

Undergraduate Research Symposium May 18, 2018 Mary Gates Hall

Online Proceedings

POSTER SESSION 1

Commons East, Easel 80

11:00 AM to 1:00 PM

Comparison of Offshore Earthquake Catalogs Across Cascadia to Seismic Reflection Images of Subduction Zone Structure

*Sofwa Sabarudin, Senior, Earth & Space Sciences (Physics)
UW Honors Program*

Mentor: Emily Roland, School of Oceanography

During the time in between large earthquakes, smaller seismic events, or microseismicity events have been detected along the Cascadia plate boundary. This microseismicity represents the accommodation of small stresses along the margin, and may provide information on the location of high stresses or zones of weakness in the crust and upper mantle, or along the plate boundary. Studying the distribution of microseismicity and comparing it to known structural models based on seismic reflection profiles may help us to better understand the overall faulting process at subduction zones. In this research, I compared the spatial distribution of microseismicity along different parts of the subduction zone with structural features from seismic reflection images. I used earthquakes dataset that are recently compiled using regional seismometer located within the subduction zone as part of the Cascadia Initiative. I presented a depth profile of Cascadia subduction zone forearc, a margin between the oceanic trench and the continental plate, to investigate whether current depth estimates for recent earthquakes are more consistent with upper plate seismicity within the North America Plate, along the plate boundary, or within the down going oceanic plate. The results of this study will help us to better visualize the spatial distribution of microseismic events and draw its relation with the damage zone or other fault structures along Cascadia subduction zone.

SESSION 1M

LIFE AND DEATH IN THE OCEAN

Session Moderator: Virginia Armbrust, Oceanography

MGH 284

12:30 PM to 2:15 PM

* Note: Titles in order of presentation.

Fatty Acids Show Variability in Food Sources for Aquaculture Mussels (*Mytilus spp.*) across Spatial and Temporal Scales

Molly K. Payne, Senior, Aquatic & Fishery Sciences

Mary Gates Scholar, UW Honors Program

Mentor: Alexander Lowe, Biology

Mentor: Emily Carrington, Biology

Seasonal stratification of the water column likely influences food availability to mussels grown at certain depths on aquaculture lines, as well as the environmental conditions experienced by the mussels. Fatty acids are important structural molecules that reflect the diet of the organism, such that fatty acid composition provides information on how the condition of mussels grown in different environments responds to food changes. Food sources vary based on a number of environmental conditions, including water temperature and turbulence, which differ between stratified water layers. Fatty acids in aquaculture mussels grown at 1m depth were compared to those at 7m in depth in the summer and fall of 2016 to test effects of varying environmental conditions between the depth layers. The results showed significant variability in the fatty acid composition of mussels grown at different depths in the summer months, but none in the fall. The difference between depths was contingent on the season. The variability in the summer months is likely due to stratification from increased surface temperatures, which decreases mixing and nutrient supply to mussels at lower depths. Stratification is then reduced in the fall and may explain homogenization of mussel fatty acid signatures from that period. In 2017, monthly sampling at the two depths was repeated and another experiment analyzing mussel plasticity was conducted in which mussels growing at 1m and 7m depth were switched during the summer and monitored at the new depth. Fatty acid signatures of switched mussels are predicted to adjust to become consistent with signatures of mussels established at the new depth by the end of the five-month sampling period. The results of this study will demonstrate the adaptability of mussels to new feeding environments and the effects of environmental changes on mussels as variable water conditions impact their algal food sources and overall health.

SESSION 1S

MINING TEXTS AND CONTEXTS: FROM JOURNALS TO BELLES LETTRES AND PUBLIC POLICY

*Session Moderator: Walter Andrews, Near Eastern
Languages and Civilization*

JHN 111

12:30 PM to 2:15 PM

* Note: Titles in order of presentation.

Energy and Modernity in Rilke's *Duino Elegies*

*Olivia Gilbert, Junior, Politics, German Studies, Whitman
College*

*Mentor: Emily Jones, German Studies and Environmental
Humanities, Whitman College*

The *Duino Elegies* is a collection of ten elegiac poems written by Austrian-Bohemian poet Rainer Maria Rilke (1875-1926). At turns mournful and ecstatic, sardonic and visionary, the *Elegies* were composed from 1912-1922, a period marked by the so-called "language crisis" (Sprachkrise) in German-speaking modernist circles and the entirety of the First World War. The poems' major themes include this crisis, the role of divinity in a secularizing society, and the ways in which the mass production of commodities threatens human relationships with things and with other humans. The latter point will be the focus of my presentation. Drawing on scholar Teresa Brennan's interdisciplinary studies of the energetic, psychic, social, and economic aspects of modernity, I read the *Elegies* as presenting a theory of energy that is at once an affective, poetic experience of modernity in Western Europe. More specifically, I show how the *Elegies* map out and respond to a collective psychic exhaustion. Alongside Brennan, I argue that capitalist production in modernity—and the attendant accelerations in transportation and communication—is the main culprit. Collective psychic exhaustion finds its correlate in natural exhaustion—the depletion of natural resources extracted for commodity production—which, if not yet catastrophic in Rilke's time, certainly is now. It should be noted that Rilke is a western, middle-class poet, and his work can by no means be read as speaking for all of 'humanity.' Yet with capitalism having only become more global, pervasive, and hegemonic since Rilke's time, the *Elegies* offer illuminating insight into our own heterogeneous, global experiences—social, psychic, and energetic—of capitalism as it unevenly and differentially entangles, exploits, and mangles various parts of the world.

SESSION 2Q

ASTRONOMY AND ENGINEERING

Session Moderator: Suzanne Hawley, Astronomy

JHN 026

3:30 PM to 5:15 PM

* Note: Titles in order of presentation.

Searching for Photometric Variability in the Wolf-Rayet Star WR124

Keyan R. (Keyan) Gootkin, Freshman, Pre-Sciences

Cayenne Elizabeth Matt, Sophomore, Pre-Sciences

Mentor: Emily Levesque, Astronomy

Mentor: Trevor Dorn-Wallenstein, Astronomy

Wolf-Rayet stars are massive stars whose high-intensity ultraviolet radiation drives a strong stellar wind, effectively pushing away its outer layers. This process forms an optically thick nebula around the star, making it difficult to obtain high-precision observations of the surface of the star. However, precise observations of the star's brightness over time could reveal a large amount of information about the behavior of these stars beneath their winds. Our group has obtained high-cadence photometric data from Apache Point Observatory's ARCTIC camera to construct figures of brightness vs. time (known as a lightcurves) for the Wolf-Rayet star WR124 to search for periodic changes in the star's brightness. We developed code which reduces and processes images of WR124, extracts the brightness of WR124 in each image, eliminates systematic trends in data, and compiles each data point into a lightcurve. This processing has shown that WR124 exhibits variability, a change in brightness over time. We also search for signals which repeat with a regular period using a hybrid periodogram analysis. Although this periodogram analysis has proven inconclusive, planned future observations of WR124 and more advanced statistical analysis techniques may still yield important results in the study of these interesting objects.

POSTER SESSION 3

MGH 241, Easel 128

2:30 PM to 4:00 PM

Impacts of Athlete Concussion Knowledge on Reporting Behaviors in Youth Sports

Talitha Ann Anderson, Junior, Public Health-Global Health

Sachi Bansal, Junior, Pre-Sciences

Henry John Hilt, Senior, Public Health-Global Health

UW Honors Program

Mentor: Emily Kroshus, Pediatrics/Health Services

Early recognition and reporting of concussions in youth

sports is crucial in ensuring proper treatment and minimizing possible consequences. All US states have passed legislation requiring that youth sport stakeholders be provided with annual education about concussion, ostensibly because this knowledge will help them engage in key safety promoting behaviors, including reporting symptoms of a suspected concussion. By conducting a systematic review of peer reviewed published studies that measure concussion knowledge, we ask how youth athlete concussion knowledge influences concussion reporting. The hypothesis is that better concussion knowledge is positively correlated with increased reporting of concussions. A systematic review of peer reviewed research published between 2009 and 2018 was conducted in November 2017. Inclusion criteria were 1) measuring concussion knowledge using a quantitative survey measure, 2) the athletes were collegiate age and younger. This resulted in 127 studies. Subsequently, studies were reviewed by two independent coders to determine whether they measured concussion reporting behavior or behavioral intentions. Data was collected in order to assess the strength of association between knowledge and behavior. While data synthesis is ongoing, preliminary results suggest that the association between knowledge and concussion reporting behavior or intention is minimal. Interventions are needed to increase reporting of suspected concussions, however, current results suggest that education focusing solely on increasing an athlete's knowledge about concussions may not be sufficient. Future research should focus on motivators of concussion reporting behavior in youth athletes and explore intervention methods that address evidence-based determinants of this important safety behavior.

POSTER SESSION 3

Commons West, Easel 29

2:30 PM to 4:00 PM

Introductory Physiology Students' Conceptions of Cardiovascular Flux and Pressure Gradients

Aquene N. Reid, Senior, Biology (Molecular, Cellular & Developmental)

Bryan A Day, Senior, Neurobiology

Mentor: Jennifer Doherty, Biology

Mentor: Emily Scott, Biology

Mentor: Jack Cerchiara, Biology

Understanding the principles that underlie physiological problems can help students succeed in the mastery of a wide range of physiology topics. Understanding the principle of flux, which governs pressure gradients, can greatly improve a student's ability to solve problems related to bulk flow and pressure in a variety of physiological systems. In general terms, the principle of flux describes the rate of movement of a substance from one compartment to another. It is defined as the magnitude of the driving force (gradient) divided by resis-

tance. We examined how students in an introductory physiology class think about flux in the context of a pressure gradient within the cardiovascular system. We began by incrementally refining a variety of gradient-related questions through successive rounds of think-aloud interviews with individual student volunteers. Using these responses, we generated a cardiovascular pressure gradient question that elicited a wide variation of student answers. We collected responses from 200 introductory physiology students both before and after relevant course content to be sure our question captured both novice and advanced reasoning. We examined the responses and constructed a rubric to categorize student responses into a hierarchy of response sophistication and completeness. Generally, level 1 represents the most novice responses, while level 5 represents the most advanced. In our rubric, level 1 answers relied on vague reasoning relating to homeostasis, equilibrium, or intuition. Responses categorized at levels 2 and 3 showed an understanding of the components that contribute to pressure without successfully identifying how they connect to changing pressures. Lastly, answers at levels 4 and 5 showed an understanding of these components as well as the ability to successfully relate them to changes in pressure. Identifying patterns in student responses to a pressure gradient problem can give instructors a starting point from which they can target common misconceptions to ensure conceptual mastery in their classrooms.

POSTER SESSION 3

Commons East, Easel 44

2:30 PM to 4:00 PM

Mapping the Supernovae-Rich Fireworks Galaxy NGC 6946

Locke Linden Patton, Senior, Physics: Comprehensive Physics, Astronomy

Mentor: Emily Levesque, Astronomy

Core-collapse supernovae (SN/e) are the spectacularly violent deaths of evolved young massive stars, which expel a shock wave into the intergalactic medium that in turn can spark star formation and disperse heavy elements into their host galaxy. While a SN event can be classified by its spectral signature, determining the nature of a supernovae progenitor depends upon chance photometry taken prior to the event. By turning to the study of SN host environments and their surrounding interstellar medium within the unique and rare population of galaxies that have hosted three or more SN events within the last century, we are granted the opportunity to study the locations and environmental properties of stellar populations prone to supernova progenitor production. Using moderate-resolution optical slit spectra taken with the Apache Point Observatory 3.5m DIS spectrograph, we aim to map metallicity, ionization parameter, and star formation rates using emission line diagnostic ratios across each SN-

rich galaxy in our sample. Dubbed the “Fireworks Galaxy” at a distance of 5.6 ± 1.5 Mpc, NGC 6946 is of particular interest as it has uniquely produced ten core-collapse supernovae (CCSNe) and several other massive star transients within the last century. We present spatially-resolved metallicity and $H\alpha$ star formation rate (SFR) maps of NGC 6946, tracing fifty-five slit orientations which span the face of the galaxy and cover all CCSN host sites. Future work will include stellar population synthesis modeling to determine stellar populations, ages, and SFR histories in NGC 6946 and a further expansion of this analysis to the other SN-rich host galaxies in our sample.

POSTER SESSION 4

Commons East, Easel 50

4:00 PM to 6:00 PM

An Analysis of Busy College Students at the University of Washington

Clarisse Mary Furtado, Senior, Communication, Psychology
Mary Gates Scholar

Noemi Correa, Junior, Spanish

Emma Spickard, Senior, Public Health-Global Health
UW Honors Program

Mentor: Anne Browning, UAA

Mentor: Emily Kroshus, Pediatrics/Health Services

The idea of busy culture permeates college campuses nationwide and describes the trend of students engaging in less leisure activities and more time spent in academic and professional devotions: a trend which in our experience is reflected in the culture of University of Washington. There is little research exploring the nature and consequences of busy culture on college campuses. To address this gap in the literature, the purpose of this study is to better understand UW undergraduate students’ own perceptions of being busy, and how they see busyness as impacting their academic experience and overall well-being. We conducted four focus groups with eight to ten participants per group, with two trained student facilitators. These focus groups explored topics including what students consider “busy,” and how busyness functions in their life. Qualitative analyses looked for emergent definitions of busyness that are consistent across students, and sought to understand if motivations and perceived consequences of busyness are similar, or different among different students. We discussed these patterns in the context of existing literature on social norms and student stress and refine hypotheses about busyness to better inform future research. We also considered how these results can contribute to improved student programming to enhance the student experience at UW.

VISUAL ARTS & DESIGN SHOWCASE

Odegaard Undergraduate Library

3:00 PM to 4:30 PM

* Note: Titles in order of presentation.

Forensic Anthropology and Human Rights in Latin America

Roshni Sinha, Junior, International Studies, Anthropology
UW Honors Program

Gwendolyn Scott, Senior, International Studies: Latin America, Geography

Leah Mc Farland Bennett, Junior, Law, Societies, & Justice, International Studies: Latin America

Min Su Kim, Freshman, Pre-Major

Mary Gates Scholar

Madison Kendall Vinson, Sophomore, Pre-Social Sciences

Kendy Joceline Bautista, Sophomore, Pre-Major (Arts & Sciences)

Hannah Thoreson, Senior, Political Science

Amber Nicole (Amber) Torell, Freshman, Pre-Major (Arts & Sciences)

Akshara Kumar, Junior, International Studies: Asia

Carly Bainbridge, Sophomore, Pre-Major (Arts & Sciences)

Mentor: Jos?? Antonio Lucero, International Studies/CHID

Mentor: Emily Willard, JSIS

This project, spearheaded by Dr. Tony Lucero, showcases the work of Dr. Clyde Snow, a renown forensic anthropologist, and Dr. Mary-Claire King, a geneticist and UW-faculty member, in the field of forensic anthropology in advancing human rights in Latin America. Our project was started by Dr. Lucero to show how various parts of the university can come together to do good for the world. This project focuses on Dr. Snow and Dr. King’s work on advancing cases of disappeared persons in Argentina and impacting trials in Guatemala, ultimately showing the world the importance of forensics in attaining justice and accountability. By conducting in-depth research and illuminating key stories of the pursuit for justice, we will answer the question of how Dr. Snow and Dr. King have revolutionized the fields of forensic anthropology and human rights. To highlight the importance of their work, we will study newspaper articles and court cases. Analyzing the news is crucial to piecing together the multifaceted nature of their work and examining court cases is necessary to identify exactly how forensic evidence was used to hold human rights abusers accountable. By analyzing media and presenting it in an accessible form, we hope to increase the public’s knowledge of forensics through extensive research of the value of the field in finding justice and closure for families of the forcibly disappeared. The output will be a culmination of independent studies conducted by members of the project team and will be presented as digital media components on a central website that is accessible to everyone.

Creating digital media that showcases this information will allow us to organize it in a way that engages the public and visually explains the importance of the fields of forensic anthropology and genetics in attaining justice in Latin America and ultimately around the world.