



DAVID W. RODGERS, PROFESSOR AND CO-CHAIR OF DEPARTMENT

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SPECIALITIES:

Structural Geology, Regional Tectonics

Structural interaction of the Basin and Range Province and the Snake River Plain

Mesozoic-Cenozoic deformation in the hinterland of the Cordilleran fold-thrust belt

EDUCATION:

Ph.D., 1987, Stanford University

B.A., 1981, Carleton College

Joined the Idaho State University faculty in 1985

WHO AM I ?

Born and raised in the Midwest, educated in Minnesota and California, and now settled in Idaho. Specialities are Structural Geology and Regional Tectonics. Beyond work, I take a few weeks off each year to vacation with my family. We travel extensively through the West and have a strong interest in visiting remote places



UNDERGRAD COURSES I TEACH

Some years I teach Physical Geology to 30 or so non-majors, many of whom are re-entry students with a wide range of backgrounds. Some Springs I teach Earth in Space and Time, a sophomore-level course that introduces computer applications in geology: map-reading, GIS, GPS, Remote Sensing, and literature searches. Every Spring I teach Structural Geology, the study of rock deformation. And every Summer I teach part of Geology Field Camp, a 5-week intensive course located in central Idaho that teaches students to make geologic maps.



GRAD COURSES I TEACH

Some of the structure-tectonics courses at ISU include Advanced Structure, Tectonics and Sedimentation, Orogenic Belts of the World, and Advanced Petrology. Each is offered once every 4 semesters and generally includes 5-10 grad students.

In Advanced Structure we complete some geologic mapping of the nearby mountains, study rock mechanics, and use the literature to investigate some specific tectonic problem. Most years the students are able to present group results at a GSA or AGU meeting. In Tect/Sed, students study the mechanics of crustal subsidence and the infilling by sediments or volcanics.

In Orogenic Belts we study the mechanics of crustal uplift and associated topography, magmatism, and sedimentation. In Advanced Petrology (which I co-teach with Mike McCurry) we study the mechanics of magma ascent as well as igneous petrogenesis. Altogether these classes are well-integrated and provide a well-rounded MS-level background in structure-tectonics.

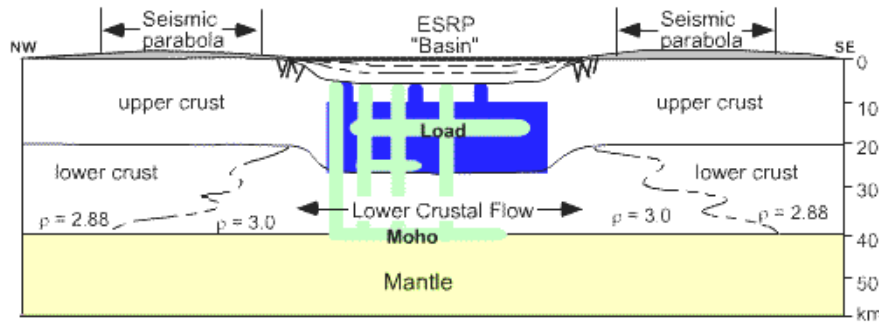
CURRENT RESEARCH

I have a wide variety of interests in both brittlely and ductilely deformed rocks, in extensional and contractional systems, and in uplift and subsidence analysis. Some common themes to the research I supervise: all research is rooted in field-based data collection such as geologic map making and structural analysis, structural analyses are generally map- and outcrop-scale, not smaller; both tectonic histories and deformation processes are studied with more emphasis on the former; and nearly all projects are completed with the help of other specialists - geochronologists, sedimentologists, petrologists, geomorphologists, or other structural geologists.



I'm pretty flexible within the broad range of interests listed below, so a student has a lot of input into what he or she might study. I suppose funding opportunities exert some control on research topics -- although one way or another I've managed to get all of my students funded. More specifically, my current research interests include the following projects.

STRUCTURAL EVOLUTION OF THE EASTERN SNAKE RIVER PLAIN -



This is a late Cenozoic bimodal magmatic province that may mark passage over a continental hot spot. I'm interested in extension of the province by dike injection, in the crustal plumbing of magma, and subsidence of the province through time. Two theses addressed the subsidence history by studying the shoulders of the structural depression. Another recent thesis focused on the geometry and kinematics of dike injection on the ESRP. More work remains to quantify the geometry and

timing of deformation throughout the province. These studies have the potential to identify the subsurface crustal layering of the ESRP and to refute or require modification of paradigms for hot-spot tectonics. Some geologic mapping, a lot of regional structural analysis, and simple flexural modeling are involved in these studies.

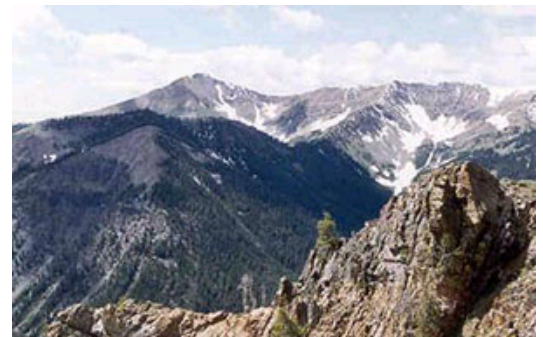


STRUCTURAL EVOLUTION OF THE NORTHEASTERN BASIN AND RANGE PROVINCE -

The style and geometry of the Basin and Range in Idaho is similar to that elsewhere in the western US, but the timing is apparently quite closely tied to magmatism on the adjacent ESRP. Over the years we have worked to quantify the amount of extension throughout Idaho and especially to document the specific age of extension in each basin. Our goal is to determine the space-time pattern of extension, relate extension to nearby tectonism, and ultimately figure out what causes extension to occur. These type of studies involve geologic mapping, study of basin fill, and radiometric dating of volcanic rocks.

STRUCTURAL EVOLUTION OF THE SEVIER HINTERLAND -

The Cretaceous Cordilleran fold-thrust belt in Idaho is called the Sevier thrust belt. Just west of the exposed thrust faults is a fairly broad region - the hinterland - that extends westward to the coeval Idaho batholith. Cretaceous deformation involved minor thrusting and a lot of folding, culminating in mylonitic shear zones along the edge of the batholith. I am interested in quantifying the amount and age of shortening and uplift associated with this tectonic event. Past projects have re-investigated supposed thrust faults (and usually eliminated them), characterized the age and amount of uplift along the edge of the batholith, and discovered map-scale recumbent folds. Another project involved thermochronology of uplifted thrust sheets to document the age and rate of thrusting. These projects generally involve remapping of mountainous country, detailed structural analysis, perhaps igneous/metamorphic petrography and sampling/analysis for age dating.



NEW ZEALAND NEOTECTONICS -



In a departure from my usual research emphases, I turned to neotectonic mapping and documented unusually large coseismic offset (~16 m) on the Wairarapa fault overlying the subduction zone in New Zealand. I used high precision GPS and laser technology to make microtopographic maps of offset stream channels, and then measured the magnitude of displacement associated with each of the last two strike-slip rupture events. Though it would be difficult to involve MS students in this research, the techniques could be used in other projects closer to home.

FORMER POST-DOCTORAL ADVISEES

Catherine Helm-Clark - Scientist, Idaho National Laboratory.

Mohammed Aly – InSAR analysis of eastern Snake River Plain subsidence.

FORMER GRADUATE ADVISEES AND THEIR CURRENT OCCUPATIONS

Phil Bandy² - Environmental Geologist, Boise, Idaho

Darlene Batatian¹ - Environmental Geologist, Salt Lake County, Utah

Luke Beranek² - Ph.D. in progress, University of British Columbia

Bob Bobo² - Environmental Geologist, Tennessee

Brad Burton² - Ph.D. (Wyoming), Shell Canada, Calgary

Duane DeVecchio² - Ph.D. in progress, UC Santa Barbara

Doug Dvoracek² - Ph.D. (Georgia), Research Scientist, University of Georgia

Dave Ettner² - Ph.D. (Oslo), Environmental and Mining Geologist, Norway

Rudy Ganske² - Mining Geologist, Salt Lake City, Utah

Jim Hengesh² - Environmental Geologist, San Francisco, California

Mary Hodges² - USGS hydrogeologist, Idaho Falls, Idaho

Adrian Holmes¹ - Environmental Geologist, Portland, Oregon

Brian Hough¹ - Ph.D. in progress, University of Rochester

Audrey Huerta¹ - Ph.D. (MIT), Assistant Professor, Central Washington University

Brad Johnson² - Ph.D. in progress, University North Carolina - Charlotte

R.J. Johnson² - Environmental Geologist, Las Vegas, Nevada

Brennan Jordan¹ - Ph.D. (Oregon State University), Assistant Professor, University South Dakota

Sean Long¹ - Ph.D. in progress, Princeton University

Brian Mahoney² - Ph.D. (British Columbia), Professor, University of Wisconsin-Eau Claire

Paul Malan¹ - Economic Geologist, Nevada and Montana

Nadine McQuarrie¹ - Ph.D. (University of Arizona), Assistant Professor, Princeton University

Dan Narsavage² - GIS Specialist, Idaho Department of Water Resources, Idaho

J.P. O'Brian² - Environmental Geologist, Denver, Colorado

Suzette Payne² - Seismologist, Idaho National Laboratory, Idaho

Arron Pope² - Environmental Geologist, Idaho Falls, Idaho

Jim Riesterer² - Environmental Geologist, Santa Fe, New Mexico

Kerry Ruebelmann² - Environmental Geologist, Salt Lake City, Utah

Paul Wetmore² - Ph.D. (USC), Assistant Professor, University of South Florida

Shelly Whitman¹ - Environmental Geologist, Portland, Oregon

Eric Wilson¹ - Minerals Specialist, Idaho Department of Lands, Boise, Idaho

Nick Zentner¹ - Instructor, Central Washington University

(¹ = DWR was primary advisor, ² = DWR was secondary advisor)

CURRENT GRADUATE ADVISEES AND THEIR THESIS TOPICS:

Andrew Drabick² - Quaternary basin history of Marsh Valley, Idaho.

Gina Iwahashi² - Petrogenesis of the Spencer-High Point volcanic rift.

Eric Johnson² - Lacustrine response to climatic fluctuations and seismic activity, central Idaho.

Milana Michalek¹ - Age and rate of eastern Snake River Plain subsidence near Carey, Idaho.

Cody Pink¹ - Structural geology of the Rock Creek mine, Seward Peninsula, Alaska.

Katie Potter² - Volcanic stratigraphy of the Arco-Big Southern Butte rift zone, ESRP, Idaho.

Kathleen Price¹ - Geology of Tertiary volcanic rocks in the Bighole Mountains, eastern Idaho.

(¹ = DWR primary advisor, ² = DWR secondary advisor)

RECENT PUBLICATIONS:

Aly, M.H., **RODGERS, D.W.**, and Thackray, G.D., 2009, Differential SAR Interferometry to investigate surface deformation of the eastern Snake River Plain, Idaho, USA: *Journal of Geology*, v. 117, p. 103-108. Doi: 10.1086/595504.

Holmes, A.A.J., **RODGERS, D.W.**, and Hughes, S.S., 2008, Kinematic analysis of fractures in the Great Rift, Idaho: implications for subsurface dike geometry, crustal extension, and magma dynamics: *Journal of Geophysical Research*, 113, B04202, doi: 10.1029/2006JB004782, 15p.

Chadwick, D.J., Payne, S.J., Van Hove, T., and **RODGERS, D.W.**, 2007, Contemporary tectonic motion of the eastern Snake River Plain: A campaign global positioning system study, *Tectonics*, 26, TC6005, doi:10.1029/2005TC001914. **RODGERS, D.W.**, and Little, T.A., in press, Very large co-seismic slip associated with 1855 rupture of the Wairarapa fault, New Zealand: *Journal of Geophysical Research*

RODGERS, D.W., and Little, T.A., 2006, World's largest coseismic strike-slip offset: The 1855 rupture of the Wairarapa Fault, New Zealand, and implications for displacement/length scaling of continental earthquakes, *J. Geophys. Res.*, v. 111, B12408, doi: 10.1029/2005JB004065.

Huerta, A.D., and **RODGERS, D.W.**, 2006, Constraining rates of thrusting and erosion: insights from kinematic thermal modeling: *Geology*, v. 34, p. 541-544.

Payne, S.J., Zollweg, J.E., and **RODGERS, D.W.**, 2004, Stress triggering of conjugate normal faulting - late aftershocks of the 1983 Ms 7.3 Borah Peak, Idaho earthquake: *Bulletin of the Seismological Society of America*, v. 94, p. 828-844.

Helm-Clark, C.M., Smith, R.P., **RODGERS, D.W.**, and Knutson, C.F., 2004, Neutron log measurement of moisture in unsaturated basalt -- progress and problems: *Vadose Zone Journal*, v. 3, p. 485-492.

Helm-Clark, C.M., **RODGERS, D.W.**, and Smith, R.P., 2004, Borehole geophysical techniques to define stratigraphy, alteration, and aquifers in basalt: *Journal of Applied Geophysics*, v. 55, p. 3-38.

Long, S.P., Link, P.K., Janecke, S.U., and **RODGERS, D.W.**, 2004, Geologic Map of the Henderson Creek Quadrangle, Oneida County, Idaho: Idaho Geological Survey Technical Report 04-3, 1:24,000.

Kuntz, M.A., Geslin, J.K., Mark, L.E., Hodges, M.K.V., Kauffman, M.E., Champion, D.E., Lanphere, M.R., **RODGERS, D.W.**, Anders, M.H., Link, P.K., and Boyack, D.L., 2003, Geologic map of the northern and central parts of the Idaho National Engineering and Environmental Laboratory, eastern Idaho: Idaho Geological Survey Geologic Map 35: scale 1:50,000.

RECENT GRANTS:

2008: Geologic Map of the southern Portneuf Range, southeastern Idaho: \$14,131 awarded to D.W. Rodgers from the U.S Geological Survey EDMAP Program.

2008: Subsurface Geology Field Trip: \$25,177 awarded to Rodgers, D.W., McCurry, M., and Welhan, J.A, from the Inland Northwest Research Alliance for the Spring 2008 field trip.

2007: Subsurface Architecture Core Course: \$15,263 awarded to Rodgers, D.W., by the Inland Northwest Research Alliance.

2007: Subsurface Geology Field Trip: \$24,343 awarded to McCurry, M., Welhan, J.A, and Rodgers, D.W., by the Inland Northwest Research Alliance.

2006: Subsurface Geology Field Trip: \$24,388 awarded to McCurry, M., Rodgers, D.W., and Welhan, J., from the Inland Northwest Research Alliance.

2004: Extension of: Synthetic aperture radar analysis of multi-scale geologic and environmental processes in Idaho and the Intermountain West (2 yrs): \$377,445 awarded to Thackray, G.D., Glenn, N., Rodgers, D.W., and Hughes, S.S., from the NASA Idaho Space Grant Consortium.

2004: Continuation of: Synthetic aperture radar analysis of multi-scale geologic and environmental processes in Idaho and the Intermountain West (2 yrs): XXX awarded to Thackray, G.D., Glenn, N., Rodgers, D.W., and Hughes, S.S., from the NASA Idaho Space Grant Consortium.

2003: Analysis of slip associated with the 1855 failure of the Wairarapa fault, North Island, New Zealand: \$4,985 awarded to Rodgers, D.W. from the ISU Faculty Research Committee

2003: Analysis of slip associated with the 1855 failure of the Wairarapa fault, North Island, New Zealand: \$3,875 awarded to Little, T.A., and Rodgers, D.W. from the Royal Society of New Zealand.

2003: Faculty Fellowship to study geothermal energy sources in Nevada: \$19,667 awarded to Rodgers, D.W. from the Idaho National Engineering and Environmental Laboratory and the Inland Northwest Research Alliance.

2003: Geologic map of the Henderson Creek Quadrangle, Idaho: \$13,499 awarded to Rodgers, D.W. and Link, P.K., from the U.S. Geological Survey EDMAP program.

