

# 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](mailto: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

# UNLV-FIA Partnership

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

**Brenda J. Buck, Ph.D.**

Director: Forest Inventory and Analysis Information  
Management Research Group (UNLV-FIA)

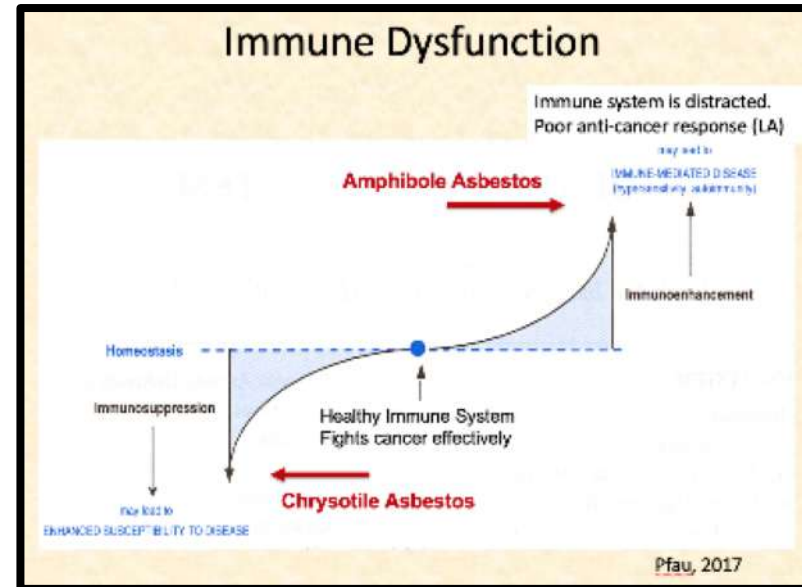
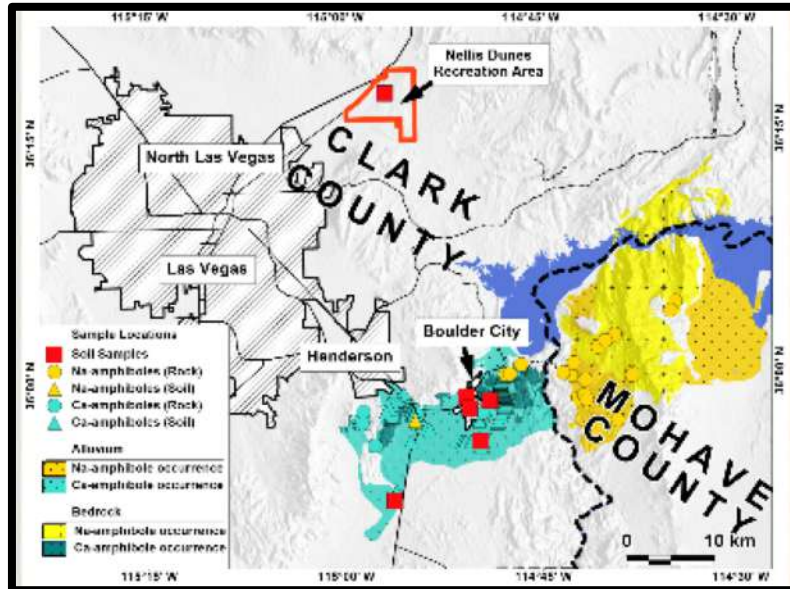
Department of Geoscience

Phone: (702) 895-1694

Email: [buckb@unlv.nevada.edu](mailto:buckb@unlv.nevada.edu)

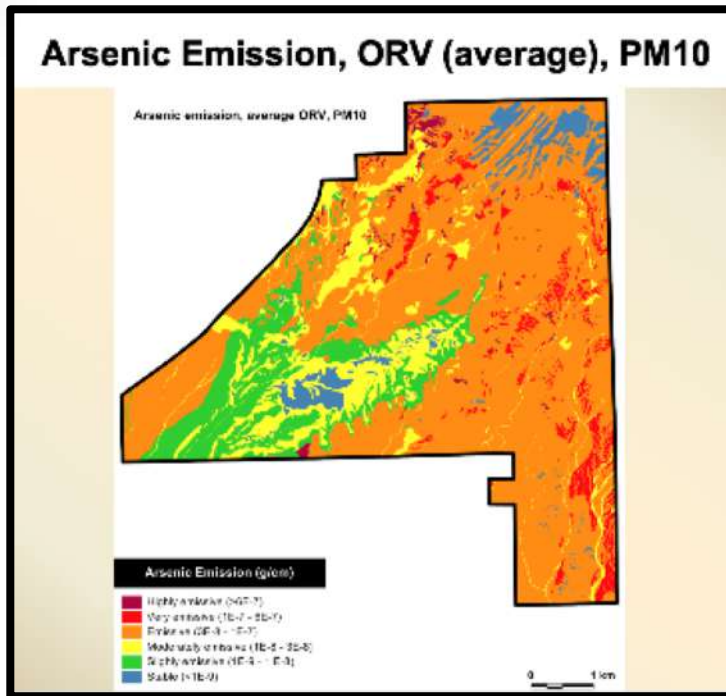
Expertise: Health effects of mineral dust; Asbestos; Heavy Metals; Soil  
Science/Geology

# Naturally-Occurring Asbestos & Health Effects of Mineral Dust

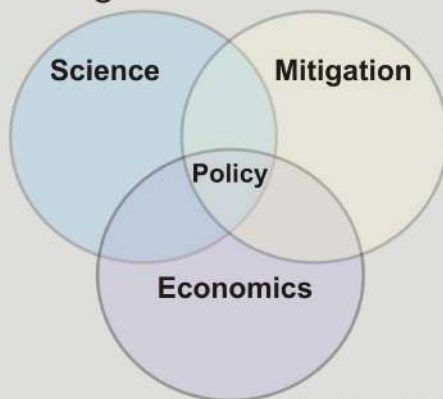




# Health Effects of Mineral Dust: Arsenic



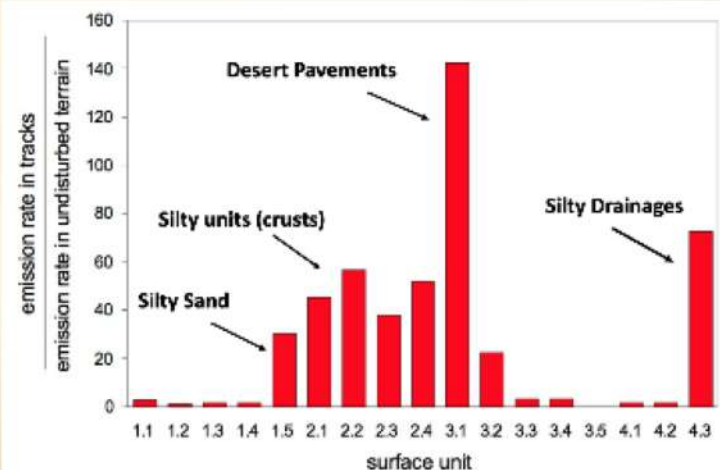
## Dealing with Hazards and Risk



after Stein & Stein (2014)



## Where disturbance matters



# Sedimentary Geology

**Dr. Tomas Capaldi**

Department of Geoscience

Phone: (702) 895-3262

Email: [tomas.capaldi@unlv.edu](mailto:tomas.capaldi@unlv.edu)

**Expertise:**

Tectonics

Basin Dynamics

Quaternary Geology



# Sedimentary Record of Magmatism, Geodynamics, and Mountain Building

Links between subduction, magmatism, and crustal deformation

A) Subduction Angle

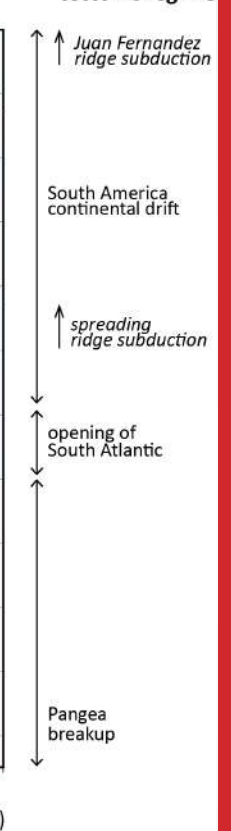
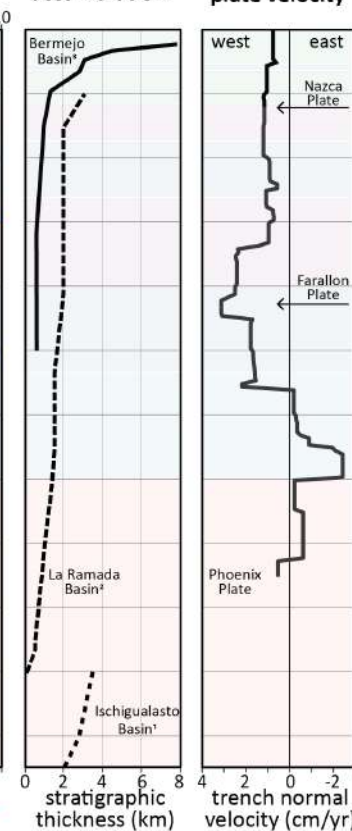
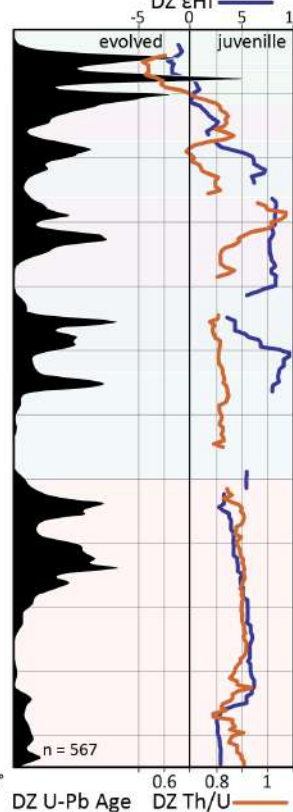
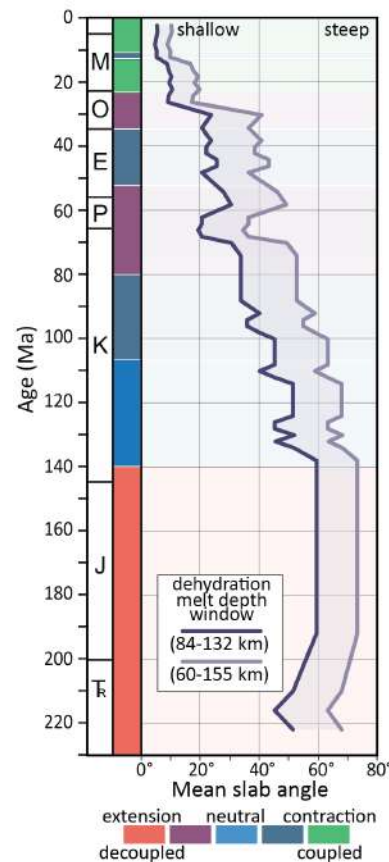
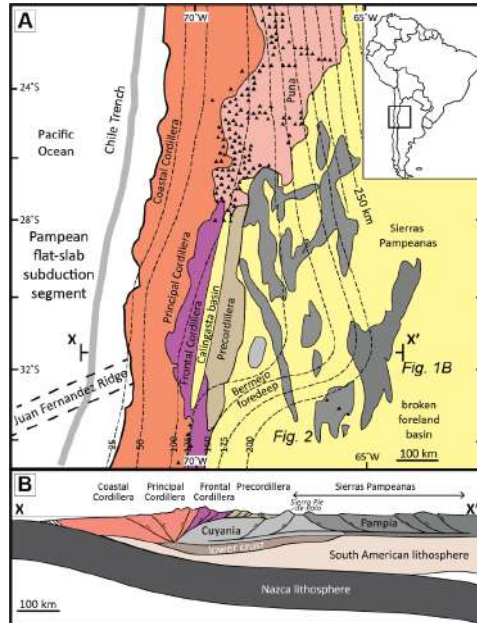
B) Andean Arc Magmatism

C) Basin accumulation

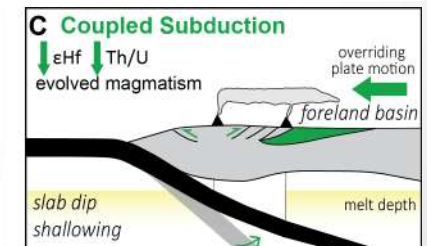
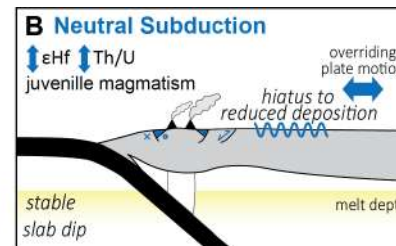
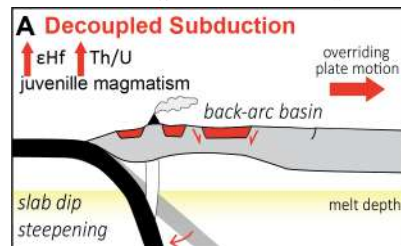
D) South American plate velocity

E) South American tectonic regime

## Argentine Andes

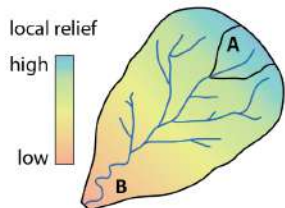
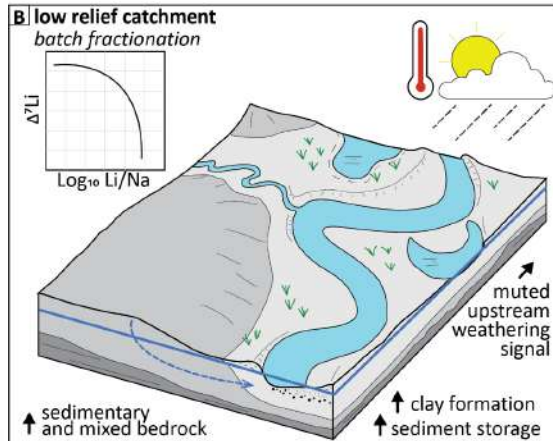
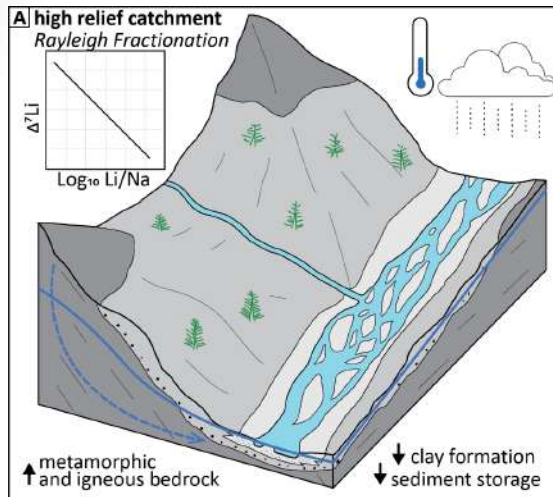


The deep time sedimentary archive provides critical insights into the dynamic relationship among lithospheric, climatic, and Earth surface processes



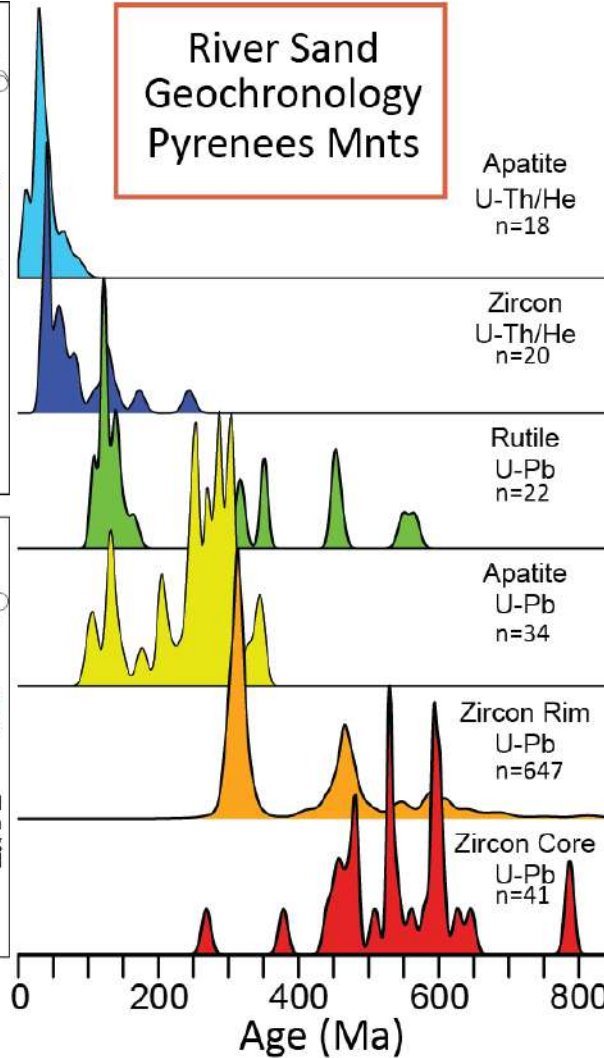
# Earth Surface Processes in Modern Sedimentary Systems

## Weathering



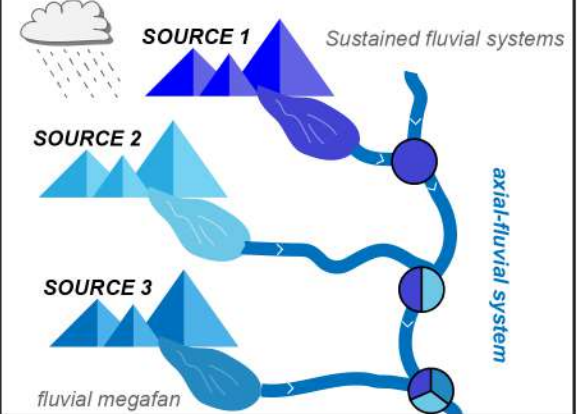
## Erosion

### River Sand Geochronology Pyrenees Mnts

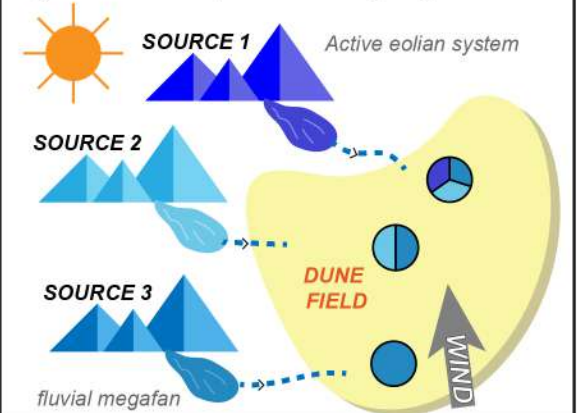


## Transport

### A) Wet climate (fluvial transport)



### B) Arid climate (eolian transport)



# Sedimentary Geology

## **Dr. Ganqing Jiang**

Professor

Department of Geoscience

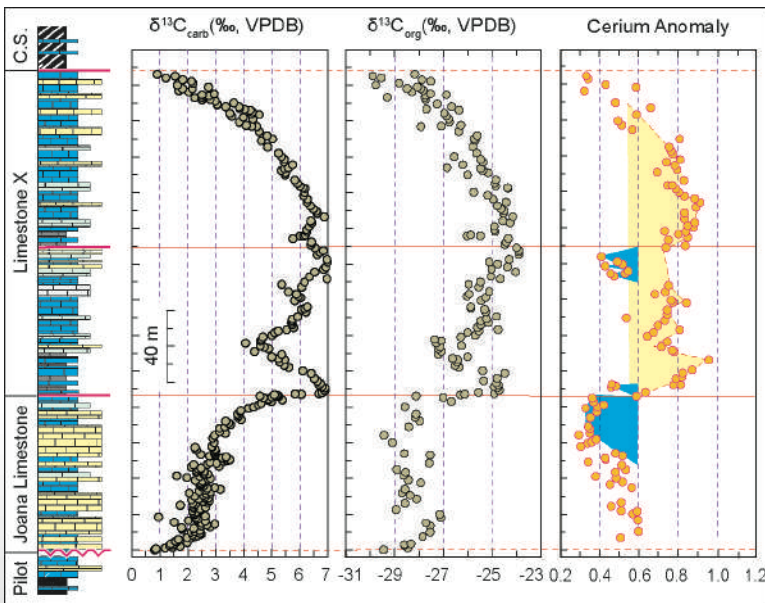
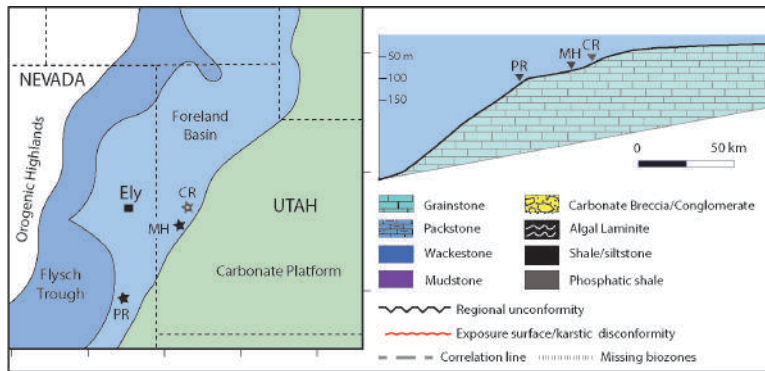
Phone: (702) 895-2708

Email: [Ganqing.Jiang@unlv.edu](mailto:Ganqing.Jiang@unlv.edu)

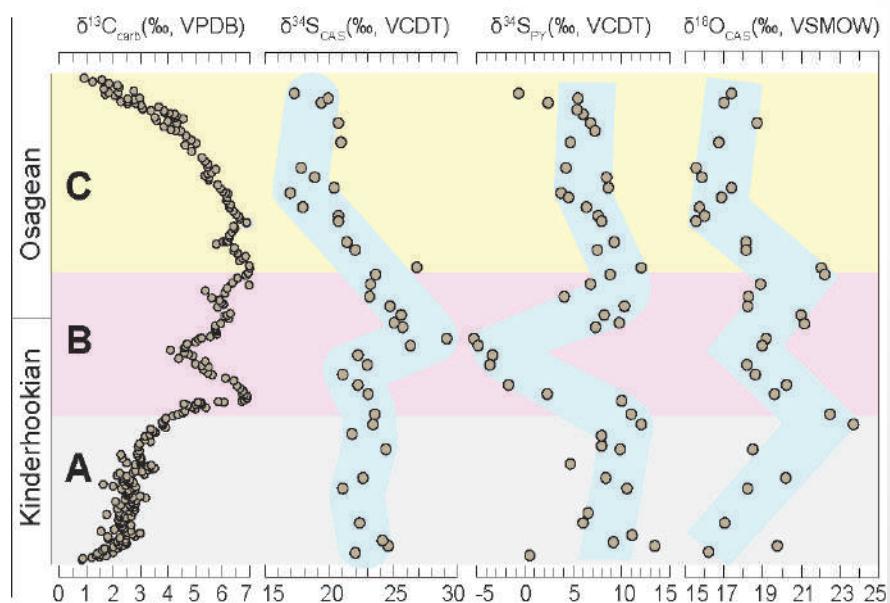
## **Expertise:**

- Sequence and chemostratigraphy
- sedimentology
- Carbonate diagenesis

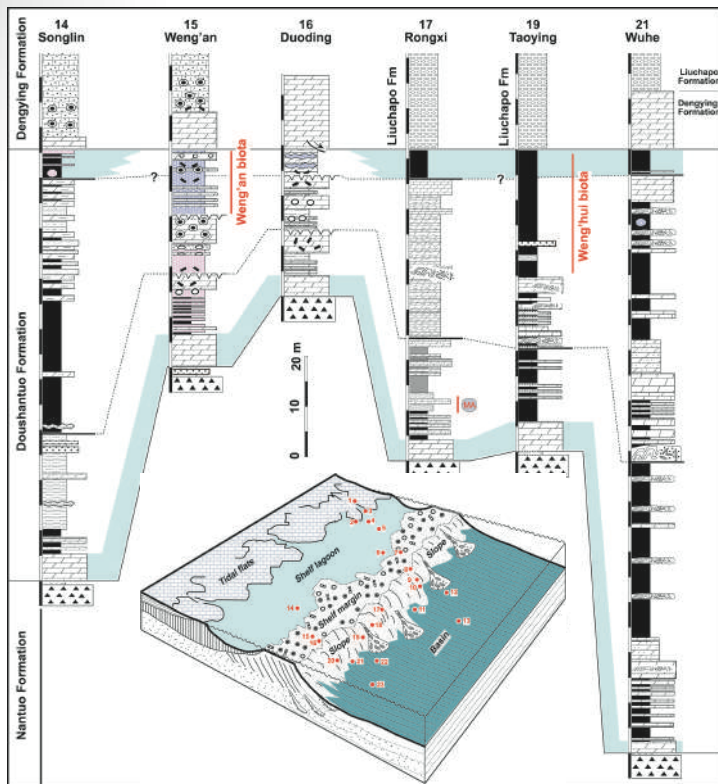




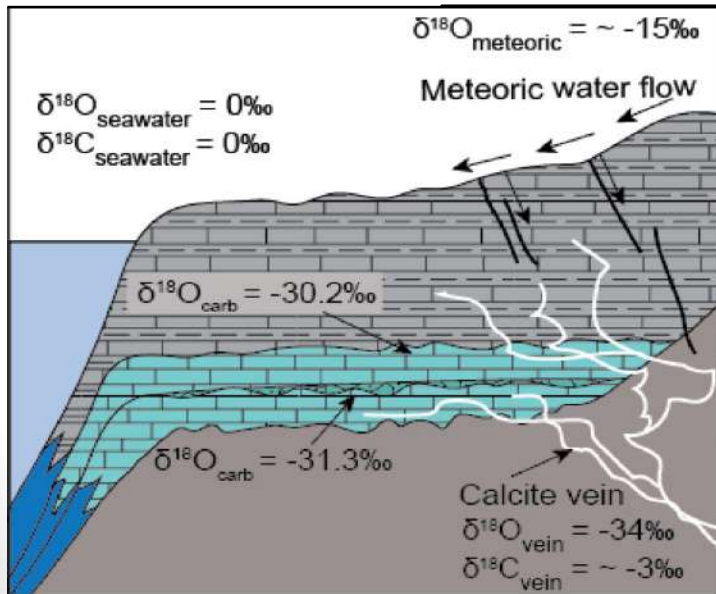
- Sequence and chemostratigraphy
- Paleogeographic reconstruction
- Applications of stable isotopes and rare earth elements
- Paleoenvironmental change across major perturbations of the carbon cycle and mass extinctions







- 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

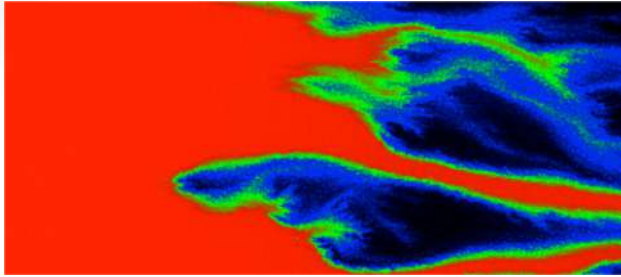
Phone: (702) 895-4616

Email: [michael.nicholl@unlv.edu](mailto:michael.nicholl@unlv.edu)

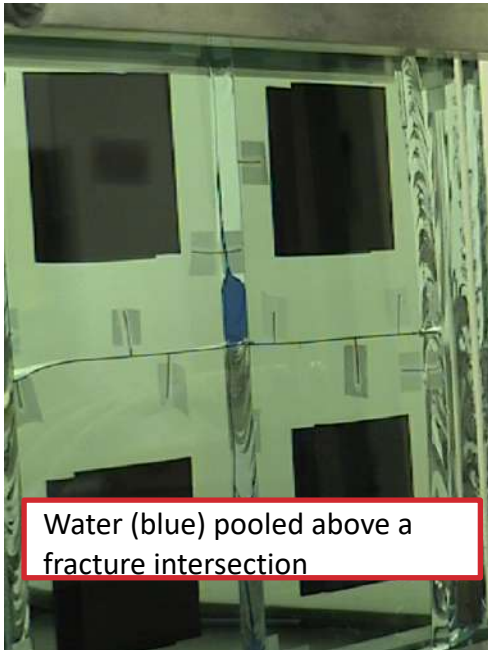
## **Expertise:**

- Unsaturated zone hydrology
- Fractured rock hydrology
- Environmental fluid mechanics

# Fractured Rock Hydrology



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



Water (blue) pooled above a fracture intersection



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



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

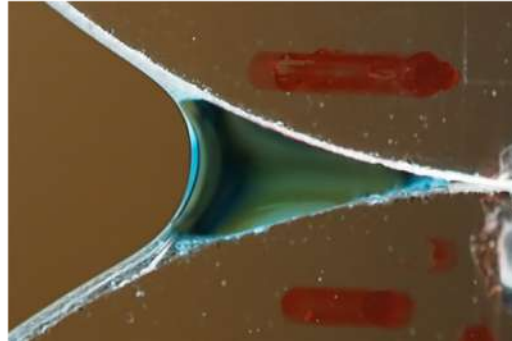
- ❑ Two-phase flow and transport in fractured rock
- ❑ Laboratory experimentation, field mapping, numerical simulations
- ❑ Contaminant transport, geothermal energy, enhanced petroleum recovery



# Unsaturated Porous Media



Seepage through gravel-sized capillary barrier materials



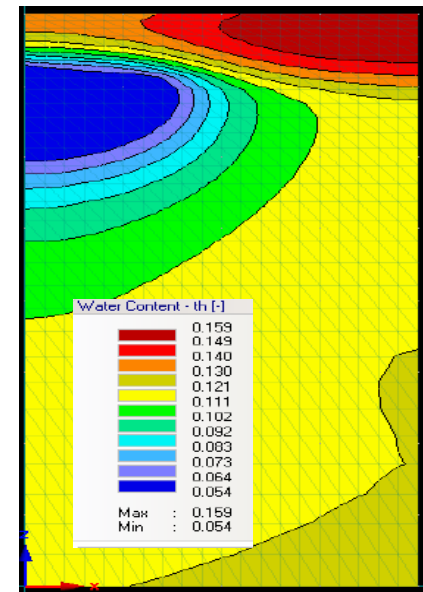
Millimeter-scale transport experiment



Hydraulic conductivity of a rock slab



Sampling Chloride as a proxy for root-driven horizontal flow



2D simulation of root-driven transport

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