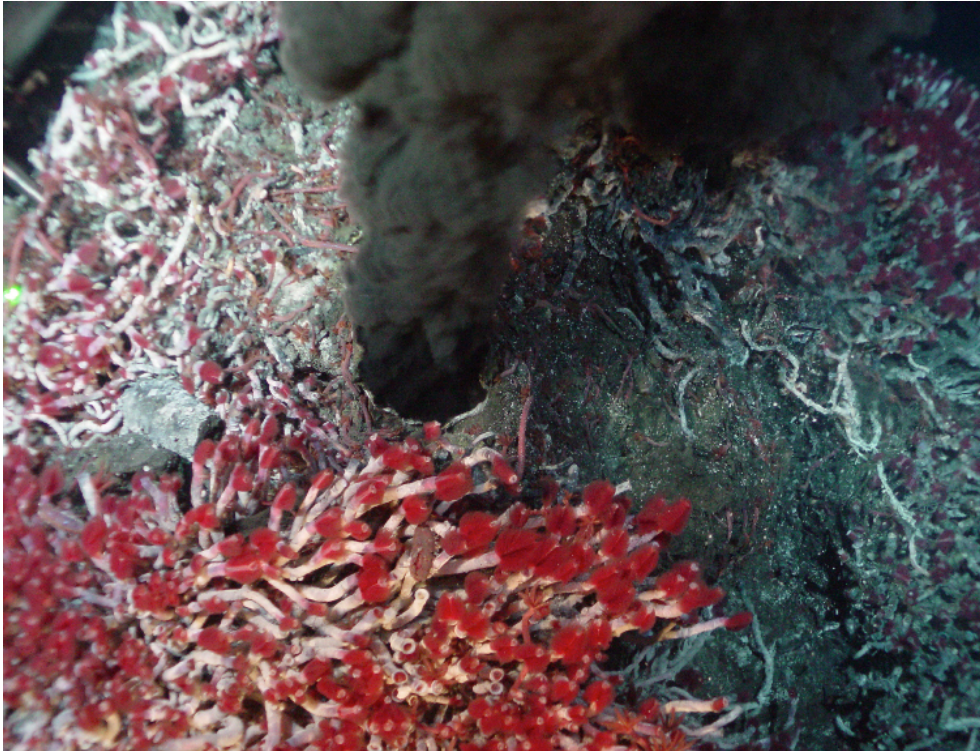


*Virtual Integrated Science for Interactive Ocean Networked Systems
(VISIONS05) Expedition*



360°C hot spring on the Endeavour hosting vibrant tubeworm communities (University of Washington)

In September 2005, University of Washington Professors of Oceanography John Delaney and Deborah Kelley will lead the VISIONS05 research expedition aboard the Research Vessel *Thomas G. Thompson* to the underwater volcanoes of the Juan de Fuca Ridge in the northeast Pacific Ocean. At this site on the seafloor, where two of the planet's great tectonic plates are spreading apart, animals live without sunlight at great depths and thrive on heat and chemicals venting from within the Earth.

What is thought to be the first-ever transmission of live, high-definition video from the seafloor to land is scheduled to take place on 28 and 29 September, weather permitting. This real-time video transmission, to be narrated by shipboard- and Seattle-based scientists, will enable viewers to virtually participate in a journey of scientific exploration and discovery. The high-definition images will bring the extreme life forms and geologic activity of the seafloor to viewers on land at a scale and quality never before experienced in real time.

This effort is an outgrowth of the convergence of many technologies that empowers scientists and educators to examine entirely new forms of planetary-to-microbial scale system dynamics in remote or dangerous environments. As an example of such capabilities, the VISIONS05 effort will allow multiple groups, including computer and ocean scientists, engineers, educators, students, and the general public to observe deep-sea volcano research taking place live with the highest visual fidelity currently possible using a satellite link. The intent is to begin changing the way that society views real, dynamic ocean systems and the way that scientific research is conducted in general.

The underwater HD video camera, manufactured by Insite Pacific, will be mounted on the arm of the Remotely Operated Vehicle *JASON*, an underwater robotic vehicle operated by the Woods Hole Oceanographic Institution. Weather permitting, from 2-3 pm PDT on September 28 and 29, live images will be transmitted by fiber-optic cable from *JASON* to the *Thompson*, then compressed and transmitted to the UWTV studios on the University of Washington campus in Seattle, via the Galaxy 10R satellite. Plans call for live broadcasts from the UWTV studios to the iGrid conference in San Diego, two sites in Australia, and sites in Chicago, Wisconsin, and Tokyo, as well as over the UW ResearchChannel and the web.

Scientific experts from the US and Canada will be on board the *Thompson* for the five-week multidisciplinary expedition, which departs September 1, 2005 from Seattle. High-school science teachers will be incorporated into this seagoing research effort as part of the National Science Foundation's Research and Education: Volcanoes, Exploration, Life (REVEL) program (<http://www.ocean.washington.edu/outreach/revel/>). The work will focus on the Endeavour hydrothermal fields, a suite of undersea hot springs located at the northern end of the Juan de Fuca Ridge. Endeavour is among the most geologically and biologically active sites in the global network of mid-ocean ridges. Current plans also include two real-time active web sites from sea, which will document the cruise and allow the public to asking shipboard participants questions about this program and sea-going research.

The high-definition video transmission will provide an early example of the capabilities of the NEPTUNE program, an ocean observatory effort building an extensive network of experimental sites connected and powered by 2,000 miles of fiber-optic/power cable on the Juan de Fuca tectonic plate. NEPTUNE technology represents the next-generation of ocean research and will provide 24/7 remote access to the extreme environments found on the seafloor (<http://www.neptune.washington.edu/>).

The NEPTUNE network will eventually enable entirely new approaches to studying and understanding the oceans: three-dimensional views of ocean and seafloor environments transmitted in real time to shore and over the Internet. NEPTUNE's capabilities will turn the oceans into the kind of laboratory that today exists only on land, overcoming many of the limitations of ship-based oceanography such as infrequent expeditions, battery-powered instruments, and low-bandwidth satellite transmission capability.

This next generation of ocean research, accessible via the Internet and featuring interactive remote control of instruments, underwater robots, and cameras, also offers entirely new opportunities in science education for schools, universities, science centers, aquaria, and museums.

Partners thus far in this effort are the National Science Foundation, the UW College of Ocean and Fishery Sciences and School of Oceanography, UWTV, the ResearchChannel, NOAA, NEPTUNE Canada, Scripps Institution of Oceanography at the University of California, San Diego, Woods Hole Oceanographic Institution and the Keck Foundation.