

# U of M

## GEOLOGY NEWS

### *A Report to Alumni and Friends*

Department of Geology, The University of Montana

Fall 1997

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#### MESSAGE FROM THE CHAIR

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It's been a couple years since our last newsletter but I think you'll still recognize the department. We've always had stimulating groups of students; that never seems to change. Currently we have about 80 undergraduate majors and around 35 active graduate students. The undergrads are distributed between our traditional professional emphasis and the environmental geoscience emphasis. Interestingly, these groups never seem to be split at the Belt Bash. Senior and graduate thesis topics range from crustal structure to virus transport in groundwater.

Besides new crops of students, we've had some changes in staff and faculty. John Cuplin retired last year. During his career John made as many friends among our students as anybody. Although things seem a little different without John around, he hasn't completely disappeared. Sporting his trademark smile, John stops by occasionally. As near as I can tell John is enjoying retired life and takes pleasure from pointing out that the rest of us are still working for a living. Dave Gaeuman joined the department this fall. Dave has a lot of experience in GIS and other computer-graphics techniques and applications. We intend to exploit Dave's expertise in many ways, prime among them is to work more computer visualization and presentation techniques into our curriculum and to move everybody's research into a GIS/database archive.

After cutting thin sections for many of you, Steve Balogh retired three years ago. Now George Stanley manages the thin section shop and students get experience turning out thin sections for petrology classes and research. As you read the included news blurbs you'll see what the faculty has been up to. And what they've been up to has been well-recognized by UM. Last year Marc won the Helen and Winston Cox Teaching award for outstanding

projects. To fill Steve's staff position we hired Lynn Biegelsen to manage our analytical facilities. Lynn spends much of her time in Johnnie Moore's geochemistry lab keeping tabs on the equipment and analytical quality. Johnnie's recent success acquiring about \$700,000 from the Murdock Foundation for new analytical facilities has kept Lynn busy and her job challenging.

Fortunately not all of our staff have abandoned us. Judy and Loreene keep the whole administrative operation running smoothly despite UM's tendency to hand departments an ever-increasing bureaucratic workload. On top of their assigned responsibilities Judy and Loreene continue to help a huge percent of our students deal with various department and university rules and hurdles. And no matter how much equipment we add, drop or drive over, Jim Bigley manages to keep most everything operational. We've kept Jim busy by adding multimedia presentation equipment to two of our teaching rooms, building two student computer labs, building the Murdock Analytical Facility, and acquiring some new environmental geophysical equipment in the past few years.

Marc Hendrix is our newest faculty member. We hired Marc when Arnie Silverman retired three years ago. At about the same time, Don Winston cut back to teaching half-time. Don needed more time to work in the Belt. And Don's found the time, the transition from fall to winter pushes Don out of the field and back to a spring semester of teaching. I view it as part of the annual wildlife migration. As part of Don's teaching he and Marc have been sharing the spring field trip for the past few years.

teaching by a young professor. Two years ago Johnnie won UM's distinguished scholar award. Nancy recently delivered an invited testimony to Congress. Gray has been producing a continual stream of well-accepted and

adopted Introductory Geology and Earth Science textbooks. Don and Dave keep the Roadside Geology series going and have a new trade book on Northwest Geology. Bill spent last year on sabbatical, George is in New Zealand on sabbatical, and Jim intends to visit Wales on sabbatical next year.

After writing the above I realized I better defend myself, at least a little. It has been a while since our last newsletter, too long. The hiatus includes a complete cycle of undergraduates, retirements, new faculty and staff, and the development of new courses and facilities. As many of you have discovered, you haven't been without access to department news. I put together a web page a few years ago (<http://www.cs.umt.edu/GEOLOGY>). The web page includes occasional news about department events, a schedule of invited speakers, recent graduate theses, updated faculty news, publications and the like. Check it out. If you have a personal page and you'd like a link on our alum page let me know, as we are currently checking out UM's regulations on such things. Also let me know what else should be included in our web site.

Perhaps you've met some of our current students. Using a portion of your donations we've been regularly helping to defray student expenses to attend GSA, AGU, NWMA, and AAPG meetings. We sent a strong contingent to the recent annual GSA meetings in Denver, Seattle, and Salt Lake City. We also use your donations to further undergraduate and graduate research. We believe one of our more successful and rewarding uses of your donations is to reduce student costs for regional field trips as well as wider ranging trips. Among the latter, Don Winston and Marc Hendrix have lead spring break trips to West Texas, Death Valley, and central California. Nancy Hinman has taken groups to Hanford, Jim Sears has lead our students around SW Montana and the Canadian Rockies, and Bill Woessner has taken students to Las Vegas as well as Frenchtown. Locally Ian Lange takes his classes to various mining districts in Montana, Don Hyndman leads trips to the Bitterroot batholith, Stillwater Complex, and the Columbia River Basalts, George Stanley has had his paleo students off to the Wallowa Mountains, and Johnnie takes 'em to Milltown, Butte and Silver Bow Creek.

You help us and we'll keep helping our students. One way you can help, and one in which hardly anyone ever takes me up on, is to visit the department and give a seminar concerning professional work you are doing as part of your career. We don't have a speakers budget and geochemistry into these studies and examine the relationships between source rock geochemistry, sedimentary facies, tectonics, and paleoclimate. Before

visiting speakers is one of the best ways our students learn about what goes on in Geology outside UM. It also helps keep at least some of the faculty honest. If you are in the position to do so, hiring summer interns or field assistants is a great contribution to the department. In any case, thanks, we all appreciate your contributions to the department.

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## What's the Faculty up to?

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### Dave Alt

When not leaping tall buildings in a single bound, Dave Alt continues to worry about flood basalts, in particular those that erupted in the Pacific Northwest during middle Miocene time. A few years ago, he worried about why they erupted. Having helped Jim Sears and Don Hyndman "solve" that problem, he now worries about the environmental effects of these eruptions, which were even more dreadful than he first imagined. Those were grim times. Meanwhile, he continues to teach, hoping to do more good than harm.

### Marc Hendrix

I joined the UM geology faculty in 1994 and am now beginning my fourth year here. Previously, I was a post-doc at Stanford University. My principle areas of interest are the architecture of sedimentary deposits and the relationships between sedimentation and tectonics. Over the past three years, I've taught classes in introductory geology, sedimentary architectures, sedimentary basin analysis, field methods and maps, field camp, and a couple of sedimentary seminars for graduate students. In addition to these classes, I've had the wonderful and very interesting experience of co-running spring break trips to the Permian Reef Complex (West Texas), the Death Valley region, and the central California coast with Don Winston.

Prior to arriving at UM, I spent seven years at Stanford University doing dissertation and post-doc work on sedimentary basins in central Asia. My work there focused principally on the evolution of Mesozoic foreland-style sedimentary basins in western China and adjacent Mongolia and the petroleum potential of these basins. Though not a geochemist by trade, I was able to weave a sizable component of petroleum source rock

my residence at Stanford, I received a MS degree from the University of Wisconsin in Madison, examining parts of the Phosphoria Formation exposed around the Uinta

Mountains in northeastern Utah. I received my undergraduate degree from Wittenberg University in Springfield, Ohio, in 1985.

Since arriving at UM, I've been busy both with my ongoing work in central Asia, as well as new research on the record of sedimentation in the Northern Rocky Mountain foreland basin. In 1995, I was able to involve my first UM graduate student, Derek Sjoström, as well as UM undergraduate Wendy Kirschner, in my work in Mongolia. This past summer, Derek and I went back to Mongolia, along with MS student Mary Beck and undergraduate student Bob Lenegan. I remain heavily involved in this work and am happy to report that I was recently awarded an NSF grant to study the sedimentary basin record of the Mesozoic transition from contractile to extensional tectonism in southern Mongolia. Now that this support has been acquired, I'm hoping to lure additional UM graduate students into the wilds of central Asia to continue to unravel its fascinating sedimentary and tectonic history. A little closer to home, I've been working with Jim Sears, and UM graduate students Amy Waddell, Toby King, Eric Roberts, and Tip Meckel on a variety of interesting sedimentation tectonics problems in Montana. I've also been involved with some dendroclimatologic analyses of Eocene petrified woods preserved near Yellowstone Park, in conjunction with MS graduate Lorin Amidon. Finally, I am beginning a project focused on documentation of the fill architecture of some of the Northern Rocky Mountain intermontaine basins like the Bitterroot and Deer Lodge basins. In all, it's been an exciting and busy first few years.

In the future, I look forward to continuing my work in central Asia and the northern Rockies as well as continuing to help shape the sedimentary program here at UM. By integrating information derived from sedimentologic analysis, geochemistry, and paleoclimatology, I'm hoping to better understand the regional effects of mountain building events on sedimentary style and architecture, the evolution of

Don Hyndman has been busy with several writing projects and with research projects with students. He coauthored two books: (1) Dave Alt and Don Hyndman, Nov., 1995, *Northwest Exposures*, Mountain Press, 442 pgs. (This is a review and discussion of the geology of the Pacific Northwest states - MT, ID, WA, OR - written for the same audiences as books of the Roadside Geology series.) Already in its second printing, it seems to be well received. Dave and Don spent five or six years working on the book, complete with the usual lengthy discussions and arguments about the geology. (2) Richard Hazlett and Don Hyndman, Oct., 1996, *Roadside Geology of Hawaii*, Mountain Press, 304 pgs. This is the latest of the Roadside Geology series. Rick Hazlett, Chairman at Pomona College in southern California spent a number of years researching geology at the Hawaiian Volcano

paleoclimate, and the character and distribution of organic-rich rocks.

## Nancy Hinman

Perhaps you recently saw Nancy Hinman on CSPAN-2 as you surfed the channels during some sleepless night in mid-October. If so, then you were watching her video-taped testimony before the Senate Subcommittee on Science, Technology, and Space. She was invited to Washington, D.C. at the request of Senator Conrad Burns to testify on the recently reported evidence for life on Mars. Nancy Hinman continues to be involved in the search for life on Mars; some would even say she is direct physical evidence for it. The focus of her work is the chemistry of mineralizing environments. Studies of silica and iron-rich springs in Yellowstone National Park are yielding fascinating results on the interaction between microbial communities and mineral precipitation processes. This past summer, Hinman's research group observed diel cycling in iron and sulfur species, and in hydrogen peroxide concentrations. These results have application to the study of thermal springs as locations for the evolution of life on Earth and possibly on Mars. As part of this work, Hinman recently traveled to the thermal fields of Kamchatka to study these processes there. She, along with Ian Lange, are planning to lead a geological field trip to Kamchatka in Summer 1998. Any interested alumni or friends should contact her or Ian. In the meantime, she used her frequent-flyer miles to travel to Florida to watch the Mars Pathfinder launch in early December 1996. No, she hasn't accumulated enough miles yet for the actual trip to Mars...

## Don Hyndman

Observatory. Don endured a number of trips to the various Hawaiian islands to examine their geology and seems to have borne up well under the strain. In the last year or so, Don worked or is working with several graduate students. Michael Poage worked on differentiation of the Plains Sill, a thick diabase sill intruding the Prichard Formation. Steven Porder is presently working on the metamorphism associated with the Plains Sill, doing a temperature profile based on metamorphic mineralogy and coexisting mineral compositions, along with oxygen isotopes in cooperation with Dr. Rob Kerrich of the University of Saskatchewan. Steen Simonsen has essentially finished his study of dikes of the Eocene Idaho-Montana porphyry belt (or Trans-Challis dike swarm), complete with Ar-Ar dating in cooperation with Dr. Peter Copeland of the University

of Houston. Carl Schafer has begun work on a study of the intrusion style of the northeastern corner of the Idaho batholith in the northern Bitterroots, and its metamorphic and structural effect on the country rocks.

This past August, Don spent three weeks at the International Geological Congress in Beijing and traveling through central and southwestern China. This fall, in addition to his usual duties, he is taught a graduate field seminar in igneous and metamorphic petrology and structure, which involved visiting some of the classic areas within a couple of hundred miles of Missoula.

## Ian Lange

Greetings from the wonderful world of teaching and ore deposit studies. I have thoroughly enjoyed the last several years of doing these things and plan to continue to work on various aspects of ore deposit genesis. As per my previous history, I tend to dabble in different types of deposits, mainly located in Montana. I hope of course that some will make ore grade so that there might be additional work for aspiring explorationists, and there are still some around. And of course new mines will give the water chemistry/remediation-type folks (Johnnie, Bill, and Nancy) more work. We have a symbiotic relationship going which I wouldn't want to change for anything.

Findings from recent studies include papers about the acid sulfate Hog Heaven silver-base metal deposit (Economic Geology, 1994), a S, C, and isotopic study of the Golden Messenger mine located near York with UM graduate Lee Woodward, University of New Mexico (Economic Geology, 1995), and two papers about to come out, one regarding a diatreme origin for the Hog Heaven system included in the special 3 volume Geology and Ore deposits of the American Cordillera series (Chile to Alaska), and a paper about the Greyson and Spokane-hosted copper belt in the Big Belt Mountains, also with Lee Woodward, which will appear in a special Belt III Symposium volume produced by the Montana Bureau of Mines and Geology.

Present research centers on the timing of thrusting and mineralization in the Black Pine mine near Philipsburg with former M.S. student Dave Waisman, a synthesis of the whys and wherefores of the Ninemile placer gold deposits with graduate student Tom Gignoux, and a continuing study of the stratiform, 12 km long, Greyson-hosted York Au deposit in the Big Belt Mountains.

Finally, I must admit that I was "put out" when I was rifted from the U.S. Geological Survey, along with all the

The Geology Department analytical laboratory is receiving a facelift thanks to the M. J. Murdock Charitable Trust. A grant from the Trust will provide

other faculty research affiliates in 1995. (A law suit is presently planned to get my old position back, especially after all the fine work I have done at taxpayers' (your) expense. For now that puts the kibosh on work in Alaska, but I may have a chance to resume working in Peru next summer which sounds fine now that the Shining Path guerrillas seem under control down there.

## Johnnie N. Moore

My research group continues to concentrate on deciphering the processes controlling the fate and transportation of metals and metalloids in aquatic systems. Presently, I have eight students (and set on committees of several others in Geology, Chemistry, Environmental Studies, Forestry and Biological Sciences) working on metal/metalloid-contaminated systems. This is mostly related to metal mining and smelting, but also involves contamination from agricultural runoff. Here's a list of ongoing projects: 1. Biogeochemical cycling of selenium at Benton Lake National Wildlife Refuge, Montana. 2. Bioremediation of selenium contaminated soils at Stewart Lake Wildlife Refuge, Utah. 3. Controls on concentrations and transport of solute metals in large, contaminated river systems, Clark Fork River, Montana. 4. Biogeochemistry of arsenic and potential methods of bioremediation of pit lakes contaminated with arsenic and sulfate. 5. Seasonal variability of metals and carbon in fine-grained bed sediment of the Clark Fork River. 6. Effects of liming on the availability of metals from contaminated floodplain soils. 7. The distribution and long-term and seasonal change of metal concentrations in fine-grained bed sediment of the Blackfoot River, Montana. 8. Fate of contaminated shallow ground water in the hyporheic zone of a small high-gradient stream. 9. Effects of ice-jam flooding on the emplacement of contaminated sediments on river floodplains (Elizabeth Landrigan-M.S., expected Spring 1997).

Funding for these projects comes from the U.S. Fish and Wildlife Service, US Geological Survey, US Bureau of Reclamation and some funds from industry.

I am also starting joint projects with Jim Gannon and Bill Holben (UM Microbiology) and Sam Luoma (USGS-WRD, CA) to look at the effects of multi-component metal contamination in rivers on the structure of geochemical cycles at the molecular to organism level. I continue to work with Bill Woessner on projects related to groundwater contamination and other water resource related work. We will start a large project to examine the health of aquatic resources on the Fort Belknap Reservation in northern Montana, this Spring. \$457,000 (matched with another \$230,000 from UM) to develop a state-of-the-art analytical laboratory to do research and train students from Biology, Chemistry,

Forestry, Environmental Studies, and Geology in Environmental Biogeochemistry. The laboratory will provide a facility for integrated research and high-quality laboratory analyses for faculty and students in many disciplines and programs. A primary role of the laboratory will begin to train students in modern techniques in environmental analyses and the application of those techniques in solving regional environmental biogeochemical problems, including the development of a new interdisciplinary graduate course in Environmental Biogeochemistry.

Elemental analysis instrumentation includes a new Charge-Injection-Device, Inductively Coupled Argon Plasma Emission Spectrometer with Ultrasonic Nebulizer for trace/major element analyses at very low levels, a fully automated Ion Chromatograph system for the rapid and anions and organic acids, a solid Carbon-Nitrogen-Sulfur-Hydrogen-Oxygen Analyzer for determination of those elements in a variety of materials and a soluble Carbon analyses system for rapid, automatic determination of low levels of TOC, TIC, POC and PIC in waters. As well, the grant provides funds for coring and sampling equipment.

We have received all the instruments and Lynn Biegelsen (our Laboratory Technician) and I are now learning to use them and train students. It is a major effort but one that will end with a modern analytical facility that will allow a level of research unavailable at U of M in the past.

## Jim Sears

This past year, I completed a study with Ray Price on restoration of Rocky Mountain thrust plates. The foundation of this project was the creation of a palinspastic map which provides a base for analysis of pre-thrusting depositional trends from southern Montana to central Alberta and BC. In addition I'm studying the timing of emplacement of giant thrust plate of NW Montana over foreland basin with Marc Hendrix and two grad students, Amy Waddell and Toby King. This project is funded by MONTS. This past summer, I began a new study of the Tertiary geology of the Bitterroot Valley in which I focused on large early Tertiary deposits of the ancestral Bitterroot River which serve as the main Bitterroot aquifer. Its porosity is influenced by diagenetic reactions of detrital feldspar. In this project, I'm working with Pete Ryan of Salish-Kootenai College (SKC) on the diagenetic story and Marc Hendrix on the sedimentological story. One of our main working hypotheses is that the ancestral Bitterroot River was apparently diverted by faulting along the Lewis and Clark Line into the modern course of the Clark Fork.

## Steve Sheriff

Like everybody else I think I've been busy but it might be more informative to see if others agree. As chair, and this is my seventh year, I've drummed up funding for computer labs and two multimedia presentation rooms in the department. These teaching facilities allow faculty to project computer simulations, calculations, videos, and color figures to large screens in front of the class. We now have a set of Apple computers for the introductory geology classes; they do tectonic, earthquake and topographic exercises. The student computer lab has a host of MS/Windows and Apple computers loaded with various calculation and presentation software. This coming spring we hope to open a joint Geology-Physics computer teaching room where each student gets a computer to work on; the instructor's screen will be projected to the front of the room. I intend to teach a Computation in Geology course in the room which should also be ideal for Bill and Nancy's modeling classes and my Advanced Gravity and Magnetics class.

In my lab, thanks to the National Science Foundation, I recently added an EG&G 12-channel seismograph, a Geonics EM-31 ground conductivity meter, a Gem Proton Precession Magnetometer/Gradiometer, and sub-meter GPS equipment. This equipment allowed me to develop a new course in Environmental Geophysics, a lab course where I teach field methods, data processing, interpretation, and presentation software. Currently four graduate students and three seniors are using this stuff for their thesis projects. The paleomagnetism equipment is still in good shape, Kelly Brunt and Josh Distler both finished paleomag MS theses last year and another is in progress.

For my own research I've recently been developing a new way to use gravity data to map sutures between chunks of lithosphere with contrasting strength. Last year, during January's semester break, I conducted a magnetic exploration project and preliminary environmental site assessment at an air force base in the Philippines. Unfortunately the project wound down before the break was over so Chris and I had to spend ten days living in a grass hut, cruising around in a traditional outrigger canoe, wandering tropical beaches, and diving World War II ship wrecks. We made up for the rigors of the tropics by spending three and half weeks this past summer with a number of friends rafting the Tatshenshini-Alsek River system (Yukon, B.C., Alaska) and climbing in the ranges it cross-cuts.

## George Stanley

Recent activities include international assignments during 1991-92 to Kumamoto University in Kumamoto, Japan, where I undertook research and some lecturing around Kyushu and Honshu. I also did research on fossil and living coral reefs in the island of Okinawa. Another international assignment in which I participated was an extended trip to Belize, Central America, during Spring semester, 1994. I had an opportunity to teach at the University of College of Belize as part of a UM-US AID Linkage project with Belize College. I also took part in a research project to develop a biological station on a remote coral atoll off the coast of Belize. My time was spent working with Belizean students and volunteers doing underwater SCUBA surveys on the Great Barrier Reef of Belize. I continue to teach Spring Break field courses for UM students under "Geology and Biology of Coral Reefs," because there is continued interest in reefs by petroleum and mining companies.

My past research projects involved geochemical study of some of the most ancient corals (in collaboration with the University of Miami). Also I have been conducting study together with UM students of fossils and rocks in Sonora, Mexico. This is in collaboration with Mexican geologists and the government of Mexico. We conducted another field session to the Sonoran desert this semester break.

I have been active in national and international lecturing and attending meetings and conferences where I have organized theme sessions and symposia on the evolution of reefs and paleontology. Recently I was a distinguished lecturer for the Paleontological Society. I organized a short course "the Biology and Paleobiology of Corals" for the Geological Society of America National meeting in Denver, Colorado in October, 1996.

I have recently begun a new intern program for UM students in the Geology Department. This program is aimed at automation and computerization of important fossil collections in our museum collection as well as curation, conservation and public exhibition of rare and unusual

fossils. This past summer I organized a seven week exhibition of our fossils in conjunction with a dinosaur "dinomation exhibit" at the Missoula Southgate Mall

Bill has been busy as usual with 10 to 12 graduate students, teaching the hydrogeology classes, and team teaching Environmental Geology with Johnnie Moore. In 1994 his text book "Applied Groundwater Modeling," co-authored with Mary Anderson at the U of Wisconsin, was translated into Japanese. Bill and Mary continue to publish papers on the use, calibration, and application of groundwater models as demonstrated by Bill's recent paper published by ASTM, "Good Models, Bad Models: Understanding the Flow Modeling Process".

Expanding his research interest, Bill has teamed up with Dan DeBorde, a virologist with the Division of Biological

shopping center.

I continue to interact with the public and with school groups, identify fossils, and to give school tours in addition to teaching and research endeavors. With only two full-time paleontologists in the state of Montana, I keep pretty busy.

## Don Winston

Teaching, the Belt, and life in general continue to treat me just fine. For the last few years I have taken leave in the fall semester and have taught the undergraduate sedimentation and stratigraphy course and sedimentary petrology in the spring semester, plus the spring field trip course with Marc Hendrix. This came about because switching to the stupid semester system initially moved the fall classes into August, which would have essentially terminated my Belt research. So, I opted to spend early fall semester in the field, followed by writing and hunting ducks. I like it. This has been misinterpreted by some to mean that I have partially retired, which, by god, I have not! Last summer and this fall I accomplished more in the field than in most years.

I am currently working on the Helena and Wallace Formations of the Middle Belt Carbonate, and true to Belt form, they don't fit any Phanerozoic models. They appear to have been deposited in a lake?, sea? in which storms swept across a very shallow bottom, leaving sand in the middle, and driving mud to the shorelines. The search for similar processes has taken me on trips to the Great Salt Lake and the muddy Louisiana coast, where I find that what has been said about sandy shorelines doesn't apply to muddy ones. Anyhow, it's fun.

Finally, we switched the Belt Bash from spring semester to the first weekend of fall semester, when students and faculty are getting back together and when the weather is more reasonable. All of you are invited next fall.

## Bill Woessner

Sciences, to research the behavior of virus transport in groundwater systems. Bruce Lauerman, Quinn Kiley, and Jennifer Bushur along with Ph.D. DBS student Pat Ball are participating in this research. Initial research has been completed at the Frenchtown High School Site and a second high velocity, floodplain gravel site along the Clark Fork River has been instrumented for seeding experiments. Graduate students Jerry Eide and Jane Madison are working on fuel transport in the fine-grained Polson clays where there are numerous plumes and a landfarm. In addition to these new areas of research, a three year septic system impact study for Missoula

County has been completed, resulting in three substantial documents. Graduate students Jeff King, Sean Lambert, and Tom Michalek used portions of the study for Masters research. Work on identifying the impact of mining wastes on the groundwater of the Silver Bow Creek Floodplain continues with Johnnie Moore, and graduate students Sonia Norgorski and Devin Shay. Last winter, Bill was invited to a conference on riparian ecology in Switzerland and participated in conceptualizing groundwater-surface water interactions in river floodplains.

The family is doing well, having survived their first exposure to high school. Kristina is off to college at St. Olaf and David has started his first year at Hellgate High. Jean continues to teach pre-school. Bill is taking a sabbatical to improve solute transport modeling skills for the 1996-1997 academic year.

## Robert Weidman

Although Bob retired from full-time teaching in 1987, he continued teaching spring semesters under a post-retirement contract until 1992. In 1991, he had the good fortune to assist Don Hyndman as co-leader for the popular Geology/Geography in New Zealand program and got to see first hand what returning advisees had reported to him in the past. Currently, he and Arnold Silverman are recruiting students for a renewal of the program for five weeks beginning January 1, 1998. As in the past, a number of retirees from the Missoula area are expected to participate. If any our readers are interested, they should phone the department office as soon as possible for details.

Bob and Eleanor have kept themselves well occupied with travel, including RV trips to Mexico, an Elderhostel "class" in Puerto Rico, Friendship Force home-hosted exchanges in Germany, Australia, and Brazil, and a memorable visit to three of the Canary Islands. Many of the trips were to destinations where Bob could put to use his recently learned Spanish. Keeping up with their daughters and their families has involved additional travel. This year Bob is serving as president of the Missoula Senior Forum, a breakfast club which has weekly speaker programs.

## Arnold Silverman

In the last two years I've been involved in two main projects. The first was arranging an exchange of

Since retirement, work and publications continue on a major study of the petroleum geology and hydrocarbon resources of the Carboniferous - Permian system of the Rocky Mountain region and a continuing study of the Mississippian-Devonian Bakken and related

assets that will compensate crown Butte for its mining site near Cooke City, MT. We are now deep in negotiation for the kinds of federal assets to be exchanged. The second project was an assessment of the coal potential for commercial marketing from the Smoky Hollow area of the Kaiparowits Plateau. Our report formed the basis for commercial coal product resolution in President Clinton's decision this past August (1996) to designate the Staircase/Escalante National Monument as 2 million acres of the Plateau. This designation also involves a very small cooperation payment to Audalux Mining for their lease holdings at Smoky Hollow.

Bob Weidman and I continued to work putting together a Geologic/Geographic field study program in New Zealand for the month of January, 1998.

## Jack Wehrenberg

This summer I testified in a homicide case in South Dakota. The physical evidence involved comparison of soils that accumulated in the wheel well of a truck owned by the suspect which was seen being driven in the vicinity of where a young girl was abducted (Sioux Falls) with soils found at the crime scene where the girl's body was found. The crime scene soils were, to simplify the story, part of a glacial moraine. The factor that led me and the jury, I believe, to be convinced that the two soils had an identical origin, was the presence in both of the very rare Zn-Al spinel gahnite. The optical anomalies, color, and physical appearance of gahnite in both occurrences were identical. This, plus very convincing DNA evidence, led to a speedy guilty verdict.

Over the past year I did a number of interesting cases for the State Crime Lab, but I feel it would be tedious to talk about them unless I had a glass of wine in my hand.

## James A. Peterson

Jim retired from the U.S.G.S. World Energy Resources Program in July, 1995, after fifty-plus years in the earth sciences, including 3 ½ years in WW II, teaching at three universities, thirteen years with Shell Oil Company, and various branches of the U.S.G.S. Projects completed include the Petroleum Geology and Hydrocarbon Resource Assessment studies of basins throughout the world.

petroleum source rock beds of the northern Rocky Mountains - Williston basin. Participation in meetings has resulted in contact with as many as 75 graduates of the UM Geology Department including several from the late 30's and 40's, e.g. Bill Cobban, world authority on

Mesozoic ammonites; Don Blackstone, Professor Emeritus, University of Wyoming; Norman Denson, Scientist Emeritus, U.S.G.S.; Ogden Tweto (deceased), "Mr. Colorado Geology" for whom Mt. Tweto in the Colorado Rockies was named; Ralph Imlay (deceased), world authority on Jurassic Paleo and Stratigraphy; and many others from the 1950's and later, most of whom are continuing active careers in various branches of geology.

## Raymond C. Murray

Ray retired from U.M. as Vice President for Research in July, 1996. He is currently Scholar in Residence for Associated Western Universities, visiting universities in the western part of the country for A.W.U. The Book *Forensic Geology* has done very well, helped by a story in the *New Yorker* by John McPhee and a book just published by McPhee. This has resulted in many lecture invitations and cases. Chairman of the Missoula Police Commission, Members of the Montana Police Officers Standards and training Board, traveling around the world, fishing and hunting keeps him off the street corners. Son Robert (UM Geology 1981) is a geologist and lives with his wife in Las Vegas, Nevada. Daughter Martha, a geologist, lives in Arden Hills, Minnesota, with her husband and two children. Ray's wife, Maureen J. Fleming, is Professor of Management at UM.

## IN MEMORIAM

### Robert W. Fields

Robert W. Fields, Professor Emeritus at the University of Montana, died on August 23, 1995, nine months after learning he had pancreatic cancer. Bob Fields was born in San Leandro, California, on September 17, 1920. During World War II he served in the Army Air Force. Bob and Charlotte G. Carpenter were married in April, 1945. The GI Bill made it possible for Bob to enter the University of California, Berkeley. He earned a B.S. in Paleontology in 1949 and continued on as a graduate student in vertebrate paleontology under the supervision of Dr. R.A. Stirton.

Bob's Ph.D., awarded in 1952, was based on geologic mapping and fossil collecting in the highlands of Columbia. Between 1952 and 1955, Bob was a stratigrapher with Shell Oil Company, carrying out field studies in the Wasatch Plateau and in the San Juan and Green River basins.

Bob joined the University of Montana Geology

Department as an Assistant Professor in 1955. He served the department twice as chairman and was a leader and work horse in university affairs. In addition to teaching basic courses, Bob developed courses in vertebrate paleontology and assembled an outstanding collection of vertebrate fossils for teaching and research.

Bob's contributions to research were mainly in the field of geologic mapping and biostratigraphic investigation of Northern Rocky Mountain Tertiary basins, funded in considerable part by National Science Foundation grants and involving some 14 graduate students. Bob Fields is remembered as an extraordinary mentor by his graduate students and by many undergraduates who went on to complete higher degrees in vertebrate paleontology at other universities.

In 1982 Bob became Professor Emeritus, but he continued supervising research and teaching part-time until 1987, when he moved to Anacortes, Washington. He returned to Montana in 1993 to live near Bigfork.

Bob was an unusually energetic, enthusiastic and versatile person. He enjoyed many outdoor activities, including fishing, hunting, skiing, sailing, and bird watching.

Survivors include Bob's wife, Charlotte, son Mark, and granddaughter Libby, residents of Columbia Falls, Montana. A daughter, Karen Fields Green, preceded him in death.

Memorial gifts may be made to the Robert W. Fields Student Award Fund, Department of Geology, The University of Montana, Missoula, MT 59812

### Frederick S. Honkala

Frederick Saul Honkala, former chairman of the Geology Department and Dean of the Graduate School at The University of Montana, died at age 77 in Leonardtown, Maryland. Survivors include his wife Rose and three children, Eric and Karl Honkala and Lisa Beverly. Dr. Honkala received his B.S., M.S., and Ph.D. degrees from the University of New Hampshire, the University of Missouri, and the University of Michigan respectively. After leaving The University of Montana, Dr. Honkala served the National Science Foundation, was the President of Yankton College, S.D., Dean of Faculty at St. Mary's College of Maryland, was Executive Director of the American Geological Institute, Science Advisor to Senator John Melcherand, and was Senior Scientist with the Virginia State Bureau of Mines.

Memorial contributions may be made to the Trinity Episcopal Church, P.O. Box 207, St. Mary's City, MD 20686 or to the Fred S. Honkala Fund in care of the University of Montana Foundation, P.O. Box 7159, Missoula, MT 59812.

## Kenneth P. McLaughlin

Bob Weidman received news of the death of former faculty member Kenneth P. McLaughlin. Ken resigned as chairman of our then three-man geology faculty when he left for Texas in 1955. He passed away in Mobile, Alabama, on November 17, 1994. After leaving Missoula, Ken was an industrial geologist in Dallas before joining the faculty at the University of Mississippi as Chairman in 1965. He retired in 1982 to enjoy exploring rivers while living on a houseboat.

## George E. Erickson

(SEG1995, SF '90), died at home on January 14, 1996, in Reston Virginia, after a brief illness. He was a graduate of the University of Montana (BA '48), Indiana University (MA '49) and Columbia University (Ph.D. '54), and spent his entire career as a geologist with the U.S. Geological Survey. His investigations were concerned chiefly with the study of mineral deposits in the western hemisphere, especially the nitrate deposits of Chile. He is credited with discovering one of the largest lithium-rich deposits in Bolivia. He participated in the early planning and development of the Instituto de Investigaciones Geologicas de Chile (now the Geological Survey of Chile), the Esquela de Georgia, Universidad de Chile, and also assisted in establishing the Geological Survey of Peru. He was honored by the President of Peru in 1982. In 1983, he received the "Order of Bernardo O'Higgins," from the Chilean government, the highest honor that can be bestowed on a foreign civilian. He received the Distinguished Service Award from the U.S. Department of the Interior in 1985, and in 1992, Bolivia awarded him the Medal for Meritorious Service to Mining. He authored over 100 research papers, abstracts, maps, and books. He is survived by his wife Mary Frances Erickson.

## ALUMNI NEWS

Barbara A. Barclay, B.A. 1986. Barbara wrote to say that she has become the Administrative Assistant to the Staff Secretary to the President of the United States. Her office is in the West Wing. Barbara assembles the materials for the daily Presidential briefings and also is a quality

controller for the events of the day. Thanks Barbara for keeping the President on the straight and narrow path!

James W. Bielak, M.S. 1978, a graduate of both the University of Montana and the University of Michigan, presented the Geology Department with a check for \$1,250 which was matched by his employer, the ARCO Corporation. The check was presented to Jim for an idea of his which resulted in large savings for ARCO. Jim, thanks again for thinking of us.

Bruce Carter, M.S., 1982, spent last spring working near Manaus, Brazil, as Assistant Director on a Columbia Studios picture called "Anaconda." He is now back in California at his home in Marina del Rey.

Ted Doughty, M.S., 1990, is now Research Geologist in the Integrated Basin Analysis Division of EXXON Production Research Company in Houston, Texas.

Peter Folger, M.S. UM, 1988; B.A. Dartmouth, 1982; Ph.D. in geological engineering from the Colorado School of Mines in 1995, was selected as the tenth GSA Congressional Science Fellow for 1995-1996. He worked as a special legislative assistant on the staff of Senator Peter Domicie (SP) from New Mexico. The fellowship, funded by the Geological Society of America and by a grant from the U.S. Geological Survey, gives a geoscientist first-hand experience with the legislative process and the opportunity to view science policy issues from the lawmaker's perspective. The Fellow assists in the analysis of public policy issues by providing scientific and technical expertise. Following the stint in Washington D.C., Pete admitted to really enjoying being inside the Beltway wielding the reins of power.

Beth Geiger, M.S., 1986, is Project Geologist for Harding Lawson Associates in Seattle.

Vicki L. Hansen, M.S. 1983, was nominated to be the President-elect of the Planetology Section of the American Geophysical Union.

Cora Helm, M.S., 1992, is an Environmental Specialist in the Montana Environmental and Hazardous Waste Bureau in Helena.

Sheila Kluck, B.A., 1993, is Ore Control Geologist for the Marigold Mine (formerly Twin Creeks Mine) of Santa Fe Pacific Gold Corporation. She lives in Winnemucca, Nevada.

Paul Kuhn, M.S., 1983, has returned from several years

of mining company work in Turkey, with a new wife,

Timothy La Tour, M.S., 1974, and Bill Fritz, Ph.D., 1980, both professors at Georgia State University, have just completed, after many years of work, the manuscript for "Roadside Geology of Georgia." It is to be published by Mountain Press Publishing Company.

Cindy McIlveen completed and submitted in December 1996, the final copy of her M.S. thesis, "An Anomalous Platinum-group Element Occurrence Below the JM reef, Stillwater Complex, Montana."

David Parker, M.S., 1995, completed and submitted the final copy of his M.S. thesis, "The Geology, Petrology, and Volcanic History of the Crater Mountain Volcanic Complex, Lewis and Clark Co., Montana. He works as a geologist for Phelps Dodge Morenci, Inc. in Morenci, AZ.

Christopher McRoberts, M.S., 1990, finished an Alexander von Humboldt Fellowship in Germany and is teaching and researching at SUNY, Binghamton.

Andrew Rorick, B.A., 1976, is the Regional Geologist for the U.S.D.A. Forest Service, Shawnee National Forest in Harrisburg, Illinois.

Michael Whalen, M.S., 1985, previously of the University of Miami (post-doc) got a tenure-track position at the University of Alaska, Fairbanks, Department of Geology.

Rick Zehner, M.S., 1987 works as a geologist for Cypress Minerals in Sparks, Nevada, discovering gold deposits..

*Please send us information about yourself so we may include it in our next newsletter which should be out hopefully before the next millennium.*

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## STUDENT AWARDS

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS RESEARCH AWARD - **Derek Sjostrom, Mary Beck**

AMOCO FOUNDATION RESEARCH GRANT - **Pavel Reichel, Arthur Stringer, Michael Savka, Matthew Gibson, Cindy McIlveen, Jerda Smeltzer, Steen Simonsen, Joshua Distler**

Berrin. They now live in Spokane.

AMOCO FOUNDATION SCHOLARSHIP - **Monte Smith, Cora Terrell, Catherine Gaskin, Cynthia McIlveen, Jerda Smeltzer, Matthew Gibson**

AMOCO FOUNDATION FELLOWSHIP - **Sarah Schlichtholz, Anna Breuninger**

AMOCO PRODUCTION CO. SCHOLARSHIP - **Cindy McIlveen, Sarah Schlichtholz**

BERTHA MORTON SCHOLARSHIP - **Catherine Gaskin, D. Jay Johnson, Christine Brick, Michael Poage, James Castro, Diane Friend, YiQiang Zhang**

BILLINGS GEOPHYSICAL SOCIETY SCHOLARSHIP- ALAN SHOTWELL MEMORIAL - **Robin Shropshire, Eric Wilson**

CLAY MINERALS SOCIETY RESEARCH GRANT - **Wayne Jepson, Peter Ryan, Lorin Amidon**

DUNIWAY BOOK AWARD - **Sarah Schlichtholz**

ESTWING PICK AWARD - **Mark Willig, John Sims, William Sevores, John Robinson, Gavin Hudgeons, Shad O'Neel, Anne Gellatly**

GEOLOGICAL SOCIETY OF AMERICA RESEARCH GRANT - **Catherine Gaskin, Cora Terrell, Michael Poage, Troy Clinton, Lorin Amidon, Stephen Porder, Amy Waddell**

GEOLOGICAL SOCIETY OF AMERICA (Rocky Mountain Section) TRAVEL GRANT - **Steen Simonsen, Bonnie Ertel, Cathy Gaskin, Mohammad Farooque, Phil Jacobson, Du Yue, Michael Baxter, Tim Dodd, Cynthia McIlveen**

GEOLOGY FACULTY SCHOLARSHIP - **Patricia Weaver, Yves Garson, Peter Ellsworth, Steen Simonsen, Bonnie Ertel, Jon Carlson, Randy Gould, Jon Warner, Steven Helgen, Troy Clinton, Jennifer Menges, Sonia Nagorski, Mark O'Riordan, Derek Sjostrom, Amy Waddell, Stephen Porder, Lorin Amidon, Kelly Brunt, Joshua Distler, Elizabeth Landrigan, Carl Schafer**

GOLDWATER SCHOLARSHIP - **Brandie Theisen**

FRED HONKALA SCHOLARSHIP - **Shane Smith**

HORTON RESEARCH GRANT - **Christine Brick**

KIM JARVIS MEMORIAL SCHOLARSHIP - **Bonnie Ertel, Karen Halberg, Jan Shifflett, Tim Orr, Kevin Lielke**

McDONOUGH MEMORIAL SCHOLARSHIP - **JoAnne Russell, Randy Gould, Kelly Brunt, Troy Clinton, Mark O'Riordan, Jonathan King, Amy Waddell, Casey Evans**

McNAIR SCHOLAR - **Sarah Schlichtholz**

MERIDIAN OIL INTERNSHIP - **Jonathan King, Wendy Kirschner, David Nyquest**

MICHAEL LEE WILSON MEMORIAL SCHOLARSHIP - **Cynthia McIlveen, Jan Shifflett, Alice Marsh, Geoffrey Gilbert, John Sims, Steve Breezley, Anna Breuninger, Galen Halversen, Philip Young, Thor Burbach, Shawn Murphy**

MONTANA SPACE GRANT SCHOLARSHIP - **Amy Emanuelson**

UM MORTAR BOARD - **Helge Gonnermann, Karen Halberg, Glenna Drake, Michael Novak, Matthew O'Hara, Sarah Schlichtholz, Philip Young**

NATIONAL GEOGRAPHIC SOCIETY TEAM MEMBER (NSF Grant - Geology of NW Senora) **David Goodwin**

NATIONAL SCIENCE FOUNDATION FELLOWSHIP **Jerda Smeltzer, Michael Poage**

NATIONAL WATER WELL ASSOCIATION FELLOWSHIP - **William Craig**

PELPHS-DODGE INTERNSHIP - **David Nyquist**

PHI KAPPA PHI SCHOLASTIC HONOR SOCIETY NOMINATIONS - **Anna Breuninger, Geoffrey Gilbert, Gavin Hudgeons, Eva Karau, Wendy Kirschner, Michael Novak, Tim Orr, Sarah Schlichtholz, Benjamin Swanson, Brandie Theisen, Shad O'Neel, Peggy Stewart, Galen Halversen, Matthew O'Hara, Jennifer Snyder, Philip Young, Shad O'Neel, Emilie Reagan, Andrew Schott**

SENIORS GRADUATING WITH HIGH HONORS - **Anna Breuninger, Geoffrey Gilbert, Eva Karau, Wendy Kirschner, Michael Novak, Tim Orr, Benjamin Swanson, Philip Young, Sarah Schlichtholz**

SIGMA XI RESEARCH GRANT - **Amy Emanuelson**

SIGMA XI SENIOR SCIENCE AWARD - **Michael Novak, Matthew O'Hara, Sarah Schlichtholz**

SOCIETY OF PROFESSIONAL WELL LOG ANALYSIS SCHOLARSHIP - **Catherine Gaskin**

STEVE CHAMPLIN MEMORIAL AWARD FOR BEST POSTER (AAPG) - **George Furniss**

UM GRADUATE SCHOOL SCHOLARSHIP - **Quinn Kiley, YiQiang Zhang**

UM GRADUATE SCHOOL TRAVEL AWARDS - **Arthur Jolly, Peter Ryan, Jeffrey Moe, Cora Terrell, Monte Smith, Yves Garson, Michael Savka, D. Jay Johnson, Peter Ellsworth, Shawn Benner, Eric Smart, YiQiang Zhang, Christine Brick, Glenna Drake, Du Yue, Bonnie Ertel, Steven Helgen, Juliette Lucy, Jerda Smeltzer, Jon Warner, Thomas McCamant, Lorin Amidon, George Furniss, David Goodwin, Quinn Kiley, Jennifer Menges, Sonia Nagorski, Devin Shay, Derek Sjostrom, Cindy Wilson**

WATKINS SCHOLAR - **Helge Gonnermann, Dwite Green, Jennifer Snyder**

ROBERT & ELEANOR WEIDMAN SCHOLARSHIP - **Benjamin Swanson, Catherine Nemeth**

WYOMING GEOLOGICAL ASSOCIATION-STEVE CHAMPLIN SCHOLARSHIP - **Carl Schafer**

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1995-1997

SENIOR THESES

**Engdahl, Mark**, 1997, Directed by Christine Brick, *Basin Closure Analysis for Sleeman Gulch*

**Henderson, Jon**, 1997, Directed by James Sears, *Re-Thinking the Hydrostratigraphy of the East Side Tertiary Deposits of the Bitterroot Valley, Southwestern, Montana*

**Scott Greve**, 1996, Directed by Dr. William Woessner, *Quantification of Organic Carbon and Viability of Denitrification*

**Galen Halversen**, 1996, Directed by Dr. Don Winston, *A Redefinition of the Middle Proterozoic Snowslip/Shepard Boundary in Glacier National Park*

*and Adjacent Areas, Northwest Montana*

**Kevin Lincicum**, 1996, Directed by Dr. William Woessner, *The Chemistry of Groundwater as it Relates to Water Table Fluctuations and Stratigraphy in Floodplain Sediments Impacted by Mining Wastes, Miles Crossing Site, Silver Bow Creek, Montana*

**Matthew O'Hara**, 1996, Directed by Dr. Nancy Hinman and Robert Strebin Jr., Battelle, Pacific Northwest Laboratories, *Monitoring Technetium-99 Contamination at the Hanford Site: Two New Methods for Technetium-99 Detection in Groundwater and Soil Matrices*

**Horace Pipe**, 1996, Directed by Dr. William Woessner, *Stratigraphy and Chemistry of Mining Impacted Flood Plain Sediments at the Miles Crossing Site Silver Bow Creek, Montana*

**Christopher Tacke**, 1996, Directed by James Sears, *The Renova and Beaverhead Formations Along the Grasshopper Creek Fault, Montana*

**Geoff Gilbert**, 1995, Directed by William Woessner, *Deionized Water Tracer Test Study of the Frenchtown Bench Aquifer, Frenchtown, Montana*

**James Maus**, 1995, Directed by Johnnie Moore, *The Relationship between Surface Water and Groundwater in Hummocky Glacial Till on the Bandy Experimental Ranch, Ovando, Montana*

**Natalie Morrow**, 1995, Directed by Dr. Johnnie Moore, *Grain Size Analysis of Fine-Grained Sediment: A Study Involving the Development of a Pipette Method and a Comparison of Metal Concentration vs Grain Size in Clark Fork River Sediment*

**Michael Novak**, 1995, Directed by Dr. Johnnie Moore, *Efficacy of Natural Zeolite as a Remediation Tool for Metal and Nutrient Contaminated Water*

**Tyler K. Swaren**, 1995, Directed by Dr. William Woessner, *An Analysis of Sediment Character and the Hydraulic Conductivity Distribution in the Vicinity of Frenchtown High School, Western Montana*

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1995-1997

GEOLOGY GRADUATE THESES

**Lorin Amidon**, M.S., 1997 - *Paleoclimate Study of Eocene Fossil Woods and Associated Paleosol from*

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*the Gallatin Petrified Forest, Sw Gallatin National Forest, Montana*

**Kelly Brunt**, M.S., 1997 - *Paleomagnetic Investigation of the Lower Cretaceous Kootenai Formation, Western Montana*

**Josh Distler**, M.S., 1997 - *Paleomagnetic and Structural Analyses of the Wallowa Terrane, Northeast Oregon and West-central Idaho: a Re-evaluation of The Salmon River Suture Zone*

**Glenna Drake**, M.S., 1997 - *Long Term Variability of Trace Metal Concentrations in Fine-grained Sediment of the Upper Clark Fork River, Montana*

**Derek Feedback**, M.S., 1997 - *Stratigraphy and Sedimentation of the Chamberlain Formation-newland Formation Boundary, Lower Belt Supergroup (Middle Proterozoic), Central Montana*

**William Harris**, M.S., 1997 - *Defining Benefit and Hazard: Distribution of Upper and Lower Tertiary Formations on the Northeast Flank of the Missoula Valley, Montana*

**Quinn Kiley**, M.S., 1997 - *Poliovirus, Bacteriophage, and Bromide Transport Through a Coarse-grained Aquifer, Western Montana*

**Jonathan King**, M.S., 1997 - *A Volcaniclastic Sedimentary Facies Analysis of The Two Medicine Formation, Wolf Creek, Montana*

**Elizabeth Landrigan**, M.S., 1997 - *The Effect of Bed Sediment Remobilization On Metal Concentrations: A Study of Ice Jams on the Clark Fork River, MT*

**Bruce Lauerman**, M.S., 1997 - *Virus Occurrence and Transport in a Cold-water, Sand and Gravel Aquifer, Frenchtown, Montana*

**Jennifer Menges**, M.S., 1997 - *Investigation of Temporal Changes of Heavy Metal Concentrations in Sediments and Water of the Blackfoot River, Montana*

**Sonia Nagorski**, M.S., 1997 - *Impacts by Acidic, Metals-rich Groundwater on The Hyporheric Zone of an Intermontane Stream*

**Stephen Porder**, M.S., 1997 - *Metamorphism and Metasomatism in the Lower Prichard Formation: a Petrologic, Geochemical and Thermobarometric*

*Study of The Lowermost Member of the Belt/Purcell*

**Devin Shay**, M.S., 1997 - *An Investigation of the Hydrogeology and Geochemistry of a Floodplain Aquifer System Impacted by Mine Tailings, Silver Bow Creek, Montana*

**Steen Simonsen**, M.S., 1997 - *40ar/39ar Ages of Eocene Dikes and the Age of Extension in a Tertiary Magmatic Arc, Idaho and Montana*

**Derek Sjostrom**, M.S., 1997 - *Lower-middle Jurassic Through Lower Cretaceous Sedimentology, Stratigraphy, and Tectonics of Western Mongolia*

**Robert Ward**, M.S., 1997 - *The Distribution and Occurrence of Radon in the Missoula Valley Aquifer*

**YiQiang Zhang**, Ph.D., 1997 - *Fate of Selenium in Benton Lake National Wildlife Refuge, Montana*

**Christine Brick**, Ph.D., 1996 - *Temporal Geochemical Processes in Metal Partitioning and Mobilization Between Water and Substrate in the Clark Fork River, Montana*

**David Johnson** Ph.D. - 1996, *Sedimentary Structures and Facies in the Helena and Wallace Formations, Middle Proterozoic, Belt Supergroup, Montana*

**Juliette Lucy**, M.S., 1996 - *Geochemical Controls and Metals Partitioning in the Vadose Zone and Shallow Ground Water Zone of a Highly Contaminated Floodplain Along Silver Bow Creek, Silver Bow County, Montana*

**Thomas McCamant**, M.S., - 1996 *The Role of the Groundwater System in Controlling Nutrient Loading of a Pristine Trout Stream, Eastern, Montana*

**Cindy McIlveen**, M.S., 1996 - *An Anomalous Platinum Group Element Occurrence Below the Jm Reef, Stillwater Complex, Montana*

**Jerda Smeltzer**, M.S., 1996, *Determination of Ammonia Release from Cyanobacterial Mats: Implications for Early Diagenetic Solution Chemistry*

**Jon Warner**, M.S., 1996 - *Cenozoic Geologic History of the Ruby River Basin and Vicinity, Southwestern Montana*

**Bonnie Ertel**, M.S. 1995 - *Lithofacies of a Fossil Hot Spring System: McGinness Hills, Nevada*

*Supergroup*

**Steven Helgen**, M.S., 1995 - *Natural Background Determination and Impact Quantification in Trace Metal Contaminated River Sediments*

**Jeffrey King**, M.S., 1995 - *The Cumulative Effects of Septic System Disposal on Groundwater Quality in Selected Portions of Missoula County, Montana*

**Sean Lambert**, M.S., 1995 - *Fate and Transport of Halogenated Aliphatic Compounds Associated with Septic System Effluent in an Un-confined Alluvial Ground Water System*

**Jinliang Li**, M.S., 1995 - *A Study of the Effects of Organic Matter on Silica Diagenesis Using Geochemical Modeling*

**David Parker**, M.S., 1995 - *The Geology, Petrology, and Volcanic History of the Crater Mountain Volcanic Complex, Lewis and Clark County, Montana*

**Michael Poage**, M.S., 1995 *Hydration, Metamorphism, and Diabase- Granophyre Relations in a Thick Basaltic Sill Emplaced into Wet Sediments, Western Montana*

**Eric Smart**, M.S., 1995 - *Hydrogeology of the Upper Clark Fork River Floodplain, Warm Springs, Montana River Water/Ground Water in a Contaminated Floodplain*

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RECENT VISITING SPEAKERS  
AND  
FACULTY SEMINARS

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December 9, 1997, **Steve Sheriff**, Department of Geology, UM, *Search for Sutures: The Free Air Anomaly and Lithospheric Strength.*

November 18, 1997, **James Sears**, Department of Geology, UM, *The Rocky Mountain Machine.*

November 7, 1997, **John Grotzinger** (UM Alum), MIT, *Anomalous Carbonate Precipitates: Precambrian analogs for Paleozoic cementstones.*

November 7, 1997, **John Grotzinger** (UM Alum), MIT, *The Terminal Proterozoic Time Scale: Constraints on Global Correlations and Rates of Early Animal Evolution.*

September, 30, 1997, **Todd Feely**, MSU Earth Sciences; *Volcan Ollague, Central Andes: A Model System for Magmatism Associated with Thick Continental Crust.*

September, 18, 1997, **Kirk Nordstrom**, USGS (Denver); *Negative pH, ultra acidic mine waters and the challenge of environmental restoration at the Iron Mountain Superfund Site.*

September, 17, 1997, **Kirk Nordstrom**, USGS (Denver); *Sulfur redox geochemistry in the hot thermal waters of Yellowstone National Park and the origin of thiosulfate.*

May, 5, 1997, **John Metesh**, Montana Bureau of Mines and Geology; *Groundwater Modeling and Contamination Transport, Butte, Montana.*

April 22, 1997, **Gary Glatzmaier**, Los Alamos National Lab; *3D numerical simulations of convection and magnetic field generation in Earth's core.*

April 10, 1997, **Susan Kidwell**, University of Chicago; *Phanerozoic trends in the Nature of the fossil record.*

April 8, 1997, **Susanne Janecke**, Utah State University; *Structure and stratigraphy of the Muddy Creek supradetachment basin, SW Montana.*

April 3, 1997, **Nancy Hinman**, Department of Geology, UM; *Preservation potential in thermal spring. The dangers of hot-tubbing on Mars.*

April 2, 1997, **Wanda Taylor**, Department of Geology, University of Nevada, Las Vegas; *Fault Segmentation Along an Active Fault: An Example from Southern Utah.*

March 13, 1997, **Charles Paull**, University of North Carolina; *Natural gas hydrates and ODP Leg 164: Sampling an ephemeral phase.*

March 7, 1997, **Connie Soja**, Colgate University, N.Y.; *Stromatolites and microbial contributions to reef development through geologic time.*

March 4, 1997, **Chris Gammons**, Department of Geological Engineering, Montana Tech; *The*

*hydrothermal geochemistry of gold: experiments, theory, and field studies.*

February 19, 1997, **Don Winston**, Department of Geology, UM, MAGMA (Missoula Area Geologists and Mineralogists Association) meeting; *The Yellowjacket is not the Prichard Formation*

February 18, 1997, **Marc Hendrix**, Department of Geology, UM; *The details of Marc's recent stratigraphy and sedimentology research in Mongolia.*

February 11, 1997, **Marc Hendrix**, Department of Geology, UM; *General meeting of the Geology Student Association and an overview of Marc's recent work in Mongolia.*

November 20, 1996, **Steve Sheriff**, Department of Geology, University of Montana; Friends of the Mansfield Library Lecture Series, *Electronic Teaching Initiatives in the Sciences.*

November 12, 1996, **Robert Dundas**, Department of Anthropology, UM; *Fairmead Landfill, Madera County, CA: A Pleistocene fauna, the National Enquirer, and mitigation of paleontologic resources on public lands.*

October 22, 1996, **Ewa Roniewicz**, Polish Academy of Science, Warsaw, Poland; *Skeletal microstructure as a tool in reconstruction of 240 year history of Scleractinian corals.*

October 21, 1996, **Bill Holben**, the Division of Biological Sciences, University of Montana; *Monitoring in situ transport of <sup>13</sup>C-enriched bacteria in a coastal plain aquifer.*

October 15, 1996, **James Sears**, University of Montana, Geology Department, *What I learned in the Bitterroot; stratigraphy, structure, and groundwater transport.*

October 3, 1996, **Steve Sheriff**, University of Montana, Geology Department; UM Mathematical Sciences Colloquium, *Gravity, topography, lithospheric strength, or, I think I have a statistics question.*

October 3, 1996, **Peter Southgate**, Australian Geological Survey Organization, Canberra, ACT, *Insights into Palaeoproterozoic Stratigraphic architecture; implications for Pb-Zn mineralization.*

September 27, 1996, **Meghan Miller**, Central Washington University, *Secular strain versus earthquake-related deformation in the eastern California shear zone; GPS results 1991-1994.*

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ALUMNI AND FRIENDS CONTRIBUTE  
GENEROUSLY

Generous donations from alumni and friends during recent years have helped many students and the department. ~~Thank you for your support if we've~~ missed anyone, we apologize. If you would like to make a donation, please send them to the Geology Department, The University of Montana, Missoula, MT 59812.

Charles Achauer  
Stephen Airhart  
AMAX  
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Gertrude Bailey  
Barbara Bekken  
Alan and Anne Bell  
Walter Benoit and Katharine Hawley  
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George Shurr  
Gary Sorensen  
Susan Taucher  
William Uthman  
Steven and Kimberly VanDelinder  
Carla Van Siclen  
Rusty and June Weaver  
Kenneth Wells and Debbie Waltari  
Robert and Eleanor Weidman  
John and Deloris Wilson  
Nancy Winslow  
Wesley and JoAnn Woodgerd

Well, that's our news for now. If you missed it on the first read, check out Winston's blurb--**he invited you to next fall's Belt Bash**. Stop by in person and in cyberspace, visit our web page (<http://www.cs.umt.edu/GEOLOGY/>) for regularly updated information, a speakers schedule, current research, and the like; feel free to let us know what is missing from the web page. And please let us know what you've been up to.

IF YOU HAVE NEWS OR IF YOU RECEIVED YOUR NEWSLETTER AT A FORWARDED ADDRESS, PLEASE  
RETURN THIS FORM.

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Name: \_\_\_\_\_

Address: \_\_\_\_\_  
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Recent events of interest, career changes, accomplishments, or whatever (3 or 4 lines).

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Return to: Department of Geology  
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Missoula, MT 59812

**Geology Department  
The University of Montana  
Missoula, MT 59812-1019**

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