

COSTA RICAN CLASSROOM



by Steve Kiggins

When he enrolled at the University of Wyoming, Dan Eakin had many expectations.

He expected to receive a first-class education.

He expected personalized instruction from his professors.

He expected to broaden his horizons.

He expected to lay the groundwork for his future.

He didn't expect a two-month expedition aboard a research vessel in the waters surrounding Costa Rica.

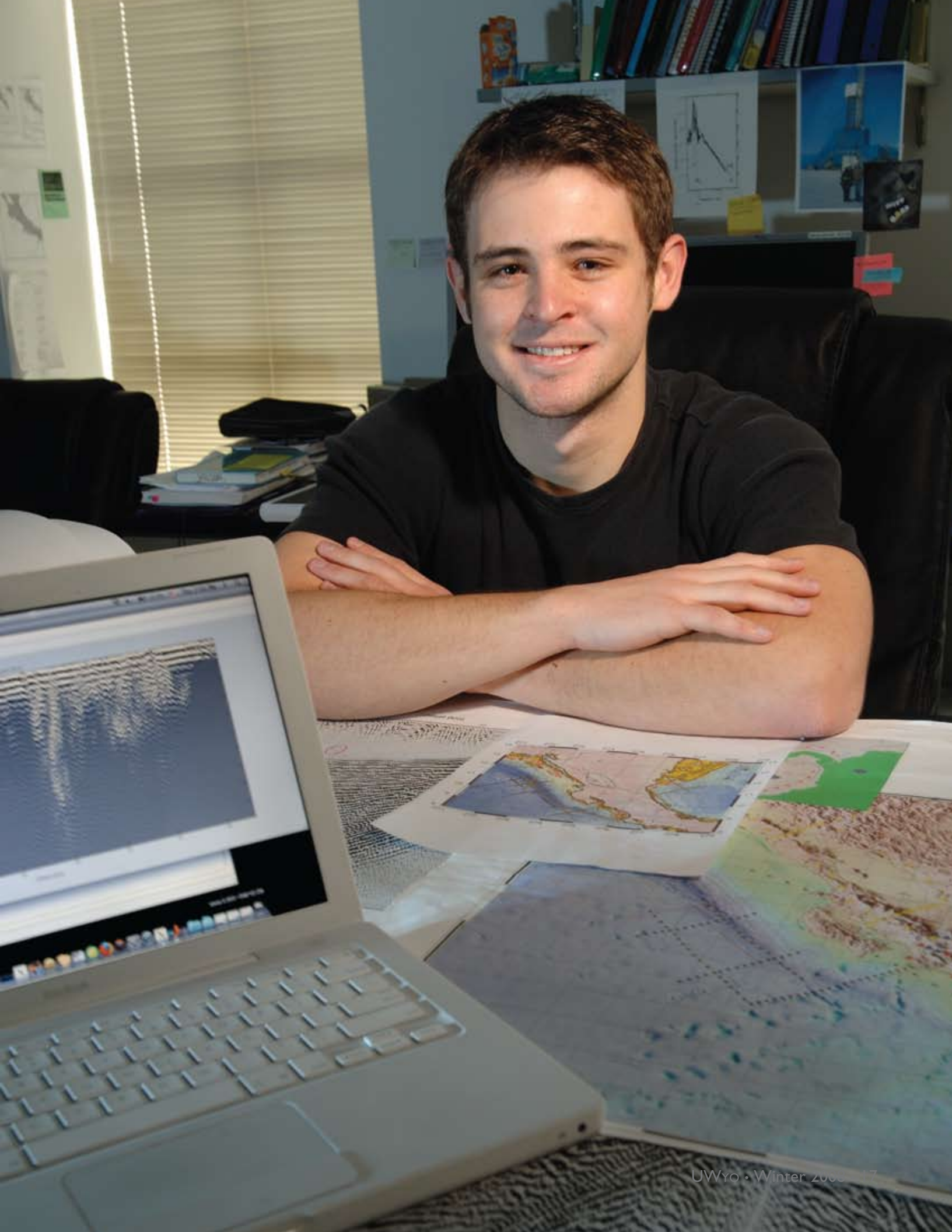
"I'm hoping I don't get seasickness," Eakin says with an uneasy smile before he embarks on the journey. "I've never really been out on the ocean on a ship. I guess we'll see how that goes."

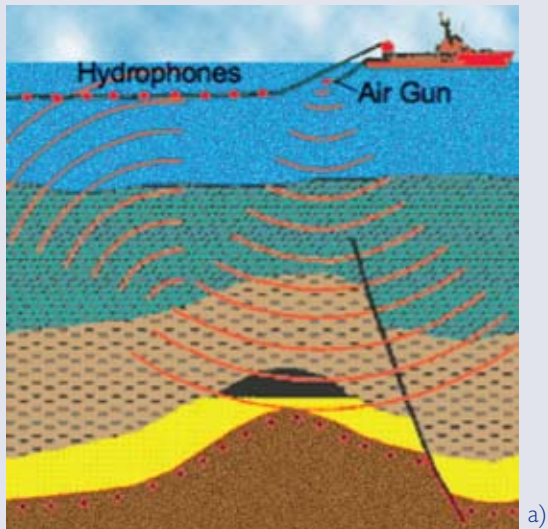
In February, Eakin joined professors and student researchers from the University of Texas, the University of Costa Rica, and the California-based Scripps Institution of Oceanography (SIO) to study the subduction zone off the coast of Costa Rica with seismic reflection profiling, a technique used to image the solid earth beneath the ocean.

It's easy to understand why Eakin didn't expect to go to sea. This is Wyoming, after all.

But there's another reason. His faculty adviser, Steve Holbrook, who has led several fact-finding cruises like this since 1990, had always preferred to rely on graduate students and postdoctoral scholars.

(above) The research vessel Maurice Ewing shooting sound booms from hydrophones during a data gathering run. (right) Dan Eakin in his office with research materials. Portrait Ted Brummond, research images courtesy Dan Eakin and Steve Holbrook.

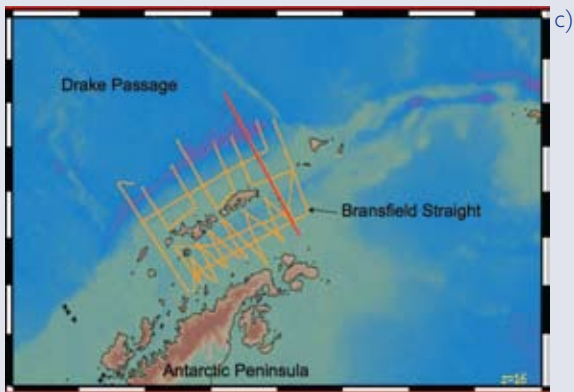




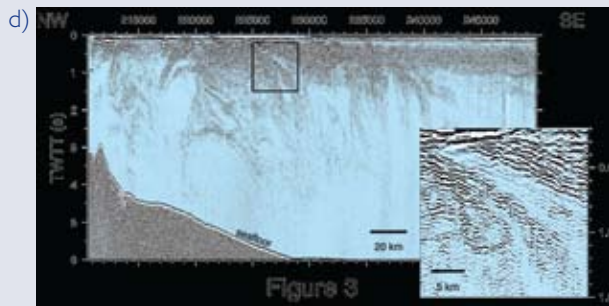
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“I’d always been hesitant to get undergraduates involved in my research, because I wasn’t sure how to get them involved in a meaningful way and in a way that would aid my research,” says Holbrook, who, in 2003, helped discover that seismic reflection profiling could also be used to provide detailed images of the thermohaline structure – the combined effects of temperature and salinity that contribute to water densities within the ocean itself.

“Dan was really the first undergraduate who I looked at and said, ‘Boy, I can make a difference in this guy’s career.’ And it’s sure worked out well.”

BRIGHT & CONSCIENTIOUS

A few years ago, Eakin was required to take a course titled “Foundations of Geology II,” which provides an introduction to the processes and properties of the physical Earth, including seismo-tectonics, global earth structure and seismology.

That class not only hooked Eakin, who, at the time, wanted to become a geohydrologist—a scientist who investigates the occurrence and exploitation possibilities of water in different geological formations and evaluates underground water resources by means of geophysical techniques—but provided a stage for him to impress Holbrook.

And he did.

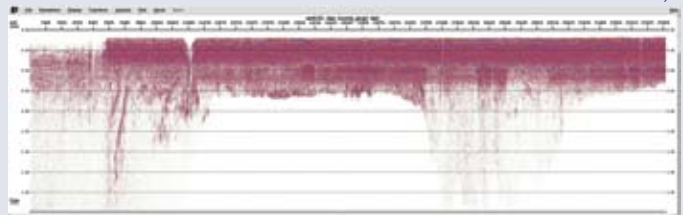
“Dan is a really bright, conscientious student,” says Holbrook, a professor in UW’s Department of Geology and Geophysics. “He was quiet at first, but once I started talking to him, I knew he was really paying attention and thinking one step ahead.”

Eventually, Holbrook strayed from his regular course of advising graduate students and postdoctoral and invited Eakin and Lisa Humbert, both undergraduates, to work in his laboratory.

Humbert, a senior from Strasburg, Colo., is also going on the Costa Rica cruise.

“He’s done a lot for me and Lisa that he has never done for other undergraduate students, which is allocate work space and processing stations in his lab and give us so much of his time,” Eakin says of Holbrook. “He’s already made a big impact on my learning, and he’s giving me a lot of opportunities to keep learning.”

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a) Air gun and hydrophone configuration diagram of sound booms data gathering, b) The Marcus Lengseth research vessel Eakin traveled on in February, c) Holbrook initial data

set collection map in the Bransfield Strait off the Antarctic Peninsula, d) Holbrook’s 2003 initial data set, and e-h) data set graphs at 263 and 421 meters with red/blue data enhancement.

A JUMP ON GRADUATE SCHOOL

Holbrook's offer to Eakin to analyze data in his lab included a stipulation: He had to complete an independent research project and present it at Undergraduate Research Day, an annual celebration of undergraduate research open to all students at UW, Wyoming's community colleges and the UW/Casper College Center.

Using seismic reflection profiling data collected by University of Texas researchers in 1991, Eakin produced an analysis of an oceanographic front off the coast of the Antarctic Peninsula.

The purpose of his project, Eakin says, was to familiarize himself with seismic processing while researching the interesting features in the water column in data obtained from within the Antarctic Circumpolar Current, which mixes water from the Atlantic, Indian, and Pacific oceans. It's widely regarded as one of the mightiest currents in the world.

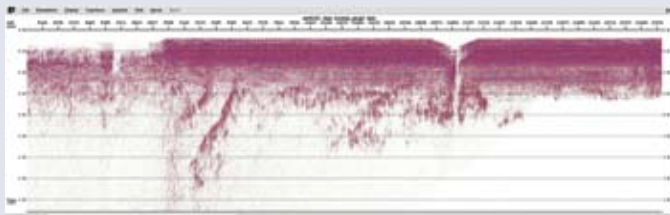
After reprocessing some of the data to correct inconsistencies, Eakin says he used geometric calculation, frequency analysis/filtering, velocity analysis, stacking and migration to produce his final image of the line.

His initial image, which showed many promising reflections as well as some features that resembled frontal structures, served as the basis for his project, Eakin says.

Although Eakin admits that preparing his presentation was stressful, especially during spring mid-terms, he says meeting the strict deadlines and drafting a concise oral presentation were invaluable lessons to learn.

"Going to an Undergraduate Research Day just made me feel really important, because people were there to see me. That was really exciting," says Eakin, a junior geology and geophysics major who was born and raised in Laramie.

"It makes you feel like, as an undergraduate, that you're doing graduate work. That was really important to me because I'm really excited to go to grad school and I know doing this kind of work really prepared me for grad school."



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If his presentation is any indication, Holbrook says Eakin will easily conquer graduate school.

"He gave just a first-rate presentation," raves Holbrook. "He really surprised me. I had reasonable expectations, but he gave a presentation that I would have expected from one of my graduate students. Really polished, really calm, really organized."

He adds, "I've got Dan pegged as going on to graduate school and doing us really proud."

A COSTA RICAN CRUISE

Before Eakin heads off to graduate school – Texas and SIO are, coincidentally, his top choices – he'll spend two months in Costa Rica.

There, Eakin will gain experience both on the ground and at sea as researchers attempt to gain a "complete understanding for the volcanic landscape of South America," Holbrook says.

While working on the ground, Holbrook says Eakin will be deploying seismometers, which are used to measure and record motions of the ground, at pre-selected sites in Costa Rica and talking to locals about the research project.

At sea, Eakin will spend much of his time monitoring seismic activities in the control room and analyzing and processing data, Holbrook says.

Researchers will spend time in both the Pacific Ocean and Caribbean Sea, using the Panama Canal to cross between the two massive bodies of water.

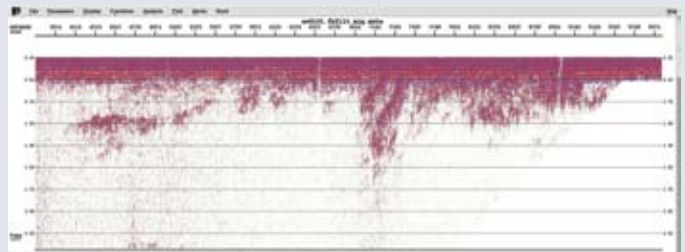
"I'm just so excited to go," says Eakin.

After finishing up at UW later this year, Eakin will choose a graduate school, where he plans to continue his study of seismic reflection profiling – particularly marine seismology, which has the potential to provide scientists with a stronger understanding of the planet's climate.

"That's the main point," says Eakin. "By using a lot of oceanographic data and coupling it with these new profiling images, we might be able to make a better model of global climate."

Where does Eakin want to continue his education?

"Anywhere on the ocean," he says, and then he cracks a smile. "But you never know. Look at Wyoming; we're doing marine seismology here and we're one of the most land-locked states ever." ❖



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