

## Team



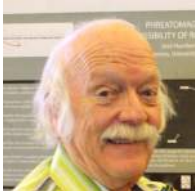
Dr. Gail L. Arnold



Dr. Diane Doser



Dr. Tom Gill



Dr. Phil Goodell



Dr. Lin Ma



Dr. Benjamin Brunner



Dr. Mark Engle



Dr. Adam Ianno



Dr. Lixin Jin



Dr. Nicholas Pingitore

## Focus

We apply the principles and tools of geochemistry and biogeochemistry to reveal and understand the links between the different parts of the Earth system. To achieve our goals, we engage in multidisciplinary collaborations with researchers from engineering, biology, and chemistry.

Curiosity, collaborations, and taking advantage of technological and experimental innovations are the main drivers of research successes in the field of Earth System Geochemistry. By strategically developing key skills within our faculty and students, we establish and maintain a thriving research, teaching and learning environment.



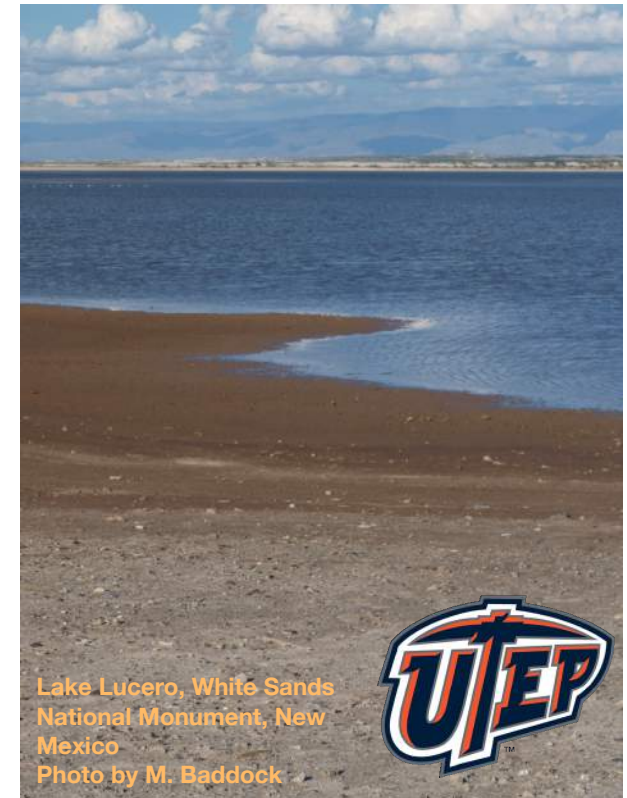
## Center for Earth &amp; Environmental Isotope Research (CEEIR)

The CEEIR provides cutting edge facilities for isotope analysis, bridging the fields of non-traditional isotope systems and development of new isotope tools with innovative applications in the field of light stable isotopes.

## Earth System Geochemistry

*Critical Zone • Biogeochemistry • Environmental Geochemistry • Elements and Isotopes • Geochemical Cycles • Geomicrobiology • Low-Temperature Geochemistry • Medical and Public Health Geology • Water, Air and Soil Pollution*

**Human society and the natural world are intertwined through the chemistry of the Earth system. We use science to find out how our civilization and natural environment can be sustainably managed together.**



Lake Lucero, White Sands National Monument, New Mexico  
Photo by M. Baddock





## Current Projects

Our research spans a wide variety of topics, such as tracing **dust and sediment transport**, studying the **inhalation and dissolution of minerals and metals in the human respiratory and circulatory systems**, assessing **water, air, and soil pollution**, measuring **biogeochemical alterations in the critical zone**, quantifying **chemical weathering**, revealing the **interactions between trace metals and major element cycles**, detecting **past climate changes in sea-floor and lake-bottom sediments**, and understanding the **geomicrobiology of sulfur cycling in the deep biosphere**.

## Selected Publications

**Engle M.A. & Rowan E.L.** Geochemical evolution of produced waters from hydraulic fracturing of the Marcellus Shale, northern Appalachian Basin: A multivariate compositional data analysis approach. *Int. J. of Coal Geology* 126: 45–56, 2014.

**Jin L., et al.** The CO<sub>2</sub> consumption potential during gray shale weathering: Insights from the evolution of carbon isotopes in the Susquehanna Shale Hills critical zone observatory: *Geochimica et Cosmochimica Acta*, v. 142, p. 260–280, 2014.

**Ma L., et al.** Regolith production and transport in the Susquehanna Shale Hills Critical Zone Observatory: Part 1. *Journal of Geophysical Research: Earth Surface* 118: 722–740, 2013.

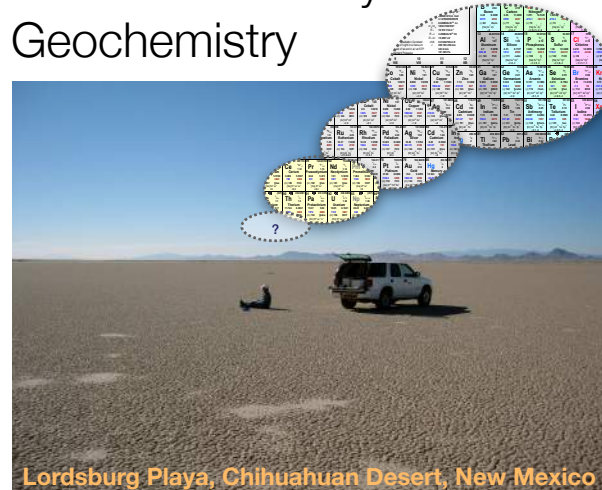
**Rojo L., Gill T.E., et al.** Intercomparison of PIXE and ICP-OES analyses of aeolian dust from Owens Lake, California. *Geostandards and Geoanalytical Research* 36: 83–102, 2012.



Rio Grande, TX, USA

Graduate students Syprose Nyachoti (left) & Jacqueline Engel (right) measure water quality parameters.

## Future of Earth System Geochemistry



Lordsburg Playa, Chihuahuan Desert, New Mexico

From rocks to humans, from dust particles to soil microbes, from trace elements to Earth's history — **Earth System Geochemistry spans a mind boggling diversity and variety of processes that operate from milliseconds to eons.**

Despite this apparent disparity, we believe that all of these processes are so closely intertwined that we have to understand them and their vulnerable relationships in a holistic and creative, yet systematic manner.

**Geochemistry provides us with the common ground and platform to tackle these tasks.**



Basse-Terre Island, Guadeloupe, French Antilles

## Student Success and Achievements



**Yvette Pereyra** received travel support by the **NSF Critical Zone Observatory Program** to present her research at the 10<sup>th</sup> international "Geochemistry of the Earth's surface" in Paris, France.

**Fotios Fouskas** received the 2014 **Antoinette Lierman Medlin Scholarship** by the **GSA Coal Geology Division**. The stipend will be used for expenses related to his study: "**Using Novel Cadmium Isotopes** to understand the behavior of trace elements related to **coal combustion** processes and the environmental impacts of disposal and beneficial use of coal combustion products."



**Joe Collins** received the 2014 **Jonathan Davis Memorial Scholarship** awarded by the Desert Research Institute. The award was made for his Ph.D. project, "Paleoenvironmental Investigations of the Harney Basin, Eastern Oregon."



### JOIN US!

Our department offers B.S. degrees in Geological Sciences and Environmental Science, M.S. degrees in Geological Sciences, Geophysics, and Environmental Science, and the Ph.D. in Geological Sciences.

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