

# Slope **ALARMS**

**LISTENING FOR LANDSLIDES**

- An acoustic slope monitoring system
- Low cost solutions
- CE marked sensors
- High sensitivity
- Award winning
- Robust

- Provides information on slope displacement rates continuously and in real-time
- Proven performance at multiple sites in UK and overseas
- In operation for more than 5 years in a variety of environments



Loughborough  
University

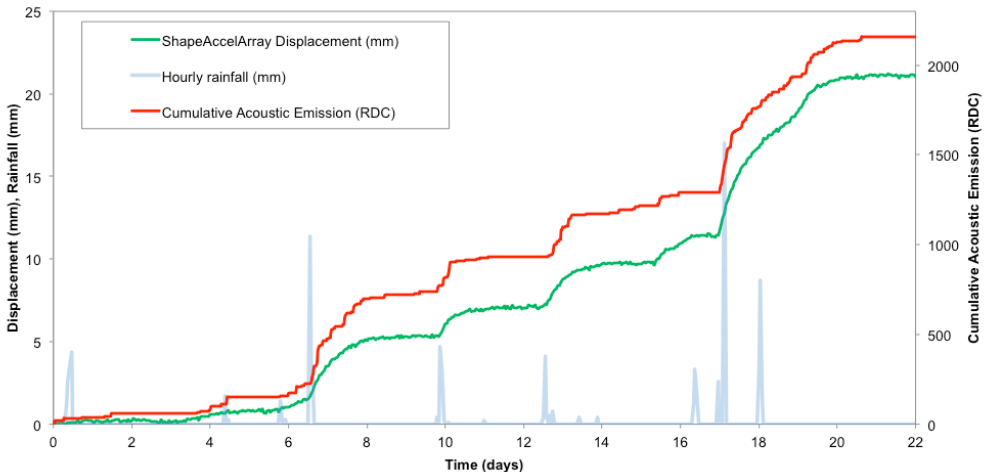
## Technical details

The sensor architecture protected by a UK patent (GB 2467419) is sensitive to small displacements and very slow displacement rates with continued operation at large displacements. Low cost materials are installed in the borehole and the overall cost is lower than current sub-surface deformation monitoring instrumentation such as in-place inclinometers. Sensor elements are located at ground level for ease of maintenance and reuse. The technology comprises a simple waveguide design, with one sensor able to inform timing of site inspections and trigger manual reading of inclinometer casings.

## Case Study: Hollin Hill, North Yorkshire

Hollin Hill is a complex of landslides in North Yorkshire. The landslides occupy a hillside used for grazing sheep and the farmer has allowed the site to be instrumented to study the landslides. Active waveguides with Slope ALARMS sensors, inclinometer casings and ShapeAccelArrays (SAAs) have been installed through lobes of landslide material that move most winters. These instruments have been read since early 2010.

SAAs installed at Hollin Hill have allowed the comparison of continuous AE with continuous subsurface deformation measurements. A series of slope movements occurred in response to periods of rainfall in January 2014 (Figure below). These comparisons confirm that: AE rates generated by the system are directly proportional to the rate of deformation; AE monitoring of active waveguides can provide continuous information on slope displacements and displacement rates; and the technique is sensitive to small displacements and rates.



## Instrumentation service

Site specific solutions, installation and support are available in association with Centre for Smart Infrastructure and Construction (CSIC), University of Cambridge

## Find out more

Interested in learning about this technology and opportunities for being involved in its commercialisation?

## Contact

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