University of Oklahoma researchers working to advance predictability research initiatives

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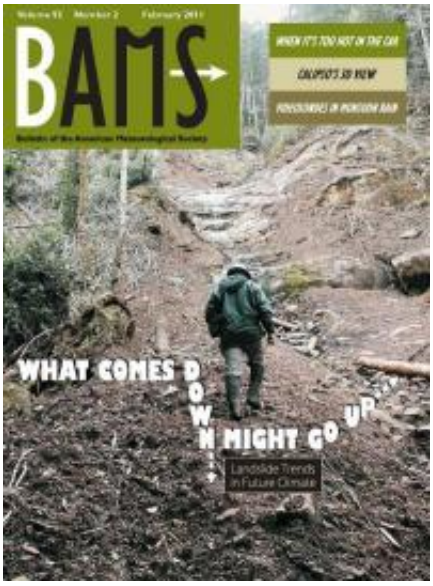

Lance Leslie, University of Oklahoma School of Meteorology professor, examined how an advanced numerical modeling system could project rain-triggered landslides in a future warming climate. His article "Predicting Storm-triggered Landslides," a collaborative effort with researchers from the University of Texas at Austin, was featured on the cover of the February 2011 issue of the *Bulletin of the American Meteorological Society*. Credit: Bulletin of the American Meteorological Society

Faculty from the University of Oklahoma School of Meteorology are leading the school's predictability research initiatives with multiple projects that could one day lead to more accurate forecasts of weather-

related events, including landslides and tornadoes.

In the Southern Plains region of the United States, people think of thunderstorms and tornadoes when severe weather is forecasted. However, the OU School of Meteorology is interested in a broad range of weather phenomena and its impacts.

As an example of the breadth of OU's program, one of the researchers, Lance Leslie, OU School of Meteorology professor, examined how an advanced numerical modeling system could project rain-triggered landslides in a future warming climate. His article "Predicting Storm-triggered Landslides," a collaborative effort with researchers from the University of Texas at Austin, was featured on the cover of the February 2011 issue of the Bulletin of the American Meteorological Society.

For this study, the researchers made projections of landslide occurrence in the upcoming 10 years over a region of Southern California. A process-based modeling system, SEGMENT (Scalable and Extensible Geofluid Model of the Environment), was used for Leslie's landslide research.

"SEGMENT is a tool that allows not only for the investigation of the triggering factors in landslides, but also for other geofluid flows such as glacier and ice-sheet melting and their impact on global fresh water supplies and on sea level rises," said Leslie.

Modeling systems is not new to Leslie and his fellow professors at OU. Theodore Trafalis, OU School of Industrial Engineering professor, and Michael Richman, OU School of Meteorology professor, won first place for the only two awards given at the Artificial Neural Networks in Engineering conference in late 2010.

Trafalis and Richman's paper, "Machine Learning Methods for Data

Assimilation," was co-authored with Leslie and OU graduate student Robin Gilbert. It received the Theoretical Development in Computational Intelligence award for its examination of novel approaches to data assimilation schemes. The Novel Smart Engineering System Design award also went to Trafalis and Richman, along with research scientist Indra Adrianto, for the paper, "Machine Learning Techniques for Imbalanced Data: An Application for Tornado Data," which examined alteration of methodologies for rare event forecasts of severe weather.

"Sweeping the ANNIE awards in both the theoretical and application categories is an unprecedented accomplishment, demonstrating the importance of cutting-edge, interdisciplinary research efforts at OU," said Richman.

Severe weather and tornado research has progressed over the past decades, but the area of predictability, which means the degree to which an event can be forecasted in time and space, remains a key area of uncertainty. This group of OU researchers is adding to the university's predictability initiative in a number of areas ranging from weather to climate scales. The research will allow them to discriminate, for example, the physical differences between severe and non-severe weather outbreaks, including tornado outbreaks.

Leslie was co-author of a recent paper, "Synoptic Composites of Tornadic and Nontornadic Outbreaks," with Richman, Charles Doswell III, OU School of Meteorology adjunct professor, and Andrew Mercer and Chad Shafer, both current assistant professors, but OU students at the time of the research. The paper appeared in Science News.

"There is a clear value to society associated with understanding the physical processes that determine the character of severe thunderstorm and tornado outbreaks," said Doswell. "We believe we have a chance to

push forward the state of the science associated with severe weather outbreaks."

The researchers, with their multiple predictability initiatives, want to advance this key research area and improve forecasting for weather-related events.

Provided by University of Oklahoma

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