US Army Corps of Engineers®

Flood&Coastal Storm Damage Reduction R&D Program

Early Warning Subsurface Seepage Detection of Levees

Description

Surface seepage has been observed at repeated intervals along a reach of levee adjacent to Eagle Lake, Mississippi referred to as Buck Chute. The surface seepage, usually expressed in the form of sand boils at Buck Chute, has been observed on the landside of the Mississippi River levee during periods of high water. Because of its seepage history, Buck Chute has been selected as a test site to assess geophysical methods as a means to monitor seepage beneath the levee. To detect seepage events at the Buck Chute site, four arrays of instruments have been installed. These include, soil temperatures probes, water content reflectometers, soil water content profile probes, and a unique automated electrical resistivity array developed specifically for this research site. Each set of instruments can be used to detect the presence of water. A sudden change in soil temperatures from the normal background temperatures would indicate water infiltration. Water content reflectometers and soil water content profile probes would respond with increase in water volumetric content. An electrical resistivity array would respond with a change in soil conductivity with the presence of water. Data are collected daily from Buck Chute via a cell phone RF network. The data can then be viewed on the U.S. Army Corps of Engineers Integrated Levee Monitoring Web site. Levee managers and emergency response personnel would have the ability to use the Integrated Levee Monitoring Utility as a tool to remotely monitor current conditions of the Buck Chute levee. In the event that water was detected by the instruments, personnel could visit the remote site and make essential emergency management decisions. This research will ultimately provide a tool kit of instruments and Web-based interfaces for managers and emergency response personnel to monitor subsurface leakage areas of a levee.

Benefits

Real-time access to conditions of a suspected weakened levee from subsurface leakage would give levee managers ample time to activate emergency response plans.

Status

Electrical resistivity, meteorological, soil temperature, and moisture measurements are being collected and transmitted hourly to the Integrated Levee Monitoring Utility. Future enhancements include monitoring time-domain reflectometer data and expanding the number of electrical resistivity arrays to allow for three-dimensional mapping or subsurface flow.

Distribution Source(s)	Information about the study can be obtained by contacting Jose L. Llopis, Christopher Williams or David Finnegan at the U.S. Army Engineer Research and Development Center.
Available Documentation	No documentation is currently available.
Available Training	No training is currently available.
Available Support	No support is currently available.
Application	Buck Chute levee, Eagle Lake, Mississippi
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Partners	N/A