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An unblinking eye on the ocean

UVic leads Canada in creating the "Hubble Telescope of inner space"

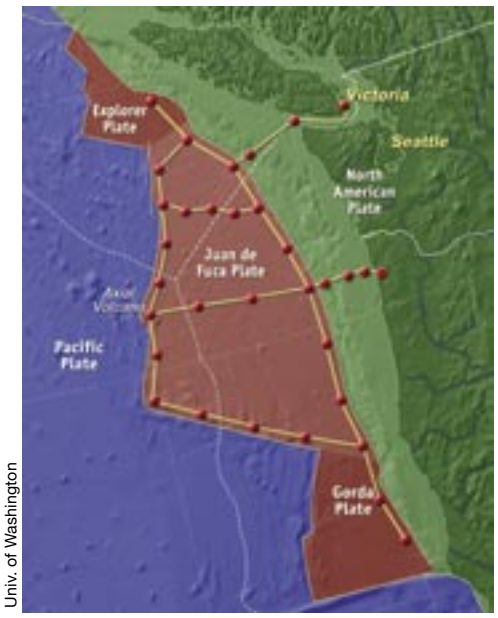
By Valerie Shore

The oceans. They feed us, shape our weather, carry our ships, and harbour in their depths many of the biological, chemical and geological processes that continue to mold this planet. Yet in many ways they're a mystery.

That will change in the coming years as the University of Victoria leads Canada in an ambitious international project that is expected to transform the way we study and understand the oceans.

UVic has been awarded $62.4 million—the largest research grant in its history—from the Canada Foundation for Innovation and the B.C. Knowledge Development Fund to construct the Canadian portion of what will be the world's largest cable-linked seafloor observatory.

The NEPTUNE—or North-East Pacific Time-series Undersea Networked Experiments—project will lay a 3,000-km network of powered fibre optic cable on the seabed over the Juan de Fuca tectonic plate, a 200,000-sq km region off the coasts of B.C., Washington and Oregon.



Univ. of Washington

The network will feature 30 or more seafloor "laboratories," or nodes, from which land-based scientists will control and monitor sampling instruments, video cameras and submersibles as they collect data from the ocean depths.

Information and images will flow instantly via the Internet to shore stations in Victoria and Nedonna Beach, Oregon. In this way, NEPTUNE will bring the Pacific Ocean online to labs, classrooms, science centres and living rooms around the world.

"This is a revolution in the ocean sciences," says UVic earth scientist Dr. Chris Barnes, project director for NEPTUNE Canada. "We can now more fully explore the last frontier on Earth—the deep sea."

Traditional methods of ocean exploration use ships, but NEPTUNE frees scientists from the limitations of ship schedules, bad weather and intermittent data. "Through the Internet, we'll get information and images live from the deep ocean, 24 hours a day, seven days a week, for the next 30 years or more," says Barnes.

NEPTUNE's unblinking eye will monitor changes over time in the water column, on the seafloor and under the seafloor. Scientists will also instruct instruments to respond to events such as storms, plankton blooms, volcanic eruptions and earthquakes.

Sensors in the water column will measure variables such as temperature, salinity, and turbidity and monitor the movements and behaviour of sea life ranging from plankton to salmon to whales.

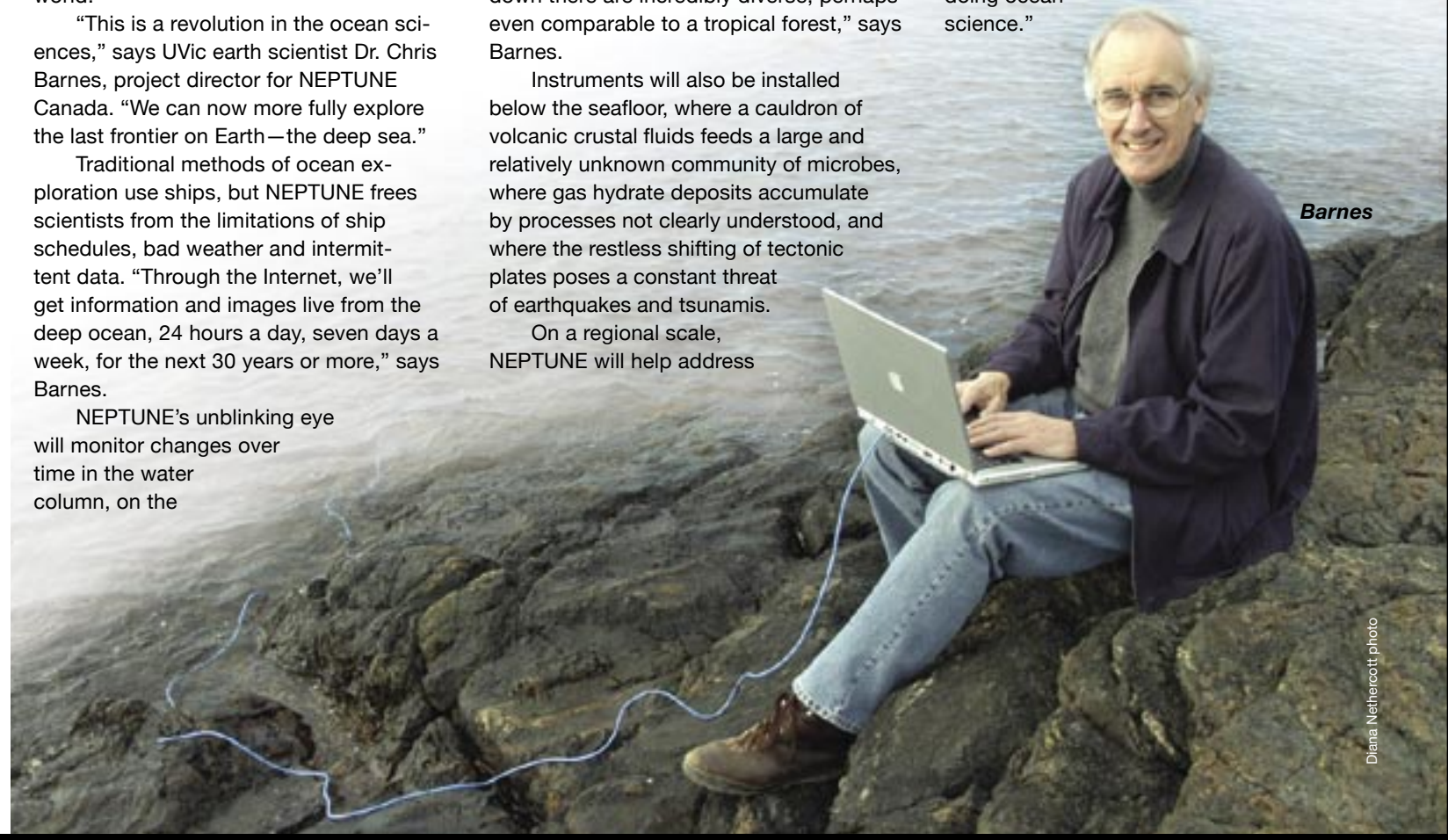
On the seafloor, instruments and robotic vehicles will examine biological communities and how they interact with the physical properties of the ocean. "We're just realizing that the ecosystems down there are incredibly diverse, perhaps even comparable to a tropical forest," says Barnes.

Instruments will also be installed below the seafloor, where a cauldron of volcanic crustal fluids feeds a large and relatively unknown community of microbes, where gas hydrate deposits accumulate by processes not clearly understood, and where the restless shifting of tectonic plates poses a constant threat of earthquakes and tsunamis.

On a regional scale, NEPTUNE will help address many global issues—such as fish conservation, climate change and earthquake preparedness—but its potential goes far beyond that, stresses Barnes.

"Let's not lose sight of the bigger picture," he says. "Before we can do anything about salmon or pollution or predicting earthquakes, we need to fundamentally understand the ocean environment—all of the physical, chemical, biological and geological processes and how they interact.

"NEPTUNE is the first large-scale, long-term step in that direction," says Barnes. "It's a completely different way of doing ocean science."



Barnes

Diana Nethercott photo

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- NEPTUNE is expected to begin operation in 2007. It will then be available to the international research community to conduct oceanographic experiments.
- The other major NEPTUNE partners are the University of Washington, Woods Hole Oceanographic Institution, NASA's Jet Propulsion Laboratory, and the Monterey Bay Aquarium Research Institute.
- UVic is leading a NEPTUNE consortium of 12 universities across the country. Also involved are five federal agencies, the Vancouver Aquarium Marine Science Centre and the Bamfield Marine Science Centre.
- Through NEPTUNE, the Canadian marine technology industry—especially in B.C.—will develop new products, services and expertise that can be exported to future ocean observatories.

To learn more about NEPTUNE visit: www.neptunecanada.ca