

WSU GEOSCIENCE RESEARCH OPPORTUNITY

PROJECT TITLE: **Impact Rocks**

ADVISOR: Dr. Jennifer L. B. Anderson

DESCRIPTION OF PROJECT: There are two main priorities for this research project: (1) Cataloging the growing collection of terrestrial rocks that have been affected by impact cratering processes (impact melts, breccias, and other shocked rocks) and (2) focusing specifically on looking for planar deformation features (pdfs) in recently sampled central-peak rocks from the Glover Bluff impact crater in central Wisconsin. These “Impact Rocks” tell the story of the most violent geologic process in the solar system – impact cratering. The goal of this project is to create a catalogued collection of terrestrial rocks affected by the impact process and found associated with known impact craters as well as a collection of thin sections of specific samples to be used for research and education. In particular, the search for pdfs in the Glover Bluff impact crater might be the first time that such features are found for that relatively under-studied impact crater with the exposure of new sedimentary rocks in the central peak region.

**** This project would be a very good fit for an Earth & Space Science Education major or someone interested in working with informal education at museums or state/national parks, etc. ****

CREDITS: 3 credit project, over 2 semesters

REQUIRED / CONCURRENT COURSES: Earth & Life through Time (GEOS 235)

Geological Research Strategies (GEOS 470) – Not required for ESCT majors

Completion of Planetary Geology or Astronomy would be beneficial, but not required

EXPECTED PROJECT WORK: Curation and description of the Impact Rocks samples. Preparation of Glover Bluff samples to be sent out and thin sectioned, and possibly other samples. In-depth study of thin sections, looking for signs of shock metamorphism. Investigation of the impact cratering process and shock metamorphism of terrestrial rocks. (PROJECT WORK IS SUBJECT TO CHANGE AS SITUATIONS WARRANT)

EXPECTED PROJECT DELIVERABLES: Curated Impact Rocks collection, including descriptions and thin sections. Final report regarding the evidence for/against shock metamorphism of the Glover Bluff central-peak samples. Poster presentation at WSU Research Symposium and Earth Talks presentation to Geoscience Department. Possible abstract and presentation at regional or national conference. (PROJECT DELIVERABLES ARE SUBJECT TO CHANGE AS SITUATIONS WARRANT)

WORK CAN BEGIN: Background research and literature review can begin ASAP.

POSITIONS AVAILABLE: 1-2 students

TO SCHEDULE AN INTERVIEW FOR THIS WORK, PLEASE CONTACT: Dr. Jennifer L. B. Anderson

RESEARCH APPLICATIONS MUST BE SUBMITTED TO THE GEOSCIENCE DEPARTMENT CHAIR BY ___ / ___ / ___

WSU GEOSCIENCE RESEARCH OPPORTUNITY

PROJECT TITLE: **Lighting Practices on WSU Campus**

ADVISOR: Dr. Jennifer L. B. Anderson

DESCRIPTION OF PROJECT: The dark night sky is a natural resource that is disappearing due to light pollution. One of the largest sources of light pollution within the city of Winona is Winona State University campus. Light pollution not only affects people who enjoy the night sky, but also interferes with bird migrations, insect and bat populations, and other nocturnal and diurnal animals and plants. The WSU Observatory is located right in the middle of WSU main campus and viewing is greatly diminished by current lighting practices. Beyond all of this, light pollution is a sustainability issue – money is wasted as energy is needlessly lost to the atmosphere. The goal for this project is to build on previous studies of light pollution on campus by mapping the types of light sources and practices across WSU campus using GIS. This data, when combined with previous light pollution surveys, will be used to make recommendations about how to change lighting practices on campus to help protect the night sky and reduce energy costs on campus.

**** This project would be a very good fit for someone interested in working with GIS. ****

CREDITS: 3 credit project, over 2 semesters

REQUIRED / CONCURRENT COURSES: GIS (GEOS 316)
Geological Research Strategies (GEOS 470) – Not required for ESCT majors

EXPECTED PROJECT WORK: Background research on light pollution and various lighting practices. Creation of a GIS map of WSU campus that records the location of every light source on campus including lighting type and shielding. Student researcher will work with paper records from the WSU Facilities staff to digitize their exterior lighting data. Student researcher must be able to use a GPS unit to take data and use GIS to map out the data. Lighting practices will be determined based on the light-source type and fixture. GigaPan imaging of WSU campus from the WSU Observatory and the city of Winona from Garvin Heights at night might be completed to provide a sense of current lighting practices. (PROJECT WORK IS SUBJECT TO CHANGE AS SITUATIONS WARRANT.)

EXPECTED PROJECT DELIVERABLES: GIS maps of current lighting practices across WSU campus. GigaPan images of WSU campus and the city of Winona at night. Poster presentation at WSU Research Symposium and Earth Talks presentation to Geoscience Department. Final written report. Possible abstract and presentation at regional or national conference. (PROJECT DELIVERABLES ARE SUBJECT TO CHANGE AS SITUATIONS WARRANT)

WORK CAN BEGIN: Background research and literature review can begin ASAP. Lighting surveys and GigaPan imaging must be completed during Fall semester, before it snows.

POSITIONS AVAILABLE: 1-2 students

TO SCHEDULE AN INTERVIEW FOR THIS WORK, PLEASE CONTACT: Dr. Jennifer L. B. Anderson

RESEARCH APPLICATIONS MUST BE SUBMITTED TO THE GEOSCIENCE DEPARTMENT CHAIR BY ___ / ___ / ___

Course Outline and Evaluation Plan

GEOS 499: Independent Study in Geoscience

Student: Tyler [REDACTED]
Research Advisor: Dr. Jennifer L. B. Anderson
Project Title: **Astrophotography II**
Semester: **Fall 2016, 2 credits**

Description:

Tyler will be using the WSU Observatory to continue his astrophotography project taking photos of the Moon through the telescopes to use for educational and outreach purposes. He has learned how to use the main telescope on the roof of Minne to take photographs. He is teaching himself how to process these images on his computer using Backyard EOS astrophotography software. His goal for this research is to image the Moon at different phases as well as star trails and design a unit on Astronomy for an 8th grade Earth Science class that incorporates these images. In addition, he will write a user's guide for completing astrophotography at the WSU Observatory so that others can follow his project.

Objectives and Plan:

1. Continue imaging the Moon at different phases and star trails and processing the images using the Backyard EOS software.
2. Design 2-3 lessons plans that utilize the images he has taken in an 8th grade Earth Science classroom.
3. Create a user's guide to operating the telescope with the attached cameras and the software.
4. Present his research to the Geoscience Department during our Earth Talk's seminar in late November.

Method of Evaluation:

50% -- based on the quality, thoroughness, timeliness, and professionalism of Tyler's data collection, analysis, and project-related activities throughout the semester.
30% -- 2-3 lesson plans with associated images.
20% -- user's guide for astrophotography at the WSU Observatory.

Bibliography:

Astronomy magazine online site (www.astronomy.com) and articles
Sky & Telescope magazine online site (www.skyandtelescope.com) and articles
Legault, Thierry (2014) Astrophotography, 1st Edition, Rocky Nook, 240 pages.
Operation manuals for:
 12" and 8" Meade Reflecting telescopes
 Meade LPI and DPI cameras and Astrostar Suite software
Minnesota State Science Standards, Grades K-12

Tyler [REDACTED], Student

Jennifer Anderson, Advisor

Course Outline and Evaluation Plan

GEOS 499: Independent Study in Geoscience

Student: Michaela [REDACTED]

Research Advisor: Dr. Jennifer L. B. Anderson

Project Title: Light Pollution Survey – Region 2, Winona MN

Semester: Fall 2014, 2 credits

Description:

Michaela will be measuring and analyzing the amount of pollution over the skies of Winona, MN. She will be using a GPS unit to map her data and two systems (light meter and sky quality meter) to measure the brightness of the night sky around the Winona, MN, area. The goal for this semester is to take data in three regions (if time permits): (1) WSU Main Campus and surrounding area; (2) Softball fields near East Lake; and (3) Blufftop dark skies location.

Objectives and Plan:

1. Become familiar with background information regarding light pollution sources and solutions.
2. Collect data on the level of light pollution using two different methods (an astronomical and a physical measurement of light intensity) on WSU campus including the Observatory as well as other chosen locations in the Winona area.
3. Prepare data to be uploaded into ArcGIS for analysis during spring semester.
4. Produce a summary of the work accomplished this semester, including detailed methods and background sections for final report.

Schedule:

Michaela and Dr. Anderson will meet weekly during the fall semester 2014.

September – Literature review and data collection design.

October – Data collection.

November – Data analysis and write-up of initial findings.

Finals week, December – Summary and Methods/Background section due.

Method of Evaluation:

50% -- based on the quality, thoroughness, timeliness, and professionalism of Michaela's data collection, analysis, and project-related activities throughout the semester.

30% -- Data collection

20% -- the summary and methods/background sections which should adhere to the following format and criteria:

Standard scientific format outlining the project and necessary background information.

Contains bibliography cited according to the GSA Author's guide.

Written in a manner appropriate to a general audience of WSU students & administrators.

Bibliography:

Klinkenborg, V. (2008). Our Vanishing Night. *National Geographic Magazine*.

IDA Brochure. (2014). *International Dark-Sky Association*.

Light Pollution Matters. (2013). *International Dark-Sky Association*.

Good and Bad Lighting in the Central Valley. (2007). *Skykeepers*.

Selene Resources. (2014). *SELENE NY*. Retrieved from <http://selene-ny.org/resources/> (2014)

Michaela [REDACTED] Student

Jennifer Anderson, Advisor