New technology may speed up, build awareness of landslide risks

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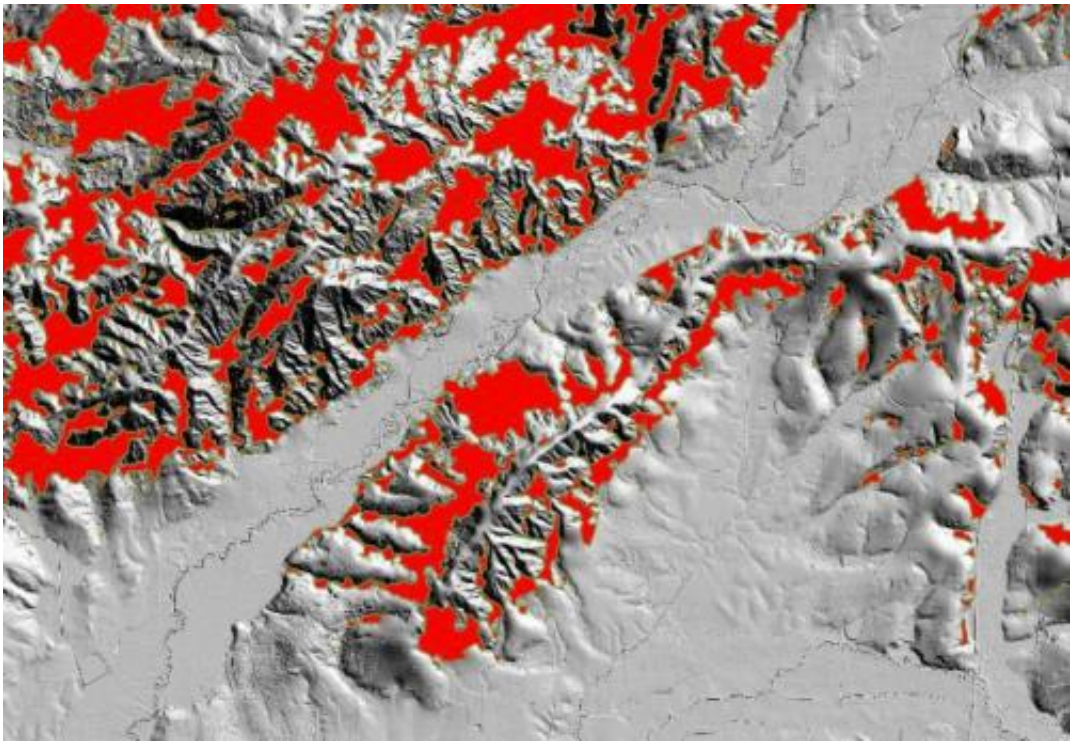

Multiple landslides are seen covering the landscape of this part of the Pacific Northwest. Credit: Oregon State University

Engineers have created a new way to use lidar technology to identify and classify landslides on a landscape scale, which may revolutionize the understanding of landslides in the U.S. and reveal them to be far more common and hazardous than often understood.

The new, non-subjective technology, created by researchers at Oregon State University and George Mason University, can analyze and classify the landslide risk in an area of 50 or more square miles in about 30 minutes - a task that previously might have taken an expert several weeks to months. It can also identify risks common to a broad area rather than just an individual site.

And with such speed and precision, it reveals that some landslide-prone areas of the Pacific Northwest are literally covered by landslides from one time or another in history. The system is based on new ways to use light detecting and ranging, or lidar technology, that can seemingly strip away vegetation and other obstructions to show land features in their bare form.

"With lidar we can see areas that are 50-80 percent covered by landslide deposits," said Michael Olsen, an expert in geomatics and the Eric HI and Janice Hoffman Faculty Scholar in the OSU College of Engineering. "It may turn out that there are 10-100 times more landslides in some places than we knew of before.

"We've always known landslides were a problem in the Pacific Northwest," Olsen said. "Many people are just now beginning to realize how big the problem is."

An outline of the new technology was recently published in *Computers and Geosciences*, a professional journal.

This massive landslide near Oso, Wash., in March, 2014, killed 43 people and was one of the most deadly in US history. Credit: Johathan Godt, U.S. Geological Survey

Oregon and Washington, especially in the Coast Range and Cascade Range, are already areas commonly known to have landslides, and as a result Oregon's Department of Geology and Mineral Industries has become a national leader in mapping of them, Olsen said. But previous approaches are slow, and the new technology, called a Contour Connection Method, could radically speed up widespread mapping, and build both professional and public awareness of the issue.

Despite the prevalence and frequency of landslides, they are not generally covered by most homeowner insurance policies; coverage can be purchased separately, but most people don't. And with increasing population growth, more and more people are moving into more remote locations, or building in scenic areas near the hills around cities where

landslide risk might be high.

"A lot of people don't think in geologic terms, so if they see a hill that's been there for a long time, they assume there's no risk," said Ben Leshchinsky, a geotechnical engineer in the OSU College of Forestry. "And many times they don't want to pay extra to have an expert assess landslide risks or do something that might interfere with their land development plans."

Lidar is already a powerful tool, but the new system developed at OSU offers an automated way to improve the use of it, and could usher in a new era of landslide awareness, experts say. Information could be more routinely factored into road, bridge, land use, zoning, building and other decisions.

With this technology, a computer automatically looks for land features, such as suddenly steeper areas of soil, that might be evidence of a past landslide. It then searches the terrain for other features, such as a "toe" of soils at the base of the landslide. And in minutes it can make unbiased, science-based classifications of past landslides that consistently use the same criteria.

The technology was applied to the region surrounding the landslide of March, 2014, that killed 43 people near the small town of Oso, Washington. In about nine minutes it was able to analyze more than 2,200 acres and many prehistoric landslide features that are readily apparent in lidar images, in this region known for slope instability.

Eventually, adaptations of the technology might even allow for real-time monitoring of soil movement, the researchers said.

Provided by Oregon State University