

Lights! Camera! Action! Science!

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Dr. Pan Conrad is on a quest. Her search for signs of life in extreme environments has taken the JPL astrobiologist from the icy realms of the Arctic and the dry valleys of Antarctica to the scorching sands of Death Valley, California.

The hunt landed Conrad at the bottom of the ocean with Oscar-winning director James Cameron and a role in his film "Aliens of the Deep."

Last year, Cameron invited Conrad and her JPL colleague Dr. Lonnie Lane to join him on an expedition to one of the most forbidding places on Earth -the ocean floor where hydrothermal vents spew scalding hot, mineral-laden water into perpetual darkness never touched by sunlight.

He asked them to bring along a unique optical instrument they use in their research, a device designed to detect the chemical signatures of life. Cameron would chronicle their experiences for his new IMAX film, now playing in movie theaters around the country.

To take advantage of Cameron's offer, the researchers had to build a special version of the instrument, which stimulates and detects fluorescence indicative of organic molecules, that could withstand the pressure of the deep ocean. The only hitch: they had only 90 days to do it.

"It was a real challenge to put it together in such a short time and get it all right when so much could have gone wrong," says Conrad. "This was a whole other story of its own. It took a team of about 14 people at JPL

to make this happen."

Conrad, Lane and the newly minted instrument rendezvoused with Cameron, his film crew, other scientists and graduate students on a Russian oceanographic research ship in Mexico last fall. Their 40-kilogram (100-pound) instrument in its special titanium housing was fixed to the arm of Mir I, a deep sea submersible used for filming the movie "Titanic," and down it went along with three humans packed very tightly together.

"It could be uncomfortable sitting in a 2-meter diameter space for 14 hours at a time," says Conrad, "but visiting a hydrothermal vent was awesome." She and Lane made four dives over a month-long period and visited three different sites in the Pacific along the East Pacific Rise and in the Guaymas Basin in the Gulf of California.

"The instrument worked like a charm," says Conrad. "We got the science data we were looking for: we saw organic material on the surfaces of rocks. We could see where organic material was and where it wasn't. We saw it spewing out of hydrothermal vents, and we could see that the material got less and less as the submarine ascended to the surface." Lots of questions remain, Conrad explains. "Where did these organic materials come from? Did they come from inside the vent, from deep in the Earth, or were they being recycled from somewhere else?"

Being a scientist for "Aliens of the Deep" gave Conrad her first visit to an ocean vent but not her first movie experience. "I was a video producer for 18 years before I became a scientist," says Conrad. "Being a producer is a lot like leading a science project—you have to juggle many balls without dropping them and knit together lots of details to understand the results."

"'Aliens of the Deep' isn't exactly a documentary," explains Conrad, "It's

more about letting people share in some of the excitement of space and ocean exploration."

Meanwhile, Conrad continues her own explorations looking for the chemical signatures of life in seemingly inhospitable spots. She says she'd love to go back to the bottom of the ocean again.

"Life is everywhere and very tenacious," she says. "It is hard to find a place on Earth without life. The questions are about how extreme the environment can get before life is unable to survive."

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