional development. Successes have ranged from enhanced topographic perceptions, ability to accurately collect field samples to a greater understanding of the importance of effectively communication geologic data. Recent University of Northern Iowa geochemistry/laboratory upgrades (XRD, XRF and ICP-MS), now provide opportunities for the second line of technological/education inquiry. These new analytical machines offer new pathways of discovery towards understanding minerals, rocks, water and ceramics; as well as opportunities to explore the inter-relationships between environmental and cultural material. A new geologic laboratory methods course guides students through proper safety measures, physical and chemical laboratory techniques, identifying technique advantages and disadvantages and effective communication of scientific research.

Particle Size and Heavy Mineral Analysis of Iowa Sandstone: A comparison of the Ordovician St. Peter and Pennsylvanian formations

Poster (Friday, April 20, 2018)

Elizabeth Kelly Chad Heinzel
University of Northern Iowa

The sedimentology (e.g. particle size, heavy mineral content) of two Iowa sandstone formations are under investigation. The two sampling locations are the Ordovician St. Peter Sandstone from northeastern Iowa and the Pennsylvanian sandstone from Fallen Rock State Preserve. Previous research has found the St. Peter to be mature (very well-sorted, well-rounded, and containing very few heavy minerals), which has been verified by this research project. The current investigation intends to expand these data as well as identify the characteristics of the sandstone found at Fallen Rock State Preserve. For particle size analysis, sand sizes are separated by sieving. Heavy mineral analysis will be conducted by separating dense minerals from the medium sized sands (.5-.25mm) with LST. Then, these minerals are identified using a petrographic microscope. Ultimately, the purpose of this research is to determine the sources of both sandstone formations and compare their characteristics.

Crinoid; Iowa's State Fossil ??

Oral (Saturday, April 21, 2018)

Raymond Anderson
Cedar Valley Rocks and Minerals Society

Iowa is one of 10 states that does not have an official State Fossil. This year the Cedar Valley Rocks and Minerals Society and other "friends of Iowa fossils" are working to convince the Iowa legislature to designate the crinoid as Iowa's State Fossil. The crinoid is a marine animal with the general body shape of a flower, so it is often publicly referred to as a "sea lily." Crinoids live in marine environments and were among the Earth's earliest animals, having been around for at least 508 million years (450 million years in Iowa). Although they still live in today's oceans, they flourished during the Paleozoic (550-250 million years ago) when most of the rocks that underlie Iowa were deposited, and they are common fossils in these rocks. Spectacular crinoid collections from Le Grand, Burlington, and Gilmore City are known to paleontologists world-wide, and samples are prominently displayed in museums around the world. The University of Iowa Museum houses about 50,000 crinoid specimens, many from Iowa, gathered by numerous collectors over the past 150 years. Senate Joint Resolution 2001 "a joint resolution recognizing the fossil crinoid as the state fossil" will soon be debated in the Iowa Legislature.

Implications of a Deep Research Borehole in Northeast Iowa

Oral (Saturday, April 21, 2018)

Ryan Clark
Iowa Geological Survey

The U.S. Geological Survey has been investigating the deep bedrock geology of northeastern Iowa and southeastern Minnesota for several years. The purpose of their investigation is to better characterize the Precambrian geology of the region. The goal is to correlate geologic features in northeastern Iowa with features in the Lake Superior region that host economic mineral deposits. Utilizing airborne and ground-based geophysical techniques has revealed a great deal of information however much more work is needed. The next step in the process it to drill a research borehole to collect rock core samples for further analyses.

It has been proposed that the borehole should be converted to a monitoring well nest after the core sampling has been completed. This part of the project is still in the initial planning phase and is struggling to achieve funding support. This talk will provide some background on the project and discuss the potential impacts that a research boring and monitoring well nest such as this could have on the scientific community in Iowa.

AN ARCHAEOMETRIC ANALYSIS OF IRON AGE CERAMICS, WESTERN SICILY

Oral (Saturday, April 21, 2018)

Chad Heinzel Paige LePlant
UNI

Selinunte, an important archaeological site, is located on the south-western coast of Sicily about 25m above sea level. It was built over three hills (Marinella, Manuzza, and Gaggera) and is 1500m long by 1000m wide, with the Acropolis taking up 500m by 300m. The site rests on top of lower Pleistocene aged sedimentary rocks made mostly of sand and clay with calcarenite. The purpose of this study is to analyze the chemical properties of Mediterranean pottery collected from western Sicily (e.g. Selinunte, Salemi and Partanna) and Lipari. These data are being used to learn about potential ceramic technologies and as attempt to characterize the potential provenances of the artifacts. In total, 91 samples were tested, 25 of which are approximately 6th century BC pottery pieces collected from Selinunte. The other 5 are sediment sample collected from the island of Lipari along the Cave di Caolino Trail.

The pieces were crushed with a mortar and pestle and examined using XRF, PANalytical (MiniPal 4), analysis. The highest concentrations from Lipari, tested both with and without oxides, were SiO_2 (18-71.3%), Al_2O_3 (6.9-23%), Fe_2O_3 (0.5-13.4%), and CaO (0.052-28.3%). The Selinunte samples (n = 91), contained high levels of Si, Fe, Al, and SiO_2. Selinunte does not have as high of a concentration as the Greek ceramics but shows a high amount of Si, Ca, and SiO_2. Lipari sediment consists mostly of Si and SiO_2 with smaller similar amounts of Fe, Ca, and Al. The Partanna artefacts were also nearly all Si and SiO_2

Plaster:

Contained very high levels of Ca, CaO, and Si

These samples are currently undergoing further characterization physically (petrographic thin sections) and chemically (Inductively Coupled Plasma Mass Spectroscopy).

The results from the Selinunte pieces are still to come. These findings will then be compared to other geological areas to determine the place of origin, as well as differences in Greek and Phoenician pottery styles.

The entire site is 1.5 by 1 km…

Acropolis = living area 500 by 300

Selinunte, an important archaeological site, is located on the south-western coast of Sicily about 25m above sea level. It was built over three hills (Marinella, Manuzza, and Gaggera) and is 1500m long by 1000m wide, with the Acropolis taking up 500m by 300m. The site rests on top of lower Pleistocene sedimentary rocks made mostly of sand and clay (calcarenite). The purpose of this study is to analyze the chemical properties of Mediterranean pottery collected from western Sicily (e.g. Selinunte, Salemi and Partanna) and Lipari. These data are being used to learn about potential Iron Age ceramic technologies and as an attempt to delineate the relationships between natural resources (clay) and ceramic artefacts. In total, 91 samples were tested, 65 of which are approximately 6th century BC pottery pieces collected from Selinunte while twelve are plaster samples taken from Selinunte's remaining architecture. Buildings at Selinunte were built primarily with locally quarried Tufa. The remaining samples include: 5 sediment samples from the island of Lipari along the Cave di Caolino Trail, 3 Partanna artefacts, and 6 Greek ceramics from a site near Selinunte. Samples were geochemically 'fingerprinted' through petrography, X-ray fluorescence and inductively coupled plasma mass spectrometry.