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Scientist at Work
Notes From the Field

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Meet Alvin, the Deep-Sea Submersible

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We awoke to the swell and sway of the Columbia River bar as Atlantis navigated its way into the Pacific Ocean. The 600-foot wide channel through the bar is one of the most treacherous passages in the country, as the river flows straight into the opposing waves of the ocean. It has claimed more than 2,000 large boats over the years, but fortunately ours was not one of them.

Jeffrey Marlow Aboard the Atlantis.

It was a full day of steaming, and with no samples to process yet, we had plenty of time for safety briefings and experiment preparation. I also explored the ship, bouncing like a pinball from wall to wall, slow to get my sea legs.

Because research cruises are such complicated and expensive undertakings, lab groups join forces for a given expedition. This one, funded by the National Science Foundation, is no different. Our research group, headed by Victoria Orphan, is joined by Lisa Levin from Scripps Institution of Oceanography, Tony Rathburn from Indiana State University and their respective entourages of postdocs and graduate students.

Jeffrey Marlow Posts From Hydrate Ridge

- Deep Sea Methane Vents at Hydrate Ridge

Although we're all united by an interest in carbonate rocks — rocks like limestone that are critical regulators of the earth's climate and biodiversity — each group has a different mission on the cruise. Our lab is looking at the methane-eating microbes. Tony's is studying slightly larger organisms called foraminifera, and Lisa is interested in deep-ocean ecology. In the ultraspecialized world of academia, these subfields can feel as different as night and day, but I'm looking forward to learning more about the other groups' work. After all, the strength of this cruise is its diversity, and by collaborating during and after the expedition, we'll be able to develop a more holistic understanding of cold seep ecosystems.

The most important member of the expedition, however, is the 35,000-pound, egg-shaped submersible named Alvin. Alvin has been the workhorse of the deep-ocean scientific community for more than 45 years, allowing us to explore unseen worlds thousands of meters below the surface of the ocean. To sweeten the deal, Alvin comes equipped with robotic arms and an array of sample boxes, so we can collect promising

samples and continue our investigations in the relative comfort of a laboratory. Faded photographs and dusty plaques commemorating the sub's prolific history adorn the walls of Atlantis's library. Alvin helped recover an unexploded hydrogen bomb in 1966, took Walter Cronkite to hydrothermal vents in 1982 and explored the Titanic in 1986. It hasn't all been smooth sailing, however. In 1967, an ambitious swordfish attacked Alvin's foam outer layer, got stuck and was eventually cooked for dinner by the crew. A couple of years later, the sub sank during deployment and spent 10 months on the seafloor before it could be resurrected.

Mark Spear The Alvin submersible on a previous expedition.

Our expedition to Hydrate Ridge is known more colloquially as a research cruise, but that label is a bit misleading: There are no climbing walls on the Atlantis, no chandeliered ballrooms and no variety shows. "It's an industrial platform in constant motion," as the ship captain, Mitzi Crane, puts it, and hazards range from slippery floors to swinging cranes, with the threat of a frigid dip in the north Pacific always looming. Because something as seemingly simple as walking can be deadly, safety briefings happen early and often. The most entertaining meeting involved donning the infamous "Gumby suit" – a red neoprene number, complete with a suffocating hood, intended to keep you (relatively) comfortable in case you need to abandon ship. It was a photographic opportunity rich with blackmail possibilities.

By now, we're almost at our first dive site: the southern summit of Hydrate Ridge. Alvin, with its photographic and sampling capabilities, is the most important source of information, but we've got other tools at our disposal as well. The multi-corer is a series of plastic tubes that gets jammed into the seafloor and collects the upper two feet of sediment, preserving the interface between the ocean floor and seawater. The CTD, shorthand for conductivity, temperature and depth, measures — you guessed it — conductivity, temperature and depth, as well as chlorophyll and oxygen levels. The Sea Beam sends out electronic signals, which bounce off the ocean bottom and come back to the ship, allowing us to generate high-resolution maps of the seafloor. All of these different instruments come together to offer a complete understanding of the geological, chemical and physical context of each dive site.

Weather reports are looking good for tomorrow, and the boat is buzzing with anticipation. If all goes well, we'll be processing the first batch of samples tomorrow evening. Let's just hope the swordfish steer clear.