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UNH Institute for the Study of Earth, Oceans, and Space

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DURHAM, N.H. -- While the Mars rovers are “up there” doing their work looking for signs of extraterrestrial life, University of New Hampshire scientist Karen Von Damm and her students are headed down to the “Hole to Hell” at the bottom of the deep blue sea. Their destination - a place where Mother Earth “burps up a new skin” in a cloud of acidic black smoke and temperatures rise to more than 700 degrees Fahrenheit, and where giant tube worms and clams form colonies around the cracks that ring the globe. The world of these mid-ocean ridges was discovered just 27 years ago, when Von Damm was doing her Ph.D. thesis.

Von Damm, a professor of chemical oceanography who has been studying deep sea hydrothermal systems ever since, is poised to head back to the East Pacific Rise at 9-10 degrees north latitude (referred to simply as “9 North”) off the coast of Mexico on the first of three cruises to occur over the next five years.

Von Damm was awarded nearly $650,000 from the National Science Foundation (NSF) to lead the expeditions as chief scientist aboard the Woods Hole Oceanographic Institution's Research Vessel (R/V) Atlantis.

Using the ship's 23-foot long “deep submergence vehicle,” the DSV Alvin, Von Damm and a scientific crew of 21, including three UNH undergraduates and one graduate student, will make 11 dives over the course of two weeks to photograph, probe, and sample the hydrothermal systems of 9 North. Atlantis sails from Costa Rica on March 15.

The UNH undergraduates are April Hyde of Colebrook, Kimberly Beers of Portsmouth, and Christopher Waters of East Hampstead. They will be joined by graduate student Claire Hoff of Scotia, N.Y., and Cheryl Parker, research technician in UNH's Complex Systems Research Center.

“This is a place we've been following since 1991 and we've been able to track the changes,” says Von Damm, Carpenter Professor in UNH's Institute for the Study of Earth, Oceans, and Space (EOS) and Department of Earth Sciences.

She adds that those changes occur at a remarkably fast rate in an extreme environment that tends to slow things down. It's a mile and a half below the ocean surface (it takes Alvin an hour and a half to reach bottom), the pressure is 250 times that of the atmosphere at sea level, the

surrounding water temperature is 2 degrees Celsius, and no light penetrates.

What drives the rapid change is the thermal and chemical “energy transfer” from the Earth's interior that pours forth from smoking, morphing mineral chimneys, which can grow 16 inches in a couple of days and engulf scientific equipment monitoring temperature and chemistry. On her last cruise to 9 North, Von Damm says only a few of the $2,000 “Hobo” temperature probes they had placed in the vents two years before were recovered; the others had been “gobbled up.”

For this most recent cruise, Von Damm hopes to come full cycle with the 9 North vents she's been studying for more than a decade. She's predicting that things are about to “blow” in a year or two.

“Based on the fluid chemistry and temperatures we saw here in 2002, I think the place is gearing up for another volcanic eruption,” Von Damm says, explaining that this would give the scientists greater insight into the life cycle of these vents which, in turn, will help them unravel the planet's past and predict future activity. “We don't know how these ridges work, and the mid-ocean ridges is where the crust is made, it's where we're resurfacing the Earth. The research we're conducting is pure science, it's really to understand better how our planet works.”

This broad understanding will be enhanced by the NSF's “Ridge 2000” program, under which Von Damm's research is being funded. The program emphasizes the importance of linking separate fields of scientific inquiry in an effort to better see the big picture. SaysVon Damm, “We're trying to understand the system as a whole - the oceanic crust, the magma, the animals, the vent fluids, and to understand how the magma moves in, moves up, heats the water, how the animals respond to changes in the water.”

Von Damm and crew will be updating the public on their progress with daily web logs accessible at http://epr2004.sr.unh.edu/log.html.

“We'll be giving the science highlights and telling about stuff that happened during the day,” she says. Stuff like that which has occurred on past cruises: a bird riding on the back of a sea turtle, dolphins playing in bioluminescent phytoplankton, and tremendous thunder and lightening storms at sea.