Faculty Research Interests

Kevin Cornwell, Professor and Chair
cornwell@csus.edu

Gemorphology

My interests generally revolve around surface and groundwater flow in mountain river systems. To that end I've had the opportunity to explore sediment transport conditions, paleo-flood reconstructions, dam break and breakout flood modeling as well as groundwater flow and modeling studies. Of late, I've been more focused on montane meadows, their ability to store groundwater and how that groundwater volume changes in degraded meadows. Specifically my students and I have been measuring the volume of groundwater that exists in both healthy and degraded meadows and assessing how that volume changes throughout the water year. We follow-up on recently restored meadows and document improvements to the overall hydrology conditions in those meadows.

David Dralle (starting Fall 2019)
dralle@berkeley.edu

Ecohydrology

The Ecohydrology Research Group at Sacramento State University studies how the hydrogeologic structure of the near-surface affects streamflow generation and ecosystem water availability, especially in places like California where precipitation is seasonally limited. We study these surface-subsurface interactions using modeling, remote-sensing, and field-based approaches, and aim to improve scientific understanding of the response of water resources availability to global change. Currently, we have a number of ongoing projects around the state of California looking at how the geological history of a watershed determines streamflow and forest response to drought

Julie Griffin, Assistant Professor
griffin@csus.edu

Sedimentary Geochemistry

The overarching aim of my research is to recognize climatic forcing mechanisms that operate on a variety of different time scales. I use sedimentological and geochemical observations to reconstruct Earth's past climate. Sequence stratigraphy and paleoenvironmental reconstructions indicate the magnitude and timing of fluctuations in sea level. The oxygen isotopic composition of conodont microfossils reveals changes in ice volume, precipitation patterns, and ocean temperature. The isotopic composition and carbon:nitrogen ratios of organic matter, as well as the strontium isotopic composition of conodonts, disentangle the multitude of signals preserved in the conodont oxygen isotope record. These various geochemical records become integrated with the use of mixing models. My research focuses on the Carboniferous, when the Earth last possessed perennial polar ice and atmospheric carbon dioxide concentrations were comparable to today's levels.

Brian Hausback, Professor
hausback@csus.edu

Volcanology

Study of active and ancestral volcanic stratigraphy, structure, petrology and geochemistry is the best way to understand mechanisms and hazards of volcanic eruption. I take a broad, commonly field-based approach to investigation of volcanoes in a variety of locations, including Mount St. Helens, Baja California's Gulf coast, the Sutter Buttes in California's Sacramento Valley, and the High Rock caldera of NW Nevada.

David Shimabukuro, Assistant Professor and Graduate Coordinator

dhs@csus.edu

Tectonics / Water Resources

I have two distinct research interests: tectonics and water resources.

Tectonics: I am a field-based tectonicist who uses mapping of field relations, geochemistry and geochronology to understand the earth. Recently, my tectonics group has been focusing on understanding the history and evolution of ocean crust, from its formation at mid-ocean ridges, to subduction, and to its emplacement as ophiolites in orogenic belts. My students have worked in Calabria, Italy; the Alps; and Northern California.
Water Resources: My water resources group studies the interaction between oil and gas wastewater injection and groundwater resources. We use data from archived oil and gas well to understand the distribution of fresh and saline groundwater, the stratigraphy of the subsurface, and potential well integrity issues.

Steven Skinner, Assistant Professor
Tectonophysics

steven.skinner@csus.edu

My research aims to solve tectonic problems through regional geology, tectonic plate reconstructions, and geophysical methods. One branch of my research has been focused on flat slab subduction. Through a synthesis of geologic and geophysical data, my previous study of flat subduction dynamics found no correlation, spatial or temporal, between historic zones of flat subduction and the subduction of reconstructed bathymetric highs. We are now expanding the scope of this work to look at other potential driving mechanisms of changes in slab geometry. Another ongoing branch of my research aims to constrain the timing and location of continental rifting in the Gulf of

California. Through geologic mapping and paleomagnetic sampling of the Tuff of San Felipe, an ignimbrite that predates rifting, we can identify vertical axis rotations associated with the rifting process. Additionally, we have measured anisotropy of magnetic susceptibility in an effort to define a flow direction to aid in outcrop correlation. Emerging

research directions include: using paleomagnetics to assess the differential exhumation of batholiths, determining the paleogeography of the Chortis block, testing the limits of Anisotropy of Magnetic Susceptibility as an indicator for paleoflow, and assessing the along trench variation in subduction parameters.

Amelia Vankeuren, Assistant Professor
vankeuren@csus.edu

Hydrogeology and Geochemistry

I am a hydrogeologist/geochemist working on water--rock interaction and groundwater quality. My group's primary areas of research are California groundwater resources and the water-energy nexus. We use a combination of fieldwork, laboratory experiments, geochemical analyses, and reactive transport modeling to assess and predict changes to groundwater flow and chemistry from a variety of processes. Recent research projects include:

- Managed aquifer recharge through off-season irrigation
- Quantifying recharge from groundwater-surface water interaction near rivers
- Arsenic mobilization in groundwater in the San Joaquin Valley
- Impact of hydraulic fracturing (fracking) for oil and gas on shale reservoir chemistry and permeability
- Mineral carbonation (turning carbon dioxide gas into rocks for permanent storage) to combat global climate change

I am interested in the intersection of science and policy, and enjoy doing research that informs policy decisions and helps us make better choices about how we interact with our Earth.

Amy Wagner, Assistant Professor
Paleoceanography and Geochemistry

amy.wagner@csus.edu

My research interests include paleoceanography/paleoclimate and isotope geochemistry. I have students working on projects using isotope and trace metal geochemical data from corals and marine sediments to understand oceanographic changes throughout the Holocene associated with natural and anthropogenic climate change. In addition, I am working with students to study the source of water delivered to mountain meadows using water isotopes. I am a member of the new Sacramento State Institute for Water, Energy, Sustainability, and Technology (iWEST), a center for interdisciplinary research to address both human and scientific challenges facing California due to climate change. My field areas include Monterey Bay, St. Croix (USVI), Ross Sea, Antarctica and the Sierra high mountain meadows.

Charlie Alpers (USGS), Adjunct Professor

cnalpers@usgs.gov

Environmental Geochemistry

Research interests include: environmental geochemistry of mineral deposits; multi-disciplinary investigation of mercury contamination and bioaccumulation in the Sierra Nevada and California Coast Ranges associated with historical gold and mercury mining; trace metals and colloid transport in surface waters; arsenic bioavailability in mine waste; acid mine drainage; efflorescent sulfate minerals; application of stable and radiogenic isotopes to environmental problems.

Joe Domalgalski (USGS), Adjunct Professor

joed@usgs.gov

Aqueous Geochemistry

My research focuses on understanding and modeling of various water quality constituents in streams and groundwater. My recent contributions include a fate and transport model of phosphorus and nitrogen in California rivers, a study of long-term trends in concentrations and loads of various nitrogen and phosphorus compounds in rivers draining to the Delta of the Sacramento and San Joaquin Rivers, and a study of wet and dry mercury deposition to the landscape of western North America and associated stream loading.