New program to expand, enhance use of LIDAR sensing technology

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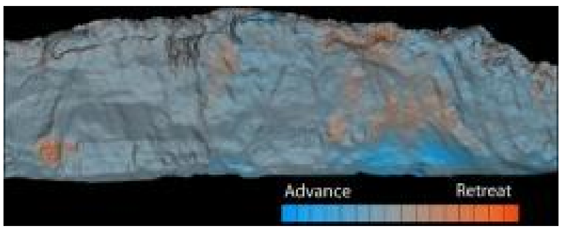

LIDAR images such as this can be used in the study of coastal beach cliffs, showing where land is advancing or retreating. (Image courtesy of Oregon State University)

Researchers at Oregon State University have developed a new system that will enable highway construction engineers in the field to immediately analyze soil movements caused by active landslides and erosion and use the powerful tool of LIDAR to better assess and deal with them.

The advance, being outlined this week at the annual meeting of the Geological Society of America, is just one of the latest innovations with this laser technology, the use of which has mushroomed in recent years in the study of everything from earthquakes and tsunamis to beach erosion and road construction.

The new computer program announced by OSU engineers is already being used to study soil movements at several landslides or trouble spots on the Oregon coast, and has promise to improve the use of LIDAR in the field, quickly and efficiently, by trained engineers.

The program was developed by Michael Olsen, a LIDAR expert and assistant professor of civil and construction engineering at OSU, and a team of several students including Shawn Butcher, Alfred Flammang, Rebecca Pankow, and Andrew Johnson. The work was supported by the Oregon Transportation and Research Education and Consortium, and the Oregon Department of Transportation Research Division.

"When you're in the field dealing with a landslide or moving soils, it's costly and time-consuming to have to take data back to the office for analysis," Olsen said. "The technology we're developing should provide critical data to help solve problems right in the field, improve construction quality and efficiency, and ultimately reduce costs and improve safety."

LIDAR – which stands for "light detecting and ranging" – is being used in both aerial and terrestrial scanning, offering laser images and measurements that can seemingly strip away vegetation and structures, "see" changes in landforms as they happen, and create a permanent record of how land looked at a particular moment in time – including right after a natural disaster.

"Some of the most innovative work we're doing right now is with earthquake and tsunami reconnaissance," Olsen said.

"We were able to go into places like American Samoa, Chile and Japan after the recent tsunamis, for instance, and record data that would quickly be lost from repair and reconstruction efforts," he said. "This virtual snapshot in time will help us better understand these forces and learn how to prepare for them, perhaps with stronger building codes for critical structures such as schools or hospitals."

At the national meetings, Olsen outlined work in several areas that are rapidly expanding the use of LIDAR:

- Erosion and collapse of unstable sea cliffs on the West Coast threatens existing development and public safety, and LIDAR can help identify the causes, processes involved and areas of greatest risk.
- LIDAR is now being used by researchers at the University of California-San Diego to study disappearing beach sand supplies, which in Southern California is costing hundreds of millions of dollars a year for artificial beach replenishment.
- LIDAR has become a primary tool to identify unknown or little-studied earthquake faults, including one recently discovered on Oregon's Mount Hood by geologists at the Oregon Department of Geology and Mineral Industries.
- This technology is helping scientists better understand forces such as liquefaction, lateral spreading, erosion and other forms of ground failure following major earthquakes.

In Oregon, OSU and state agency experts are combining the use of LIDAR and other analytic tools to identify work that needs to be done in "lifeline corridors" – the key roads between coastal areas and the Willamette Valley that will be disrupted by an expected subduction zone earthquake.

The actual cost of LIDAR technology is coming down as its uses expand, Olsen said. But significant work still needs to be done to improve software to meet the demands of these emerging applications, and allow them to be used by trained professionals, not just expert scientists. Much of the OSU research is directed toward that goal.

Provided by Oregon State University