UVic KNOWLEDGE
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Listening to the ocean floor

by Dana Codding & Leah Pence

During the Cold War, oceans were monitored for the sounds of hostile submarine activity. Now, UVic scientists are listening in — but for purely peaceful reasons.

At UVic's ocean acoustics group, Drs. Ross Chapman and Stan Dosso are using ocean sounds to map the ocean floor, assess ocean bottom habitats, investigate subsea energy resources and predict earthquakes and ice movement.

The tools of ocean acoustics have become so sophisticated that researchers can tell, just using sound waves, whether the bottom is covered in rocks, mud, or logs; whether it will support cod or halibut fisheries; or whether it can withstand the weight of a deep-sea drilling platform.

Ocean acoustics researchers use hydrophones, or underwater microphones, to gather sound data. A small compressed airgun is used to set off an explosion near the surface, and the hydrophones record the sound waves after they bounce off the seafloor. Computer software analyzes the sound waves to produce a picture of the bottom.

These sounds can tell researchers about earthquakes and sub-sea pockets of energy resources, and help them refine navigation techniques for submarines and ships.

Chapman has developed new techniques to interpret sound signals reflected from the sea bottom and is applying them to study gas hydrate deposits off Vancouver Island. These deposits contain huge reserves of methane — a potential energy source and a possible environmental threat if released in large amounts.

Dosso's particular research interest is the Arctic. He's part of an international group of scientists who set up and maintain an array of hydrophones in the Arctic sea about 100 km from the North Pole. They monitor these hydrophones year-round, creating a record of the ambient noise of the Arctic sea.

"The ambient noise tells us about earthquakes, ice movement, and the temperature of the oceans," says Dosso. "Before the array was in place, we had no way of getting under the thick Arctic ice to study the seafloor."

The UVic group was established in 1995, after the Department of National Defence (DND), which had supported ocean acoustics facilities on both coasts, decided to move all their research to Halifax.

Subsequently, the ocean acoustics group was established at UVic, with funding from the Natural Sciences and Engineering Research Council of Canada (NSERC) and DND. "It would have been a shame to lose the research opportunity here on the West Coast, as we have a unique underwater environment," Chapman says.

The group is now supporting itself through industry and government grants and contracts. This summer the group was awarded a $240,000 grant from the Canadian Foundation for Innovation (CFI) to combine faculty expertise with technology from Sidney-based Quester Tangent Corp. to establish a marine acoustic remote sensing facility at UVic. This is the second grant the group has received from CFI.

Chapman and Dosso have also established a graduate-level academic program in ocean acoustics. The well-received program has graduated 12 masters and PhD students and currently employs two post-doctoral fellows.

"The last five years have been really productive for the Ocean Acoustics Group," Chapman says. "We've brought a lot of recognition to UVic, as well as doing really useful and interesting research."

Dosso (right) and technician Jim Perkins prepare to deploy an ocean bottom seismometer to measure vibrations 500 metres beneath the Arctic sea ice.

EDGE/WISE Casting nets of sound

There is good reason why blue whales communicate using sound instead of light. Sound is the ideal medium for sending messages through water.

"With sound we can transmit from here [Vancouver Island] to Hawaii," says Dr. Ross Chapman, chair of UVic's Ocean Acoustics Group. Whereas with light, even when using high-tech underwater devices, researchers can see only about 10-12 metres at a depth of 1,300 metres.

Light scatters in water, making it nearly useless as a transmitter of information. Think of the pictures of the wreck of the *Titanic,* where huge spotlights only penetrate a few metres into the darkness. It would take a lifetime to scan the ocean bottom with submarines and spotlights.

With sound waves, which are focused and easily transmitted by water, ocean acoustics scientists can map and model hundreds of square kilometres of ocean bottom in just a few days. And the work is done from the ocean surface, without submarines or expensive diving equipment.

SHARPEN YOUR KNOWLEDGE

UVic's Ocean Acoustics Group at the School of Earth and Ocean Science maintains a Web site with information on their latest projects. **http://ceor.seos.uvic. ca/~acoustic/**

For more information on the field of ocean acoustics see the website of the Institute of Ocean Sciences, Acoustical Oceanography Research Group, located in Sidney on Vancouver Island. **http://pulson.seos.uvic.ca**

Details about Chapman's work on the Haro Strait Tidal Front Mapping Expedition with scientists from the Massachusetts Institute of Technology and the Woods Hole Oceanographic Institution can be found at **http://auvserv.mit.edu/hs_map_exp.html**

ON THE EDGE OF YOUR SEAT

The Gersher Project
An inter-generational Holocaust exhibit of mixed-media paintings
through Jan. 12, 2001
Maltwood Art Museum & Gallery
Info: 721-8298

UVic Chamber Singers Christmas Concert
Susan Young, conductor
Dec. 1, 12:30 p.m. Philip T. Young Recital Hall
($5)
Info: 721-8559

For further information, visit the online events calendar at **www.uvic.ca/events**

SPARK

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Chapman (left) and Dosso