IAG Webinar North America

4 March 2024 at 16:00 – 19:00 UTC

Coordinators: Mark Sweeney, Karen Gran, Jen Pierce
Quaternary Geology & Geomorphology Division, GSA

INTERNATIONAL GEOMORPHOLOGY WEEK 2024

11:00–11:20 EST
8:00-8:20 PST

Advances in Landslide Hazard Science in Puerto Rico

Dr. Stephen Hughes, University of Puerto Rico Mayagüez, USA

Landslides in Puerto Rico span from nuisance level to fatal events. The deadliest landslide event in any jurisdiction of the United States occurred in southern Puerto Rico in 1985 and claimed at least 129 lives. Widespread landslide-triggering events have affected the island from time to time and recently have also spurred an impulse of hazard science and community engagement on the topic. This presentation will review the SLIDES-PR (Storm-induced Landslide Impact Dynamics on Environment and Society in Puerto Rico) initiative and progress at the University of Puerto Rico Mayagüez over the past several years.

11:20–11:40 EST
8:20-8:40 PST

Pyrogeomorphology

Dr. Francis Rengers, United States Geological Survey, USA

Sub-disciplines in geomorphology (e.g., fluvial) provided a lens to interpret processes generating landscape change. Recent increases in wildfire have added the role of fire to the processes that accelerate sediment transport. Unlike rivers or glaciers that directly transport sediment, wildfire does not move sediment; however, it creates conditions that enhance erosion and deposition. Specifically, wildfire reduces the influence of vegetation (in terms of evapotranspiration and surface roughness), and fire effects (hydrophobicity, roughness reduction, canopy loss) enhance overland flow at storm timescales. This will be an overview of fire-induced geomorphic processes, with a special focus on the postfire debris flow hazards.

11:40–12:00 EST
8:40-9:00 PST

Smokey the Beaver: how beaver ecosystem engineering keeps riparian corridors green during droughts and wildfires

Dr. Emily Fairfax, University of Minnesota, USA

Beavers are powerful ecosystem engineers, second only to us (people) in their ability to intentionally control the physical environment. Beaver dams and beaver mimicry (e.g. Beaver Dam Analogs) are currently gaining popularity as a low-cost, nature-based strategy to build climate resiliency at the landscape scale. Through the construction of dams and excavation of canals, beavers create physical complexity in riverscapes that helps to slow and store water. Precipitation and runoff that was stored during wetter periods can then be accessed by riparian vegetation during droughts. As a result, the well-watered vegetation in beaver-dammed riparian corridors is less flammable. My research has shown that these beaver-influenced patches of the landscape stay green and can serve as fire refugia, preserving intact, mature riparian habitat, even during megafires. Perhaps instead of relying solely on human engineering and management to create and maintain fire-resistant waterways and riparian zones, we could benefit from partnering with beaver's ecosystem engineering to achieve the same goals at a lower cost.

12:00–12:20 EST
9:00 – 9:20 PST

Reconstruction of Laurentide ice sheet margin dynamics over the last two major glaciations using geomorphology, geologic mapping, geochronology and soils, Indiana, United States

Dr. Jose Luis Antinao Rojas, Indiana Geological & Water Survey, Indiana University, USA

The integration of glacial geomorphology, stratigraphy and radiocarbon chronology for the last major glaciation affecting the lower midwestern United States has improved understanding of Laurentide ice sheet margin dynamics. Similar dynamics can be inferred from older glacial deposits that appear mostly buried under the most recent glacial sediments, in this case using luminescence and cosmogenic nuclide techniques as well as investigation of paleosols. This presentation will highlight our active research in Indiana and southern Michigan with an emphasis on how mapping, geochronology and soils research can be combined to understand ice margin evolution, with implications for water resources, landscape evolution, and paleoclimate and ice sheet modeling.

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Organization in the post-glacial landscape leads to rapid fluvial network recovery

Dr. Nooreen Meghani, University of Illinois Urbana-Champaign, USA

Continental glaciation disrupts fluvial networks, removing streams by filling with glacial sediment or by eroding material into which channels have incised. This disruption is prominent in the Central Lowlands physiographic province (CL), where repeated Quaternary glaciation has resulted in low drainage density, internally drained basins, and unusual channel features. Recent work shows that despite the low relief of the CL, most drainage density is recovered within a typical interglacial – significantly faster than expected if network growth was driven purely by headward incision. We propose a new model for fluvial network growth in the CL that emphasizes the importance of internally drained basins, fill-and-spill, and top-down mechanisms of channel growth, and show examples from the Sangamon River of Central Illinois.

12:40–1:00 EST
9:40-10:00 PST

New insights into dune morphology and paleo-climatic interpretations from Lidar analysis, northeastern North America

Dr. Stephen Wolfe, Geological Survey of Canada, Natural Resources Canada, Canada

Sand dunes are globally extensive and are found on all continents on Earth. In arid and semi-arid regions, sand dune occurrence and morphology are well-document from ground-level field studies and aerial/satellite image interpretation. In humid and cold-climate environments, forest and wetland vegetation cover has traditionally obscured stabilized dune fields. In formerly glaciated regions of northeastern North America, newly released open-sourced Lidar (light detection and ranging) reveals 1000s of previously unknown sand dunes and their morphology. This talk described the range in dune morphology observed and highlights the complex history of past winds interpreted from the stabilized parabolic dunes in this region.

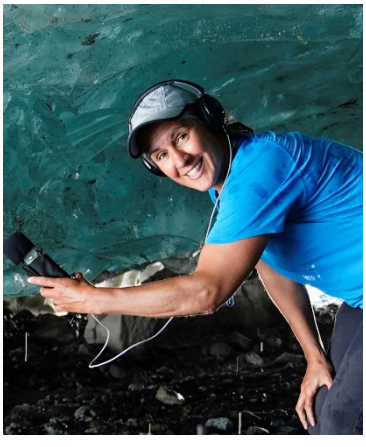
1:00–1:20 EST
10:00 – 10:20 PST

Earth surface processes and hazards in volcanic and tropical terrains

Dr. Lizeth Caballero, National School of Earth Sciences, Mexico

Volcanic environments in tropical climates are prone to surface processes triggered by rainfall. Extreme rainfall on unstable volcanic slopes promotes high sediment transport, up to distances of tens of kilometers from the volcano. This causes strong damage to populations in volcano surroundings. The responsible for such phenomena are lahars, high-concentration mixtures containing water and solid particles. In this talk, I will analyze the relation rainfall-runoff-slope instability to form different types of lahars, and the hazards they pose, by using examples from volcanoes in Mexico and Central America.

1:20–1:40 EST
10:20-10:40 PST



Listening to the stories of ice and stone: Using soundscapes to capture landscape change

Dr. Michele Koppes, University of British Columbia, Canada

The emerging field of sound studies introduced an attention to sound and listening that counterbalances the visible as the dominant sense through which understand the world. Acoustic recordings provide additional sensory dimensions beyond the visible, creating new empirical approaches to document the impacts of climate change. My team and I are exploring how the tonality of sound, including its pitches, tempos and rhythms, can be used to acoustically map the physical processes occurring in a watershed, capturing rates of ice melt, meltwater discharge and sediment transport. We collect acoustic field recordings of the sounds of glacial rivers and the sediments carried within them as they flow from the mountains to the sea. By training geomorphologists to deeply listen to the landscape, we can engage in what André Pinto calls 'a re-tuning of our ears to the wider sound palette of the world', and develop new awareness of our entanglements with the landscapes we inhabit and shape.