RESILIENCE FOR COMMUNITIES AFFECTED BY LANDSLIDES AND OTHER NATURAL DISASTERS

Landslides are a serious global, geologic hazard. It is estimated that in the U.S., landslides cause more than $1 billion in damages and 25-50 deaths each year. As part of the U.S. Department of Homeland Security (DHS) Science and Technology Directorate's (S&T) Community and Infrastructure Resilience (C&IR) program, the Remote Sensing for Geohazard Resilience project will identify actively deforming hillslopes, based on past deformation trends, and develop novel methods to predict hillslope deformations for short-term forecasts. The C&IR team (including S&T staff and partners) will create a comprehensive landslide event inventory (based on high-resolution satellite images, aerial photos, and field surveys), as well as exploit Interferometric Synthetic Aperture Radar (InSAR) technology, to monitor hillslope deformations prone to landslides over the entirety of any earthquake-affected area.

It is a specific objective of the Massachusetts Institute of Technology (MIT) Lincoln Laboratory (LL) to identify domestic, earthquake-affected environments where these capabilities may be applied. Some landslide prone regions, critical sites, and infrastructure will be further examined and monitored through comprehensive field investigations, supported by geophysical/geotechnical instruments and/or other remote sensing surveys.

SUPPORTING THE SHAKEN PROGRAM

This work will be completed in concert with the multi-lateral and multi-national NATO Science for Peace and Security program entitled *Post-earthquake Monitoring of Seismically-induced Chains of Landslide Hazards (SHAKEN) for Protection of Critical Sites and Infrastructure*, and will partner the MIT LL with Istanbul Technical University, Middle East Technical University, University of Twente, and Abdul Wali Khan University. Findings from their research will deliver risk or close-to-risk estimates, which will be useful for planning adequate mitigation actions. The goal is to raise awareness in local communities, enabling local administrators and emergency management agencies to take appropriate risk-mitigation actions to prevent loss of life and property. The project will produce technical guidelines for post-event monitoring of critical sites and infrastructure, which will be utilized in hazard and safety assessment for future community planning and infrastructure rebuilding.

Landslide at Howard Gap Road, Hendersonville, NC. Photo: Jessica DeWitt, U.S. Geological Survey.

THE IMPACT OF LANDSLIDE MODELING

- This research will enable early warning for expected high deformations that could cause catastrophic rapid failures

- This project will provide information on documented risk or close-to-risk estimates and their capabilities for future application in domestic resilience use cases

UPCOMING MILESTONES

- Develop training materials for stakeholders involved in earthquake response and recovery efforts

- Develop predictive model, targeting InSAR-derived surface deformation rates

- Establish active scientific collaboration and exchange of information

PARTNERS/PERFORMERS

Performers:
- U.S. Air Force, Arlington, VA

- MITLL, Lexington, MA

Partners:
- Istanbul Technical University, Istanbul, Turkey

- Middle East Technical University, Ankara, Turkey

- University of Twente, Enschede, Netherlands

- Abdul Wali Khan University, Khyber-Pakhtunkhwa, Pakistan