Online Proceedings

Poster Session 1

MGH 241, Easel 123

11:00 AM to 1:00 PM

Kindness Online

Catherine Jaekyung Yoo, Senior, English, Informatics
Amulya Paramasivam, Sophomore, Engineering Undeclared
Jack Lo, Senior, Informatics: Data Science
Ashley Zhou, Junior, Informatics
Shiyue Sybil Wang, Recent Graduate, Informatics, Economics
Mentor: Alexis Hiniker, Information School

Communication on online platforms has become one of the primary methods by which people communicate with one another. Regardless of conversation space, either online or offline, arguments can arise. Through our research, we are studying the ways in which the design of a platform influences the tenor of a conversation and the factors that lead to fights and reconciliation. We conducted in-depth in-person and phone interviews with 23 adults to understand how arguments arise online, how they end in different circumstances, and received input for possible design ideas. We followed up with the interviewees to gather demographic information about them. Through affinity diagramming, we qualitatively analyzed the 23 interview transcripts to uncover recurring themes, such as the role of time, the stages of an argument, the way people move arguments from public to private spaces, and differences between images and text in sparking arguments. Based on these themes and design suggestions from participants, we made sketches for potential design ideas that can be implemented in social media platforms to encourage constructive discourse. We are planning to use the design sketches to create prototypes to test with participants for iteration, which we will describe in a research paper to share our findings and design ideas broadly.

Poster Session 1

MGH 241, Easel 124

11:00 AM to 1:00 PM

Modeling the Engagement-Disengagement Cycle of Compulsive Phone Use

Katherine Suvan Yang, Junior, Human Centered Design & Engineering
Jonathan Anh Tran, Senior, Human Centered Design & Engineering
Mentor: Alexis Hiniker, Information School
Mentor: Katie Davis, Information School

Many smartphone users engage in compulsive and habitual phone checking which they find frustrating, yet our understanding of how this phenomenon is experienced is limited. We conducted a semi-structured interview, a think-aloud phone use demonstration, and a sketching exercise with 39 smart phone users (ages 14–64) to probe their experiences with compulsive phone checking. Their insights revealed a small taxonomy of common triggers that lead up to instances of compulsive phone use and a second set that end compulsive phone use sessions. Though participants expressed frustration with their lack of self-control, they also reported that the activities they engage in during these sessions can be meaningful, which they defined as transcending the current instance of use. Participants said they periodically refect on their compulsive use and delete apps that drive compulsive checking without providing sufficient meaning. We use these findings to create a descriptive model of the cycle of compulsive checking, and we call on designers to craft experiences that meet users' definition of meaningfulness rather than creating lock-out mechanisms to help them police their own use.

Poster Session 2

Commons West, Easel 34

1:00 PM to 2:30 PM

Geological Evolution of Western Anatolia during the Late Cretaceous and Early Paleogene

Gui Guenther Aksit, Fifth Year, Earth and Space Sciences: Geology
Mary Gates Scholar, UW Honors Program
Mentor: Alexis Licht, Earth and Space Sciences
Mentor: Megan Mueller, Earth and Space Sciences

Anatolia, in modern Turkey, is a complex assemblage of micro-continents that collided during the Late Cretaceous and the Paleogene, 80 to 25 million years ago. Despite the large volume of work on the numerous Anatolian terranes and collisions, basic questions regarding the timing of collision, style of post-collisional deformation and development of topography remain enigmatic. In western Anatolia, the timing and mechanisms of these successive collisions are poorly understood and do not conform with current continent-continent collision models. This project reconstructs the evolution of the collision zone in order to reconstruct the tectonic evolution of western Anatolia and refine models of collisional tectonics. Here, we present new data from the 160-40 million year old sedimentary archives preserved in the Central Sakarya Basin, a sedimentary basin that formed adjacent to the collision zone. Two methods for sedimentary analysis are employed in this research: detrital zircon dating and sandstone petrography. Detrital zircon ages attained through Uranium-Lead dating techniques are compared to known ages from surrounding mountain ranges to determine the source of sediment through time and apply age constraints to stratigraphic layers. Sandstone petrographic analysis examines the composition of samples to determine sedimentary provenance. The evolution of sediment sources through time provides a robust timeline of collision, post-collisional deformation and topographic development. The results from zircon dating and sandstone petrography show an evolution of sediment provenance where the oldest, pre-collisional sediments are derived from an adjacent volcanic chain. The onset of collision, around 60 million years ago, is marked by a change in sediment composition as collision creates topography and fault systems exhume older, buried rock. In constructing a progression of sediment source, this research determines a precise chronology for the collision and post-collisional evolution of western Anatolia and contributes to modifying current models on collisional margins.

Poster Session 3

Commons East, Easel 58

2:30 PM to 4:00 PM

The Enigma of the Sentinels of Washington State: When Did the Olympic Mountains First Appear?

Samuel Joseph Shekut, Senior, Earth and Space Sciences: Geology
Mentor: Alexis Licht, Earth and Space Sciences

The Olympic Mountains on the west coast of Washington State are an impressive topographic feature, the emergence timing of which remains poorly documented. The Olympic Peninsula comprises 52 million year old (52 Ma) igneous rocks, and marine sedimentary rocks deposited from 52Ma to present. Here, we use a proxy to model sourcing of sediment called detrital zircon provenance (DZP). We use DZP of sedimentary rocks from the Olympic peninsula and from the Seattle Basin further east to model ancient drainage systems in order to place age constraints on the uplift of the Olympic Mountains. Our data from both areas show that 52 Ma through 23 Ma sandstones display DZP patterns and sediment type in agreement with a direct supply from central Washington. Samples of 13 to 11 Ma sandstones and modern river sands from the west of the Olympic Peninsula display a youngest zircon age population at 17 Ma. These data indicate that this area was still fed by central Washington at that time. 11 Ma sandstones from the eastern part of the Seattle Basin display DZP patterns still in agreement with supply from central Washington. By contrast, contemporary river sandstones from the western part of the basin mostly consist of reworked older sediment. This change in sediment source shows that by 11 Ma, the Olympics had already emerged and reached sufficient topographic prominence to support eastward draining rivers that deposited the 11 Ma river sandstone units of the Seattle Basin. These data allow us to constrain the initial uplift of the Olympic Mountains sometime after 17 Ma but before 11 Ma. The data are in close agreement with previously published ages that establish the exhumation of the Olympic Mountains beginning at 18 Ma, and show that the Olympic Peninsula became an emerged topographic high in less than 6 million years.

Poster Session 3

Commons East, Easel 57

2:30 PM to 4:00 PM

Determining the Age of the Irrawaddy River (Myanmar) Using Zircon Geochronology and Petrographic Analysis of River Sands

Aida Amirah Rusman, Senior, Earth and Space Sciences: Geology
UW Honors Program
Mentor: Alexis Licht, Earth and Space Sciences

The Irrawaddy River is Myanmar's biggest river system and the world's third largest river in terms of sediment load. It drains the eastern edge of the Himalayas and flows through the Central Myanmar Basin into the Andaman Sea. Its geological history remains yet poorly documented, and when its modern drainage basin was established is unknown. For my research, I reconstructed the history of the Irrawaddy drainage system by using sedimentary provenance methods. Sediments in the Central Myanmar Basin can be traced back to their source rock by using different geochemical and petrographic proxies; by using these proxies on dated sedimentary rocks in the basin, I aimed at determining when the modern sediment sources were established. My research focused on two proxies: zircon geochronology and petrographic analysis of sandstones. Zircon geochronology is a method of dating zircon minerals from sandstones. The zircon age distribution obtained from a particular sediment sample is a direct insight into the age of the sediment source rock. Sandstone petrographic analysis involves analyzing at least 300 individual sediment grains and classifying them according to their mineralogy to compare them with the known rock characteristics in the potential sediment source areas. Both proxies were applied on sedimentary rocks of different ages previously collected in the field. I compared the results from both analyses with the modern sediments collected from the Irrawaddy river mouth and modern sediment source areas. I looked for consistency in the zircon age distributions and petrography signatures between the modern and older deposits to deduce the maximum age of the river. My preliminary results suggest that the Irrawaddy River was established around Middle Eocene (40Ma), which would make the Irrawaddy one of the oldest drainage systems of Asia.

POSTER SESSION 3

Commons East, Easel 59

2:30 PM to 4:00 PM

Investigating the Origins of the First Asian Grasslands

Stokke Xu, Senior, Earth and Space Sciences: Geology, Drama: Design
UW Honors Program
Mentor: Alexis Licht, Earth and Space Sciences
Mentor: Caroline Stromberg, Biology

Grasslands cover approximately 20% of Earth's land today and spread gradually worldwide in subtropical areas during the last 40 million years. Pollen data from sedimentary rocks in Myanmar suggest that grasslands might have existed there as early as 25 million years ago but did not spread to other Asian regions until much later, 10-6 million years ago. To fully understand the ecology of these early Asian grasslands, I reconstructed the paleoenvironments of Myanmar during the late Oligocene and early Miocene, 25 to 18 million years ago. I used two paleoenvironmental proxies on paleosol samples from Burmese sedimentary rocks: carbon isotopic composition of bulk sediment and phytolith analysis. The bulk carbon isotopic composition in paleosol is an indirect insight into the local aridity and can help reconstructing soil productivity; phytoliths–silica bodies deposited inside living plant tissue that remain in the soil after the tissue decays, forming fossils—when extracted, can help identify the grass types and their relative abundance in the ecosystem. Documenting the characteristics and paleoenvironmental setting of these early grasslands will help us understanding why they did not spread until millions of years later in Asia –and if this timing of ecological expansion is linked to the regional evolution of monsoonal intensity.

POSTER SESSION 4

Balcony, Easel 104

4:00 PM to 6:00 PM

Increasing Cholesterol Export from Artery Wall Cells via Indirect Delivery of Therapeutic microRNA

Ethan Knight, Senior, Neurobiology, Public Health-Global Health
Mary Gates Scholar, UW Honors Program
Mentor: David Dichek, Cardiology
Mentor: Alexis Stamatikos, Medicine

Atherosclerosis, the underlying cause of most heart attacks and strokes, results from lipid accumulation in cells of the artery wall. Gene therapy, delivered directly to the artery wall, has the potential to prevent and reverse atherosclerosis. However, lipid accumulates primarily in cells below the endothelium, which are difficult to reach with gene therapy vectors. Our goal is to remove lipid from these cells by delivering therapeutic microRNA (miR) that increases cholesterol export from the cells. We hypothesized that if we introduced a therapeutic gene expressing the miR to endothelial cells (cells along the artery lumen), the endothelial cells would release this miR (anti-miR-33a-5p) via extracellular vesicles (exosomes) that transport miR between neighboring cells. We also hypothesized that smooth muscle cells (SMC) and macrophages would take up the therapeutic miR-containing exosomes, leading to higher expression of a critical cholesterol export protein (ABCA1) and increased cholesterol export. To test this in vitro, we introduced a therapeutic gene encoding the miR into endothelial cells and used RT-qPCR to test if the miR was released into the endothelial cell culture medium (CM) via exosomes. After confirming the presence of the therapeutic miR in exosomes purified from CM, we treated SMC and macrophages by incubating the cells with the exosome-containing CM. After incubation, we measured ABCA1 protein expression and cholesterol export. Expression of ABCA1 protein increased by 1.6- and 2.2-fold in SMC and macrophages, respectively, while cholesterol export increased by 1.4- and 1.6-fold. We conclude that gene therapy delivered to endothelial cells can produce therapeutic miR that is transferred to neighboring artery wall cells via exosomes, and increases cholesterol export in these target cells. If also effective in vivo, our approach has potential for reducing the severity of atherosclerosis by delivering therapeutic miR to cells that are difficult to reach with gene therapy.