Natural Resources, Climate, and Clean Energy

Geology of Mountains & Basins Research
Forest Inventory and Analysis Information Management

Brenda J. Buck, Ph.D.
Director: Forest Inventory and Analysis Information Management Research Group (UNLV-FIA)
Department of Geoscience
Phone: (702) 895-1694
Email: buckb@unlv.nevada.edu

The Team’s Expertise:
• Inventory, monitoring, and analysis
• Storage and display of forest inventory data
• Computer systems analysis
• Database development
• Application development
• Section 508 compliance
Since 1998, our research group at UNLV has worked in partnership with the Forest Inventory and Analysis (FIA) Program, which is part of the research and development (R&D) arm of the USDA Forest Service. As the Nation’s forest census, FIA researches and reports forest status and trends in the United States.
UNLV-FIA Partnership

As a university partner to FIA, our work focuses on the agency’s strategic program area of inventory, monitoring and analysis. Our area of emphasis is information management research and development to optimize the storage, delivery, and display of forest inventory data.

The support we provide helps to ensure that information about the health and productivity of our Nation’s forests is both timely and accurate. This enables policy makers, land stewards and non-governmental groups to base decisions and assessments related to the health, diversity, and productivity of U.S. forests and grasslands on scientifically credible information.
Medical Geology

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Phone: (702) 895-1694
Email: buckb@unlv.nevada.edu

Expertise: Health effects of mineral dust; Asbestos; Heavy Metals; Soil Science/Geology
Naturally-Occurring Asbestos & Health Effects of Mineral Dust

Photo courtesy of Regine Trias (regine-trias.com).

Immune Dysfunction

Amphibole Asbestos
- Healthy Immune System Fights cancer effectively
- Poor anti-cancer response (LA)

Chrysotile Asbestos
- Poor Immune System/Discosystem (generally understood)
- Enhanced susceptibility to disease
Health Effects of Mineral Dust: Arsenic

Arsenic Emission, ORV (average), PM10

Dealing with Hazards and Risk

Science
Mitigation
Policy
Economics

Where disturbance matters

Desert Pavements
Silty units (crusts)
Silty Drainages
Silty Sand

after Stein & Stein (2014)
Sedimentary Geology

Dr. Tomas Capaldi
Department of Geoscience
Phone: (702) 895-3262
Email: tomas.capaldi@unlv.edu

Expertise:
Tectonics
Basin Dynamics
Quaternary Geology
Sedimentary Record of Magmatism, Geodynamics, and Mountain Building

The deep time sedimentary archive provides critical insights into the dynamic relationship among lithospheric, climatic, and Earth surface processes.

Argentine Andes

Links between subduction, magmatism, and crustal deformation

- A) Subduction Angle
- B) Andean Arc Magmatism
- C) Basin accumulation
- D) South American plate velocity
- E) South American tectonic regime

The deep time sedimentary archive provides critical insights into the dynamic relationship among lithospheric, climatic, and Earth surface processes.
Earth Surface Processes in Modern Sedimentary Systems

Weathering

Erosion

Transport

River Sand
Geochronology
Pyrenees Mnts

A) Wet climate (fluvial transport)

B) Arid climate (eolian transport)

UNLV COLLEGE OF SCIENCES
Sedimentary Geology

Dr. Ganqing Jiang
Professor
Department of Geoscience
Phone: (702) 895-2708
Email: Ganqing.Jiang@unlv.edu

Expertise:
• Sequence and chemostratigraphy
• sedimentology
• Carbonate diagenesis
- Sequence and chemostratigraphy
- Paleogeographic reconstruction
- Applications of stable isotopes and rare earth elements
- Paleoenvironmental change across major perturbations of the carbon cycle and mass extinctions
• Basin analyses and paleoceanography
• Fluid migration and carbonate diagenesis
• Tracing fluid migration in sedimentary basins using stable isotopes and trace elements
• Carbonate aquifer
Hydrology

Dr. Michael Nicholl
Department of Geoscience
Phone: (702) 895-4616
Email: michael.nicholl@unlv.edu

Expertise:
• Unsaturated zone hydrology
• Fractured rock hydrology
• Environmental fluid mechanics
Fractured Rock Hydrology

- Two-phase flow and transport in fractured rock
- Laboratory experimentation, field mapping, numerical simulations
- Contaminant transport, geothermal energy, enhanced petroleum recovery

False color image of a miscible displacement experiment in a single fracture

Field mapping of fracture networks
blue dye (right foreground) is from an infiltration test

Water (blue) pooled above a fracture intersection

Isothermal flow across a single rock fracture (matrix-to-matrix flow)
Unsaturated Porous Media

- Challenging existing conceptual models for unsaturated and two-phase flow
- Design and execution of critical laboratory/field/numerical experiments

- Seepage through gravel-sized capillary barrier materials
- Millimeter-scale transport experiment
- Sampling Chloride as a proxy for root-driven horizontal flow
- Hydraulic conductivity of a rock slab
- 2D simulation of root-driven transport

- Unsaturated Porous Media