

WMU Magazine Cover Story Summer 2006

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## WMU Magazine

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### WMU Magazine, Summer 2006



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Geosciences faculty are capitalizing on WMU's newest research center to address environmental and national security issues.

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# WMU Magazine

## Cover Story

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## No Stone Left Unturned

### Researchers work to plumb Michigan's depths for oil, combat environmental issues

With environmental and national security issues lurking under every rock these days, Western Michigan University geoscientists haven't been leaving many stones unturned.

They're busily working to stem the tide of everything from shoreline erosion and water pollution to the skyrocketing cost of energy and mounting concern over global climate change.

Their work got a little easier early this year, though, when WMU opened the Michigan Geological Repository for Research and Education (MGRRE), part of the Department of Geosciences. The facility unites the University's research, education and outreach activities in several geosciences areas that have important implications for the nation as well as Michigan.

Located off of U.S. 131 just two miles from the main campus, the facility adds 6,000 square feet of office and research space to the department and 22,000 square feet of storage space for its Michigan Basin Core Research Laboratory.

Dr. G. Michael Grammer, associate professor of geosciences and director of the MGRRE, says the Core Lab was the driving force behind the University's decision to lease a former commercial building to establish the new research and education facility.

Now incorporated into the MGRRE, the Core Lab holds a treasure trove of rock samples and paper records from thousands of Michigan oil and gas wells. In fact, it has the most comprehensive collection of subsurface geological specimens and data in the state.

Initially, the lab's main goal was to acquire, preserve and use materials from Michigan's oil and gas wells for use in energy research and education. But these data are more valuable than ever today, providing one-of-a-kind information researchers can use to address such pressing problems as how to boost domestic oil and gas production; put greenhouse gases back into the

ground; and convert depleted wells into gas storage areas for the U.S. strategic petroleum reserve, capitalizing on the fact that Michigan has more underground space than any other state.

## Timing is everything

When several large at-risk collections were offered to the Core Lab last year, WMU worked with numerous partners to address its urgent need for space.

“Everything came together at a critical time,” Grammer says. “We needed to accommodate our broadening research and education activities as well as our growing collection of subsurface geological specimens and data. The MGRRE does that and will meet our needs long into the future.”

Among those helping in the effort to finance and equip the facility were the U.S. Department of Energy, private industry, state legislators and officials, and WMU alumni. So far, the MGRRE has received nearly \$600,000 in federal support, plus \$890,000 from Michigan industry and departmental friends.

But before long, Grammer hopes WMU can buy the building that the MGRRE is leasing, or a similar one. And to that end, the Department of Geosciences has launched a \$2.5 capital campaign to raise the necessary funds.

In the meantime, the MGRRE is focused on facilitating the Core Lab’s work as well as a broad range of ongoing environmental- and energy-related research being conducted by geosciences faculty.

Five projects have already been folded into the facility.

- Grammer leads a research team that’s developing new approaches to maximize domestic oil and gas production, with a focus on Michigan’s major oil and gas reservoirs. Their work will help reduce America’s dependence on foreign oil while improving Michigan’s economy.
- Associate Professor David Barnes leads an environmental research project aimed at reducing atmospheric greenhouse gases by safely storing them in Michigan’s unique underground rock formations. Creating technologies to safely store carbon dioxide and other greenhouse gases in the state’s thick limestone formations can potentially lessen the impact of global climate change.
- Barnes, Grammer and Professor William Harrison, who directs the Core Lab, are working on a project to take CO<sub>2</sub> out of the earth’s atmosphere and put it to use, making oil and gas production economically viable in non-working hydrocarbon fields. They’re studying the feasibility of injecting the CO<sub>2</sub> into existing wells to force out more oil and gas, creating new energy supplies without having to drill new wells.
- Barnes also has teamed up with state personnel to research aquifers in a three-county area near Lansing that constitutes Michigan’s largest bedrock aquifer. Their work will help local governments determine how vulnerable their aquifers

are to known surface contamination and will produce 3D maps to aid officials in identifying, evaluating and protecting these underground supplies of drinking water.

- Professor Ronald B. Chase is leading a project with Professor Alan Kehew at three locations near South Haven, Mich., that focuses on reducing lakeshore erosion. The project involves state-of-the-art slope monitoring to study the processes of bluff failure and test methods of stopping landslide activity.

## Staying grounded

Plans call for additional projects to migrate to the MGRRE and for the MGRRE to initiate new ones as more faculty, graduate students and visiting researchers set up shop in the facility.

“The importance of the MGRRE in developing Michigan’s natural resources and for advancing scientific frontiers can’t be overstated. This facility, with its technical expertise increasing and the addition of the Core Lab, can do more and more things,” Grammer says. “Technology is advancing all the time. There was no such thing as 3D modeling a few years ago, and carbon sequestration wasn’t even thought of. There’s plenty more for us to learn from cores, but you can’t learn anything if you throw away the rock.”

The state’s hydrocarbon heritage will continue to fuel much of the MGRRE’s work. Oil and gas production is a \$2 billion enterprise annually and one that benefits all Michigan citizens. The industry provides more than 10,000 jobs, helps underwrite the Department of Environmental Quality, and in exchange for mineral leasing and production on state lands, has paid more than \$550 million into the Michigan Natural Resources Trust Fund, which helps create and maintain recreational areas in the state.

“Michigan is one of America’s top 15 hydrocarbon-producing states. The work we’re doing on carbon sequestration is huge, but our work in the area of oil and gas production is vital for national security,” Grammer says. “It’s interesting to note that this May, 72 percent of the oil America used came from foreign sources. This is significant because in 1973 during the oil embargo, 70 percent of the oil we used came from domestic sources, and you know the chaos the embargo caused back then.”

Grammer is doing his part to come up with new ideas and approaches to help reverse that trend. Along with a cadre of graduate students, he and Harrison are studying Michigan’s Niagaran Reef reservoirs and has made significant discoveries that oil and gas producers are applying to focus in on every drop of remaining hydrocarbons.

Some 400 million years ago when the continents were closer together, Michigan sat just north of the equator in an environment much like today’s Bahamas, with coral reefs that were later buried, ultimately trapping pockets of oil and gas. Grammer’s studies have taken him to exposed ancient reefs in the United States, Canada, Mexico, Russia and the United Kingdom, and living reefs throughout the Caribbean and Pacific.

“We’re trying to understand what’s a mile or two under the surface of Michigan from 4-inch diameter wells that provide a small window into the past,” Grammer says. “By studying current environments and old, exposed reefs, we can make predictions about Michigan’s buried reefs and develop 3D maps of where there’s the best chance to locate oil, gas and water.”

## **Educating for the ages**

In addition to training the next generation of geologists, the MGRRE is constantly sharing the knowledge its faculty is building with private companies, universities, and other states and nations.

Grammer and Harrison routinely collaborate with several other major U.S. universities, particularly in oil-producing states, and give several talks a year to petroleum trade groups. Harrison was awarded an honorary doctorate in Latvia for his work there, and Grammer is currently working with Brazil’s national oil company.

This summer, MGRRE staffers have also fielded calls for help from environmentalists concerned about the Jordan River System near Traverse City, a Colorado company interested in applying a new drilling technology to an old oil field to see if more crude can be extracted, and representatives of the U.S. Geological Survey who have been asked to evaluate the resources on land owned by a band of Ottawa Indians.

“The things we’re learning are applicable throughout the country and in some cases throughout the world,” Grammer says. “Western Michigan University is the only university in the Midwest doing this type of integrated and applied geosciences research. What we’re doing here benefits industry and the economy and attracts students.”

Getting more students trained is a key role for the MGRRE, Grammer adds, given that there’s a dearth of geology students right now.

And he’s not just setting his sights on college students. In July, the MGRRE launched its first K-12 outreach program, opening up its technical expertise, cutting-edge research equipment and core samples to a group of southwest Michigan teachers. Down the road, the hope is that the teachers trained by WMU will excite their students about geology and the environment.

“In the next five to seven years, 40 percent of the geologists who are currently employed will turn over,” Grammer says. “There’s only about five percent of the new geologists needed in the pipeline, so the opportunity for students is phenomenal.”

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Spotlight

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