

Undergraduate Research Symposium May 18, 2018 Mary Gates Hall

Online Proceedings

POSTER SESSION 1

Commons East, Easel 49

11:00 AM to 1:00 PM

The Enigmatic Geologic History of the Indo-Burman Ranges in Myanmar

Diana Park, Senior, Oceanography, Earth and Space Sciences: Geology

Mentor: Alexis Licht, Earth and Space Sciences

Myanmar, in Southeast Asia, has recently opened access to foreign geologists; however, most of the Burmese geology still remains to be studied. At the western edge of Myanmar, the Indo-Burman mountain ranges today form a prominent topographic high. One of the big mysteries in geology of Myanmar is the precise timing of the Indo-Burman Ranges uplift, which is currently estimated to be in between the early Cretaceous (~140 million years ago) and the Neogene (~20 million years ago) periods. Here, we present preliminary sedimentary provenance in river and sedimentary basins between the Indo-Burman Ranges and the central Myanmar low plains. We use Uranium-Lead radioactive ages of detrital zircon crystals from dated sedimentary rocks, revealing the source of the sedimentary input which resulted from the uplift of the surrounding mountains. Our results will indicate the timing of sedimentary input to our study basin sites, and when the uplift of the Indo-Burman Ranges occurred. Dating the Indo-Burman Ranges uplift will contribute to understanding tectonic activities in the past, which would have affected the regional climate evolution, such as the Asian monsoons.

POSTER SESSION 1

Commons East, Easel 52

11:00 AM to 1:00 PM

How Old Are the Olympic Mountains?

Samuel Joseph Shekut, Junior, Earth and Space Sciences: Geology

Mentor: Alexis Licht, Earth and Space Sciences

In a region as tectonically and volcanically active as the Pacific Northwest, accurate models of tectonic history are essential to inform our understanding of modern tectonics dynamics. At present, very little is known of the history of the Olympic Mountain Range. Previous work has used fission

track dating to date the onset of exhumation of the Olympic Mountains and has placed it around 18 Million years. Fission track dating as a method relies on the analysis of fissures in certain uranium containing minerals, in this case zircon and apatite, to determine when the rock body they inhabit cooled below the temperature at which that mineral is no longer able to chemically diffuse with its surroundings. This data is a proxy for paleodepth, however it gives little information about the topography at that time. In the past 20 years, newer, more precise methods have been developed such as Uranium-Lead dating of detrital zircon crystals. This method relies on analyzing zircon minerals extracted from sandstones and dating them using the radioactive decay of Uranium to Lead, and eventually comparing these ages with those of the potential sediment sources to reconstruct their provenance. Here, we analyze sandstones from the Seattle Basin and Olympic Peninsula to reconstruct the uplift history of this region. This approach coupled with stratigraphic techniques may be used to place a more precise age constraint on the onset of high topography in the modern Olympic Mountains: an event which tremendously impacted regional tectonics, ecology and climate in Washington State.

POSTER SESSION 1

Commons East, Easel 51

11:00 AM to 1:00 PM

Investigating Dramatic Climate Change in the Mysterious Sedimentary Archives of Myanmar

Dominic James Brinas Jones, Senior, Earth & Space Sciences (Environmental)

Virginia Heidi Littell, Graduate, Earth & Space Sciences

Mentor: Alexis Licht, Earth and Space Sciences

The Eocene-Oligocene Transition (EOT) 34 million years ago was one of Earth's most dramatic global cooling events from a hothouse with no ice caps to our current icehouse world with intermittent glaciations. It is important to understand the details behind the EOT in order to understand the mechanisms that can drive such significant climate change as well as the magnitude of the effects such a shift could cause to modern ecosystems. Here, we apply geochemical methods to organic-rich rocks from the Yaw Formation in the central Myanmar to reconstruct its paleoenvironments and gain a better understanding of Eocene climate in Southeast Asia. The ratio of the stable Carbon isotopes C12 and C13 (d13C) from

plant matter in rocks can be used as a proxy for changes in the amount of woody cover in tropical ecosystems as well as mean annual precipitation (MAP). Using mass spectrometry on coals and sandstones of various ages, we are able to see how the $\delta^{13}C$ values have evolved over time in order to observe possible trends in Myanmar's paleoenvironment. Preliminary results show an increase in $\delta^{13}C$ values over time which could indicate aridification in the environment.

POSTER SESSION 2

Commons West, Easel 2

1:00 PM to 2:30 PM

Addictive Experiences in Mobile User Interfaces

Katherine Suvan Yang, Sophomore, Pre-Major (Arts & Sciences)

Jonathan Anh Tran, Junior, Human Centered Design & Engineering

Mentor: Alexis Hiniker, Information School

Smartphones and mobile applications have enabled users to access a world of features and content in the palm of their hands. Many of these mobile applications are professionally designed to keep the user engaged, or what some consider "addictive." Our goal in this study is to understand what specific user interface features make it more or less likely a user will feel that an experience is addictive. We also hope to learn more about what specific features prompt users to self-interrupt to engage with an app. We are currently developing a mobile application that helps spark conversation about phone usage and helps users reflect on their behaviors and habits. We are also conducting interviews that include a phone demo and participant sketching, enabling us to co-design new interfaces with users. As phones become ever-present in all of our activities, we seek to understand people's experiences with feelings of addiction, self-interruption, and checking in, and to identify what designers can do to help users engage in behaviors they feel good about. We have found that participants can identify negative feelings about their phone usage behaviors but those feelings are not strong enough for them to actively seek change

POSTER SESSION 2

MGH 258, Easel 179

1:00 PM to 2:30 PM

Fossil Mollusks from the Sinop-Boyabat Region of Turkey

Andrea M. Hatsukami, Senior, Earth & Space Sciences (Physics)

Mentor: Elizabeth Nesbitt, Earth And Space Sciences

Mentor: Alexis Licht, Earth and Space Sciences

This project focuses on fifteen potentially unpublished

species of molluscan fossils—specifically gastropods and oysters—originating from the Sinop-Boyabat sedimentary basin in north-central Turkey. The intent is to identify each fossil in order to date the surrounding rocks, as paleontologists have discovered an unusual mammalian fossil fauna in close proximity. Marine sedimentary rocks from this region accumulated in a small rift basin connected to the Black Sea, and span from the early Cretaceous to the late Paleogene periods (140 to 30 million years ago). The invertebrate fossils were unearthed in the uppermost part of the sedimentary section consisting of shallow water coastal and reef limestones, and calcareous mudstones. Investigations in the Sinop-Boyabat have provided detailed rock descriptions, but additional clues gleaned from the invertebrate identifications will help determine a more temporally restricted age. The fossils must be identified to the generic level and, ideally, to the species level as well. Identification occurred in four stages. First, I separated each fossil into the taxonomic classes, Bivalvia and Gastropoda. Then I separated them based on shell characteristics and markings such as whorl length, aperture shape and size, and the presence or absence of axial ridges, sutures, or an apex. Next, I took photos of the most intact specimens. The final step has been reading through the literature and attempting to find a fossil description that matches each group. This is the most challenging stage as we cannot find publications that describe any of our specimens. Thus, we are using texts focusing on European and East Asian fossil faunas, none of which include matching identifications. Throughout the search for applicable literature, it became clear that the Sinop-Boyabat invertebrate specimens have not been studied before and many are new species.

POSTER SESSION 2

Commons West, Easel 3

1:00 PM to 2:30 PM

Design of Video-Viewing Platforms and Children's Media Consumption

Sharon Saiyin Heung, Junior, Human Centered Design & Engineering

Mentor: Alexis Hiniker, Information School

Mentor: Julie Kientz, Human Centered Design & Engineering

Watching entertainment media is a popular activity for children's learning and leisure, playing a central role in children's everyday lives. However, Child Development research shows that extensive video consumption is linked to unhealthy development, including disrupted sleep patterns, increased likelihood of obesity, and reduced imaginative play. In this study, we explore how video-viewing platform design features contribute to children's media use. We introduce CoCo's Videos: a video-viewing platform for preschoolers with features that encourage children to self-manage media consumption, en-

abling children to play a role in setting and sticking to their own limits on the amount of video consumption. We deployed three different versions of CoCo's Videos to 24 different families for three weeks in a counterbalanced within-subjects study design. Preschoolers experienced three different versions of CoCo's Videos: one version is neutral to the limits they set, another version enforces limits they set ("lock-out"), and the last version challenges the limit by automatically playing more content after their set limit ("post-play"). Our results show that the post-play feature significantly decreased children's autonomy and self-regulation, indicated by extended video-viewing time beyond the set limit, leading to increased parent intervention. Our results show that the lock-out feature did not reduce viewing time or parent intervention. Ultimately, our research advises others to avoid platforms that undermine children's autonomy and intention, which will likely be more effective than parental controls in developing healthy media habits.