



# Spying on the health of BC's forests

by Leah Pence

Every 16 days, UVic geography professor Olaf Niemann has reason to get excited about his research. That's how often a satellite passes over the West Coast and, if skies are clear, takes an image.

Niemann is one of 11 Canadian scientists participating in a multi-disciplinary, cross-Canada remote sensing project led by Dr. Dave Goodenough, chief research scientist with the Pacific Forestry Centre of the Canadian Forest Service. The project's goal is to test new NASA equipment in a variety of research settings.

While the earth observation satellite EO-1, equipped with the latest in hyperspectral remote sensors, scans the forests from above, scientists are collecting corresponding forestry data on the ground.

"The satellite is relatively small in terms of data capability, but it's what we call a proof of concept," says Niemann. "If it works, then it will likely be upscaled into a much larger instrument that will run on a production basis."

The project, one of few funded by NASA outside the U.S., is yielding a staggering amount of atmospheric and biophysical data for use by participating researchers.

Niemann is using the satellite data to map ecophysiological aspects of the forest canopy in the Sooke watershed and Clayoquot Sound. The images reveal much about the forest canopy, including nutrient levels and moisture stress, which can indicate the onset of an insect infestation.

The images captured by the satellite can look more like abstract art than typical

overhead photographs. But to a trained observer, the blotches of colour translate into a variety of ecophysiological effects.

For example, they can signal moisture stress in the canopy — a clue that mountain pine beetles may be present. The beetles burrow into a tree, lay their eggs, and infect the tree with a fungus that essentially cuts off the water supply to the tree's crown, killing it. The challenge for researchers is to detect when the water and nutrient supply to the foliage is in the early stages of being cut off.

"The other satellites up there now don't have the spectral resolution to detect moisture differences," says Niemann. "The information they collect is too broadly based."

But the new NASA satellite offers hope. "This new generation of imagers will give us much finer spectral detail so that we can detect those signals," says Niemann. "Then we can determine which trees have been affected recently and foresters can apply whatever measures necessary and try to kill off the beetles before they spread."



Niemann and a satellite image of the Sooke Reservoir

Diana Nethercott photo

## facts from the **EDGE**

- Remote sensing involves gathering information about an object without coming into direct physical contact with it. Though it mainly refers to images taken by aircraft and satellites, one of the earliest remote sensing projects involved pigeons with small cameras.
- It costs \$1,000 to obtain a satellite image that covers 180 by 180 kilometers. To put a team in the field to collect the same data, there are costs for salaries, travel, logistics (i.e. helicopter rental), and the data gathering process takes two to three weeks. "And with remote sensing you get complete coverage, whereas if you're in the field you go only to a set of points," says Niemann.
- The biggest advances in remote sensing are being made in military projects. The scientific applications of remote sensing come later. "It has a trickle down effect," says Niemann. "The military gets the big bucks, they do most of the development, and after a few years, when the technology improves, they'll declassify the older, and in their view, obsolete technology. That's what we get to work with."

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- To learn more about Niemann's research program, visit his personal website at: <http://office.geog.uvic.ca/dept/faculty/niemann/>
- The NASA homepage ([www.nasa.gov](http://www.nasa.gov)) is a gigantic site with information on everything from the space shuttle to NASA kids activities. For more specific information on Earth Observing-1 visit <http://eo1.gsfc.nasa.gov/>
- The Canadian Forest Service is the largest forest science organization in Canada. Visit its homepage at [www.nrcan.gc.ca/cfs-scf/index\\_e.html](http://www.nrcan.gc.ca/cfs-scf/index_e.html)
- Want to know what Canada looks like from space? Visit the Canada Centre for Remote Sensing website at [www.ccrs.nrcan.gc.ca](http://www.ccrs.nrcan.gc.ca)

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