CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

Faculty Expertise

Dr. Eliot A. Atekwana

Assistant Professor of Geology, IUPUI
Hydrogeology, Stable Isotope Geochemistry,
Hydrogeochemistry, Wetlands

Ph.D., Western Michigan University, 1996
M.S., Howard University, 1987
B.S., University of Maryland, College Park, 1984

Research focuses on the application of stable isotopes of carbon, oxygen, and hydrogen in the hydrologic system. Current research projects include the use of dissolved inorganic carbon and its isotopic ratio (a) in landfill environments for leachate detection and impact analysis (b) in agricultural settings for denitrification studies, (c) at hydrocarbon contaminated sites for biodegradation studies, and (d) for carbon cycling in streams, lakes, and wetlands. Other projects involve examining carbon and oxygen isotopes in carbonates associated with concrete degradation, and carbonates in soils and lake marl as indicators of paleoclimatic changes.

Dr. Estella A. Atekwana

Associate Professor of Geology, Western Michigan University
Exploration Geophysics, Environmental Geophysics,
Engineering Geophysics, Hydrogeophysics

Ph.D., Dalhousie University, Canada, 1991
M.S., Howard University, 1986
B.S., Howard University, 1983

Research foci are two fold: 1) geophysics applied to tectonic studies of basements, rifts and basins of continental interiors and 2) the application of non-invasive techniques (gravity, magnetic, seismic, electrical, electromagnetic and ground penetrating radar methods) for subsurface characterization, especially in areas related to aquifer vulnerability and groundwater contamination problems. Dr. Atekwana's multidisciplinary team is currently testing the hypothesis that a causative relationship exists between microbial degradation of light non-aqueous phase liquids (LNAPL), associated chemical and physical processes and the anomalous geoelectrical signatures of aged hydrocarbon plumes. Dr. Atekwana is also involved in the development and deployment of a site monitoring automated resistivity probe system (SMAPS). Study sites have included landfills in Kalamazoo, MI, Wurtsmith AFB, MI and in Gaborone, Botswana.

Dr. Andrew Barth

Associate Professor of Geology, IUPUI
Chairperson, Department of Geology, IUPUI
Petrology, Geochemistry, Tectonics

Ph.D., University of Southern California, 1989
M.S., California State University, 1985
B.S., California State University, 1981

Research focuses on the evolution of the western margin of North America during the last 3 billion years. Current projects include studies of the origin of continental crust, deformation within ancient island-arc systems in southern California and western Arizona, and the role of carbon, sulfur, and water in arc volcanism and global climate.

Dr. Timothy S. Brothers

Associate Professor of Geography, IUPUI
Physical Geography, Biogeography

Ph.D., University of California, LA, 1985
M.A., University of California, LA, 1981
B.A., University of California, Davis, 1978

Research interests include physical geography and geographic methods including physical systems of the environment, biogeography, cultural biogeography and applied spatial statistics, with expertise is human-caused vegetation change. He has studied causes and consequences of deforestation of the Los Haitises karst region in the Dominican Republic. Current research focuses on regeneration of forests after fire. A new project combines remote sensing and field work to analyze vegetation contrasts between the Dominican Republic and Haiti.

Dr. Pascal de Caprariis

Associate Professor of Geology, IUPUI
Mathematical Geology, Quantitative Hydrology, Geophysics

Ph.D., Rensselaer Polytechnic Institute, 1973
M.S., Boston College, 1967
B.S., Boston College, 1964

Research focuses on sampling techniques for geologic variables. Current projects include developing ways to determine the minimum size sample that needs to be taken to characterize an environment. He is also working with the I.U. School of Continuing Studies to develop courses to be taught using the Internet. In addition to course development, he is studying ways to assess students' achievement in distance education courses.

Dr. Paul Dubin

Ph.D., Rutgers University, 1970

Professor of Chemistry, IUPUI

Research is on polymer-surfactant complexes. Surfactants dissolve organic compounds, and can be, in principle, used to take up non-aqueous phase pollutants (e.g. benzene). However, the surfactant itself is mobile. Polycations form complexes with surfactants, and at the same time adsorb strongly to siliceous solids (e.g. sand). We have shown that these complexes act as immobilized surfactants that can take up water-insoluble solutes, while permanently adsorbing on siliceous solids). Thus, organic pollutants can be prevented from migrating in an aqueous environment.

Dr. Gabriel Filippelli

Ph.D., University of California, Santa Cruz, 1994
B.S., University of California, Davis, 1986

Associate Professor of Geology, IUPUI
Environmental Chemistry, Paleoceanography/Paleoclimatology

Research includes biogeochemical cycling in the environment and the connections between geochemistry and the geologic record of global climate change. Current research involves determining the effects of glacial cycles on chemical weathering rates and weathering styles in the mid-continent; examining carbon and nutrient cycles on glacial/interglacial time scales; assessing industrial heavy metal inputs to wetlands in the Indiana Dunes National Lakeshore and metal contamination of soils from the Indianapolis area; and evaluating the role of dust on ocean biogeochemical cycling.

Dr. Robert D. Hall

Ph.D., Indiana University, 1973
M.S., University of Colorado, 1966
B.S., Purdue University, 1963

Professor of Geology, IUPUI
Glacial Geology, Soils, Geomorphology, Quaternary Geology, Environmental Geology

Current research interests involve the record of glacial-interglacial cycles in Indiana and western Ohio and in the Rocky Mountains. Surface soils and buried soils are interpreted as the result of an interplay of several soil-forming factors then used to help redefine glacial chronology. Other approaches to dating glacial and other Quaternary deposits include mapping, mineral and rock weathering, radiocarbon dating, and cosmogenic-isotope dating. The complexity of soils is being investigated, particularly with regard to the effects of variations in parent material, soil drainage, soil erosion, and growth and melting of permafrost. An interdisciplinary approach to studying soils is emphasized. Research activities include advising other investigators who are studying the impact of contaminants on surface water and ground water.

Dr. Kathy Licht

Ph.D., University of Colorado, 1999
M.S., University of Colorado, 1995
B.S., St. Norbert College, 1992

Assistant Professor of Geology, IUPUI
Quaternary Geology, Glacial Geology, Geomorphology

Research focus is on reconstructing the history of the Antarctic Ice Sheet over the past 30,000 years. Previous work has utilized sedimentology and stratigraphy to reconstruct ice extent, as well as ^{14}C dating to constrain the timing of ice advance and retreat. The goal of a recently funded project is to determine past ice flow paths into Antarctica's Ross Embayment in order to make a significant contribution to the understanding of changes in ice sheet dynamics through time. A detailed study will link the mineralogical, geochemical, and isotopic characteristics of the sediments from seafloor sites that were once covered by ice to sediments collected from the source areas of ice in East and West Antarctica.

Dr. Greg Lindsey

Ph.D., M.A., The Johns Hopkins University, 1992, 1989
M.A., Northeastern Illinois University, 1987
B.U.R.P., University of Illinois, 1977

Associate Professor, SPEA, IUPUI
Associate Director of Environmental Research,
Center for Urban Policy and the Environment, SPEA, IUPUI
Environmental Planning, Water Resources Management,
Program Evaluation

Teaching and research interests are in the areas of environmental planning, policy, and management. He has published articles on a number of substantive environmental issues, including greenways, groundwater protection, stormwater management, and erosion and sediment control.

Nadine C. Martin

Ph.D., Université de Montréal, 1999
M.A., Université Laval, 1993
B.A. Université Laval, 1991

Lecturer in Geography, IUPUI
Fluvial Geomorphology, Palaeohydrology,
River Ice Dynamics, Cold Environments Hydrology,
Fish Habitat Restoration

Research focuses on the turbulent structure of flow in ice-covered rivers. Current research projects include extensive turbulence measurements recorded under an ice cover in a natural environment for four different hydraulic conditions: 1) winter low water; 2) under ice flood; 3) tidal conditions; and 4) mixed tidal and under ice flood conditions. The research is especially concerned about the vertical mixing and the dampening of vertical expansion of coherent flow structures.

CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

Faculty Expertise, Continued

Dr. Joseph Pachut, Jr.
Associate Professor of Geology, IUPUI
Invertebrate Paleontology, Paleoecology, Biometrics, Evolution

Ph.D., Michigan State University, 1977
B.A., State University of New York, Oneonta, 1972

Research interests involve understanding the patterns of evolution in fossil organisms using quantitative data analysis techniques. Included are analyses of the paleoecology of ancient ecosystems, of patterns of growth and development in colonial animals that lived under different paleoenvironmental conditions, a statistical evaluation of the "genetics" of fossil colonial organisms, fossil biodiversity patterns and changes in the tempo and mode of evolutionary changes throughout geologic time.

Dr. Allen Perry
Adjunct Professor of Geology, IUPUI
Environmental Geology, Engineering Geology
Environmental Impacts of Mining and Mineral
Processing, Mined Land Reclamation

Ph.D., Purdue University, 1977
M.S., Purdue University, 1972
B.S., Indiana University, 1961

Research interests include: improved methodologies for mining and mineral processing; mine hydrology; abatement procedures to ameliorate adverse environmental effects of mining; coastal zone management, public lands, marine minerals; and internal cooperation in the areas of mining and energy policy.

Dr. Gary Rosenberg
Associate Professor of Geology, IUPUI
Biomineralization, Evolution, Historical Geology,
History of Geologic Thought

Ph.D., University of California, Los Angeles, 1972
B.S., University of Wisconsin, 1966

Dr. Rosenberg uses digital electron microscopy to produce high magnification images of the minerals and matrices that organisms deposit in shells, teeth, and bone as well as to draw maps of the distribution of elements within those materials. He is interested in determining how the external environment and the internal physiology of the organism have influenced the shape, structure, and composition of skeletons throughout the course of evolution, how various human afflictions alter skeletal development, and how pollution influences growth as well. Dr. Rosenberg also explores connections between the development of modern geological thought and the evolution of western culture as recorded in art history.

Dr. Jill Saligoe-Simmel
Sr. Research Associate, The Polis Center at IUPUI
Resource Geography, Spatial Analysis

Ph.D., Oregon State University, 1997
M.A., Indiana State University, 1993
B.S., Ball State University, 1990

Research is in GIS policy and planning, environmental planning and management, including water quality/land use interactions, watershed management, and geo-spatial analysis. Current projects include coordination and development of a state-wide Indiana Geographic Information Catalog linked to the National Spatial Data Infrastructure. Chair of the Indiana GIS Initiative and interim chair of the Indiana Geographic Information Council, she has more then 10 years of experience in GIS, including research, analysis, and data development. She has taught university courses in GIS, environment conservation, and natural resources planning and management, and has conducted GIS metadata workshops.

Dr. Catherine Souch
Associate Professor of Geography, IUPUI
Associate Director, Center for Earth and Environmental Science
Records of Environmental and Climate Change,
Hydroclimatology, Human Impact on Environment

Ph.D, University of British Columbia, 1990
M.S., University of British Columbia, 1984
B.A., University of Cambridge, England, 1982

Research is in past environmental conditions using sedimentary evidence in lacustrine/wetland environments. Increasingly this work is focusing on the relative effects of natural variability and human-induced effects on the hydrological and sedimentological functioning of wetlands. Currently this work is being conducted at the Indiana Dunes National Lakeshore as part of a larger project focused on ecosystem restoration. She is also working on post-glacial lake sediments collected in British Columbia, Minnesota, and Saskatchewan. Of interest is the chronology of deglaciation and the nature and controls over post-glacial sedimentation rates.

Dr. R. Jeffrey Swope

Assistant Professor of Geology, IUPUI
Mineralogy

Ph.D., University of Colorado, 1997
M.S., Ohio State University, 1988
B.S., Ohio State University, 1983

Research involves the determination of mineral structures using x-ray diffraction data in order to address a wide variety of Earth-related problems including: the crystal chemical behavior of mantle minerals, the effects of Cl in biotite and amphibole, the shape of atoms in minerals as related to bond type, and the effects of cation ordering in micas. Additional applied studies include: study of natural analog minerals to evaluate potential nuclear waste forms, structure determination of organo-metallic molecules, and evaluation of the structural state of semi- and super-conducting materials.

Dr. Lenore Tedesco

Associate Professor of Geology, IUPUI
Director, Center for Earth and Environmental Science
Sedimentology, Records of Environmental and Climate Change,
Carbonate Sedimentology and Diagenesis, and Wetland and Estuarine Restoration.

Ph.D., University of Miami, 1991
B.A., Boston University, 1984

Current research interests involve studies that compare modern and ancient sedimentary environments and their record of environmental and climate change. This research examines the influences of catastrophic events, biologic community and sea level processes on sedimentary sequence development and evolution. Dr. Tedesco is currently working in Everglades National Park studying the role of sea level rise and catastrophic storms in controlling the stability of coastal wetlands. She is also using pollen analysis of high-resolution core sequences to evaluate natural vs. anthropogenic changes to the Everglades ecosystem as part of a larger project focused on ecosystem restoration efforts. Her research on the distribution of anthropogenic pollutants in surface sediments within estuarine ecosystems and associated fresh water marshes is being utilized to plan wetland restoration programs.

Dr. Jeffrey S. Wilson

Assistant Professor of Geography, IUPUI
Geographic Information Systems,
Environmental Remote Sensing

Ph.D., Indiana State University, 1998
M.A., California University of Pennsylvania, 1994
B.S., California University of Pennsylvania, 1986

Research is in environmental remote sensing, geographic information systems and land cover dynamics. Current research includes multi-temporal analysis of land use and land cover dynamics along the border between Haiti and the Dominican Republic and their relationship to variables in the physical and socioeconomic environment; remote sensing of water quality in the Lower Rio Grande watershed using digital airborne camera data; and relationships between field-based measurements of forest canopy characteristics and space-borne remote sensing instruments