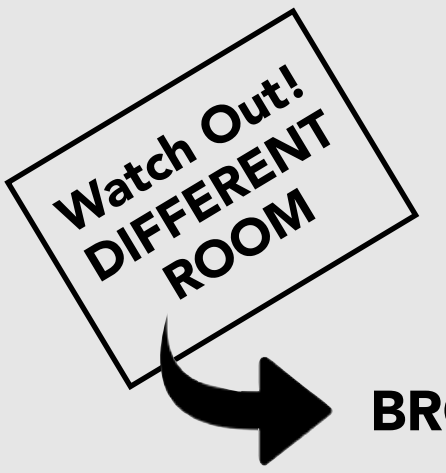

UC **SANTA BARBARA**

Department of Earth Science

Speakers Club

BROIDA 1640 • THURSDAY DEC 6th.• 2:00 PM

The contribution of post-wildfire rilling to generation of the 2018 Montecito, CA debris flow: quantification and interpretation of rill geometries and patterns.

Paul Alessio
Department of Earth Sciences
UC Santa Barbara

The debris flows that occurred in Montecito, CA, on January 9th, 2018, significantly impacted infrastructure, homes, people, and the landscape. Initial field surveys and GIS mapping revealed dense networks of rills on bare, burned hillslopes of the shale formations, whereas their occurrence was relatively sparse in sandstone formations and the most extensive ground disturbances were in gullies and shallow colluvial failures. Field surveys, Structures from Motion modelling, and DEM analyses were used to quantify rill geometries, patterns, and contribution to the rate of mud generation. Rills, together with with intervening sheetwash erosion, exhibited anastomosing patterns at the top of each hillslope before incising rapidly into dense networks with low convergence or divergence angles. Debris levees on the rill margins reflected viscous behaviour of flows within short distances of initial incision, indicating that the water and sediment were intimately mixed upon entering stream channels. This mud subsequently initiated scour and rafting of boulders and woody debris in the channels. Downslope changes of rill spacing, widths, and depth were measured on different hillslope geometries to build a statistical model that was used to estimate the volume of material removed and to quantify the rate at which the granular fluid discharge increased along stream channel networks.

Ross Orogeny magmatism in Northern Victoria Land, Antarctica: insight into along-strike arc variation

Elizabeth Erickson
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Neoproterozoic to Ordovician continental arc rocks of the paleo-Pacific Gondwana margin in Northern Victoria Land, Antarctica, are thought to represent syn-tectonic mid-crustal granitoid to mafic plutons emplaced near the final stages of northward-younging, oblique subduction during the Ross Orogen. Sparse existing bedrock crystallization ages suggest igneous activity between c. 545 to 481 Ma. Here, we present zircon U-Pb geochronology, Hf isotope, and trace element geochemistry, as well as whole rock major and trace element data from ~100 granitoids from NVL to further determine the extent of along-strike variation in the timing and nature of magmatism. Our new age data indicate long-lived, dominantly peraluminous magmatism from c. 526 to 469 Ma, with evidence for older events at 1.1 Ga and 1.8 Ga. Hf isotope data indicate the rocks were sourced from an enriched region(s) of the lithospheric mantle throughout the history of the arc. This study reveals a step-like transition in the age of magmatic pulses between NVL and the Delamerian in Australia, as well as a transition of dominantly metaluminous magmatism in Southern Victoria Land to dominantly peraluminous magmatism in NVL.