Seventh Annual
AEG Student Poster Night

Portland State
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Tuesday, April 21, 2009
6:00 – 9:00 pm

Book of Abstracts

List of Titles

"Analysis of Pleistocene Loess Thickness in the Coastal Dune Sheets around Newport, Oregon" Keith Olson (PSU)

"Andesites/Dacites of the Oceanic Narcondam Volcano, Andaman Sea: Modification of Tholeiitic Arc Basalts by Crustal Contamination and Amphibole-Dominated Fractionation" Aspen Gillam (PSU)

"Coarse-grained overgrowths - an indication of shock effects in stony meteorites" Niina Jamsja and Alex Ruzicka (PSU)

"Do modern soil carbonates reflect local meteoric water in the Argentine Andes?" Kendra Williams (PSU)

"Digging up earthquakes and slip rates along the Coyote Creek Fault, southern San Jacinto Fault Zone, California" Danielle Verdugo (SDSU)

"GIS Applications in Watershed Analysis: A Case Study from the Sixes River Basin, Curry County, Oregon" Matthew Buche and Ryan Stanley (WOU)

"Numerical Model investigation of Crane Glacier response to collapse of the Larsen B ice shelf, Antarctic Peninsula" Adam Campbell (PSU)

Special thanks to the poster judges:

Bill Burns
Lisa Glonek
Michael Zimmerman

Thank you to AEG, the AEG Oregon Section, and PSU for their support.

And thank *you* for attending the **Seventh Annual AEG Student Night**

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"Numerical modeling of heat transfer: Potential application for the study of differentiated asteroids" Niina Jamsja (PSU)

"Occurrence and Distribution of Rhyolitic Magma Types during John Day Time, Northeastern Oregon" Christopher Ricker (PSU)

"Relative Dating of Soils within the Bridge of the Gods Landslide Complex, Skamania County, Washington" Serin Duplantis and Kate Mickelson (PSU)

Abstracts

"Analysis of Pleistocene Loess Thickness in the Coastal Dune Sheets around Newport, Oregon" Keith Olson

This investigation successfully produced a series of maps depicting the thickness of loess layers in the Pleistocene dune sheets found throughout the Newport, Oregon coastal zone. The dune sheet loess layers were formed between 20 and 70 thousand years ago during periods of low sea-level that exposed the marine silts deposited on the inner portion of the continental shelf. To produce the thickness maps, ArcGIS was used to perform the spatial analysis techniques of inverse distance weighted (IDW) interpolation and universal kriging on dune sheet profile data. The maps produced with these techniques show the loess thickness extrapolated over the intervening subsurface areas and should be useful in the geotechnical and hydrological aspects of planning and development within the Newport coastal zone.

"Andesites/Dacites of the Oceanic Narcondam Volcano, Andaman Sea: Modification of Tholeiitic Arc Basalts by Crustal Contamination and Amphibole-Dominated Fractionation" Aspen Gillam

The active Barren Island volcano and its 140 km distant northern neighbor, the Pleistocene

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Floods as originally initiating the movement of the complex 15,000 years before present. Numerous studies in the area have dated movement of landslides within the complex using techniques such as lichenometry, dendrochonology, and radiocarbon dating. However, a definitive date of last movement for the Bonneville Landslide was found to be 500 years before present. This was found using radiocarbon dating of Douglas Firs that had been buried in the landslide. The aim of this study is to obtain relative ages for two landslides within the complex, the younger, Bonneville landslide, and the older, Moseley Lakes landslide. Various field and lab analysis techniques, including digging soil pits and using the pipette method for grain-size analysis, were employed in this study. Three soil pits were dug in each of the Moseley Lakes and Bonneville slides. Then, relative ages were calculated by using a soil chronosequence for the area. The resulting date of the last activation of the Moseley Lakes section of the complex is between 500-1,000 years before present and the date of last movement of the Bonneville section of the complex is approximately 500 years before present.

ignimbrites erupted locally. Depositional basins during John Day time led to the formation of the Western, Southern, and Eastern Facies of the John Day formation. This study concentrates on locally erupted rhyolitic lavas of the Eastern Facies. I will develop a detailed geochemical and mineralogical database for rhyolites of the Eastern Facies focusing on the area around John Day Fossil bed, the newly discovered Tower Mountain caldera, and the area around Unity reservoir where several tuffs crop out. Major and trace elemental analysis will be performed on whole rock samples and mineral compositions will be determined. With this data, the petrological affinity of erupted rhyolitic magmas will be evaluated, whether individual units are calc-alkaline in nature or rather resemble rhyolites of bimodal volcanism. All data will be used to generate a geospatial map depicting composition, distribution, and age. This is important to place John Day rhyolite volcanism in its proper geotectonic context which is currently poorly understood.

"Relative Dating of Soils within the Bridge of the Gods Landslide Complex, Skamania County, Washington" Serin Duplantis and Kate Mickelson

The Cascade Landslide Complex, located approximately one mile west of Stevenson, Washington, is one of the most extensively studied areas in the northwest. It is 11-14 square miles in area and is comprised of numerous landslides. Previous research has pointed to the Missoula

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Narcondam volcano, are the only subaerially exposed arc volcanoes, which rise from the 1000-2300 m deep seafloor, of the Andaman Sea. This volcanism is the result of the subduction of the Indian Plate beneath the Burma Plate. Lavas of Barren Island volcano range from basalt to andesite while lavas from Narcondam volcano range from andesite to silicic andesite/dacite. Similarities in the geochemistry of both lava suites include strong and comparable depletion in Nb and Ta (K_2O/Nb ~0.7; Ba/Nb 130-250); low, MORB-like Nb/Zr (0.01-0.03); and nearly constant U/Th (0.15-0.22). These characteristics suggest a genetic link between both magma suites. Distinct geochemical differences, however, include isotopic ratios which for Barren Island are: $^{87}Sr/^{86}Sr$ ~0.7039-0.7041, $^{143}Nd/^{144}Nd$ 0.51285-0.51296, and $\delta^{18}O$ plagioclase 5.81-5.89, and for Narcondam are: $^{87}Sr/^{86}Sr$ 0.7049-0.7053, $^{143}Nd/^{144}Nd$ ~0.51270, and $\delta^{18}O$ plagioclase 6.78-7.44. Other geochemical parameters (e.g. Sr/Y, Th/La, Ba/La) of Narcondam lavas positively correlate with increasing SiO_2 but are anchored at the mafic end within compositions observed at Barren Island volcano.

Narcondam magmas evolved through a multi-stage evolution characterized by fractional crystallization, shallow contamination, and magma mixing. Prior to eruption, the latest event was marked by mixing of a silicic lava with a Barren Island-type basaltic magma that lowered the $^{87}Sr/^{86}Sr$ from values of 0.70534-0.70542 as observed in single plagioclase and

amphibole phenocrysts to values of bulk rock and caused juxtaposition of mineral populations. The generally more incompatible trace element enriched silicic Narcondam magmas are best explained by amphibole-dominated fractionation of a Barren Island-type basalt; being consistent with an increase of Sr/Y with increased silica of samples containing abundant amphibole. The shift in isotopic values from Barren Island to Narcondam samples is likely caused by crustal contamination in the upper plate involving sediments from the fan associated with the Irrawaddy Delta at the Myanmar continental margin consistent with more proximal position of Narcondam to the continental margin.

"Coarse-grained overgrowths - an indication of shock effects in stony meteorites" Niina Jamsja and Alex Ruzicka

Shock effects in meteorites can be recognized by the presence of opaque shock veins, planar fractures, and twinning and plastic deformation effects. Work presented in this work introduces another feature that could be related to the effects of shock metamorphism in stony meteorites: coarse-grained silicate overgrowths that are believed to have formed during slow cooling following one of the last collision events.

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shelf at the downstream end of the glacier, and a large increase in the sliding speed, together with an increase in downstream stretching. The magnitude of the modeled instantaneous speedup is similar to the observed, as is the instantaneous thinning rate associated with the change in downstream stretching.

"Numerical Modeling of Heat Transfer: Potential Application for the Thermal Study of Asteroids" Niina Jamsja

Heat conduction through an asteroid could provide important clues for the alteration of materials with different thermal conductivities. The numerical model presented by the author demonstrates the pattern of heat transfer around an insulating material. Such a model, if designed to account for different complexities and compositions of a differentiated or undifferentiated asteroid, could aid in the study of thermal processes affecting these extraterrestrial bodies.

"Occurrence and Distribution of Rhyolitic Magma Types during John Day Time, Northeastern Oregon" Christopher Ricker

The John Day formation (37-20 Ma) is an important part of the Tertiary stratigraphy of Eastern Oregon. The John Day formation primarily consists of fallout tuffs and rhyolitic ignimbrite deposits. Fallout tuffs are distally derived from the Western Cascades while

they allow the partitioning of landscapes in a way that is relevant to surface processes operating within watersheds.

"Numerical Model investigation of Crane Glacier response to collapse of the Larsen B ice shelf, Antarctic Peninsula" Adam Campbell

In March 2002, the Larsen B Ice Shelf disintegrated catastrophically. Many of the glaciers that fed the ice shelf are observed to have experienced increased rates of ice discharge and front retreat but the response is neither uniform nor universal. At one end of the range is the large response of Crane Glacier, which has sped up 3-fold in its downstream reach and by late 2006 thinned 150 meters since ice shelf collapse. Between March 2002 and early 2005, Crane Glacier's calving front retreated by about 11.5 km and is now oscillating about that position.

Here, the dynamic response of Crane Glacier to ice shelf collapse is investigated using a finite element model of momentum balance along a profile down the trunk of Crane Glacier. Assuming that the glacier was near equilibrium with its boundary conditions before ice shelf collapse, observed pre-collapse flow is used to tune the model. The model is then used to perform stress perturbation experiments to investigate the instantaneous response of the glacier to the removal of the ice shelf. The response has two components, a minor dynamic change due to the stress perturbation as ocean and air replace the ice

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"Do modern soil carbonates reflect local meteoric water in the Argentine Andes?" Kendra Williams

Previous paleoelevation studies have assumed that sedimentary carbonates accurately record the isotopic composition of local rainfall. To determine whether this assumption is valid, this study compared the $\delta^{18}O$ values of modern soil carbonates to the $\delta^{18}O$ values of local meteoric water as they vary with altitude. Both the $\delta^{18}O$ values of local meteoric water and soil water, estimated from modern soil carbonate, decrease with increasing altitude. Soil water reconstructions plot within the bounds of modern waters and show a similar slope relative to elevation. This similarity between water estimated from modern soil carbonates and local meteoric water suggest that in this region, soil carbonates accurately record surface water compositions. Assuming a similar climate to modern, we infer that pedogenic carbonates can be used in quantitative reconstructions of paleoelevation.

"Digging up earthquakes and slip rates along the Coyote Creek Fault, southern San Jacinto Fault Zone, California" Danielle Verdugo

The southern San Jacinto fault (SJF) zone is the most seismically active fault zone in the southern San Andreas fault system, with InSAR studies suggesting that the SJF accommodates 21 out of 45 mm/yr, or 45% of total Pacific-North American plate motion. This is also evidenced by a majority of SJF

segments having ruptured historically, producing M6.5 or greater earthquakes, including the Coyote Creek fault, which ruptured in the 1968 magnitude 6.8 Borrego Valley Earthquake. While slip along most of the southern SJF zone is typically partitioned between several well-defined strands, the CCF is the only recognized fault strand conducting slip between multiple strands to its north and south. Thus, the CCF should be carrying a majority of the SJF slip and also be a major seismic hazard to rapidly developing exurban growth along its footprint.

Previous studies have yielded little data in which to understand the future potential rupture hazard for the CCF. Therefore, we studied its past earthquake history by conducting a fault trenching study on the North Break of the 1968 CCF rupture. The trench, located in Benson Lake playa within the confines of the Ocotillo Wells Airport, was excavated across the mapped surface break from the 1968 earthquake. Surprisingly, there were only 4 distinguishably discrete events in the last 3000 years and a clear lack of organization in the fault zone, down to 3 meters beneath the playa surface. By comparison, the San Andreas fault, carrying a comparable amount of slip, ruptures on average every 200 years. A 3000 year-old C-14 dated sand blow was also exposed across the best expressed fault within the trench, and, although clearly faulted, is apparently offset less than a meter (the width of the trench). This suggests a sub-millimeter slip rate during the late Holocene. Although this fault sustained rupture in 1968, it apparently is not the main long-term active strand of the CCF and suggests a potential 19 mm/yr slip deficit for this portion of the southern SJFZ.

"GIS Applications in Watershed Analysis: A Case Study from the Sixes River Basin, Curry County, Oregon" Matthew Buche and Ryan Stanley

Geographic Information Systems and similar methods are now widely applied in hydrology and geomorphology to automate basin, hillslope, and stream network analyses (Wilson and Gallant, 2000). The goal of this project is to demonstrate watershed-related GIS applications by presenting an overview and hydrologic analysis of the Sixes River Basin in Curry and Coos counties. This basin drains approximately 25 km^2 and includes more than 920 km of stream channel network. The Sixes Basin was the subject of a GIS class project with data compiled from available web resources; synthesized coverages include bedrock geology, soils, precipitation, topography, and surface hydrology. DEMs were analyzed to derive morphometric and hydrologic parameters using a combination of ESRI Spatial Analyst and the Terrain Analysis System (Lindsay, 2005). Bedrock lithology was selected as an independent variable to examine the controls on sub-basin morphology and drainage characteristics. This project highlights the applicability of GIS data processing techniques to geomorphic analysis within the Sixes River Basin. Such analyses serve as valuable modeling and management tools because