Atom Wireless Seismograph

DAM SAFETY GROUP©

CASE STUDY

The recently released Atom Wireless Seismograph is making a name for itself as a reliable tool in the geotechnical industry, where it can be used in ways that traditional seismographs cannot.

Traditional seismographs require spread cables that constrain the nodal spacing and line geometry to that of the cable. This one-size-fits-all solution may not meet the needs of those investigating earthen dams or levees due to their size, location, or depth of the investigation. Cable-free nodal systems have been used in the oil and gas industry for years, but these systems are often composed of hundreds to thousands of nodes and are well outside the reach of most geotechnical investigators. The single component Atom 1-C and the 3-component 3-C are designed for the geotechnical industry and give investigators a reliable and high-quality option to simplify their search.

Image showing data collection during a passive seismic survey in the Sacramento Delta.

Finding non-destructive methods to evaluate the integrity of earthen dams and levees is becoming more important as our infrastructure ages and sea levels rise. In recent years researchers have been using the Atom wireless seismograph in these investigations because it is lightweight, easy to use, doesn't require heavy cables and is reliable. Better yet, the Atom can be placed at irregular intervals or in non-linear arrays. Each Atom has a built-in GPS. Once it has GPS lock, tape measures or additional location surveying are not required.

To evaluate its usefulness as a non-invasive tool for levee inspection, researchers have used the Atom to assess the subsurface conditions of several dam and levee sites. One group performed this work in New Orleans at four locations where water breeched the levees during the 2005 hurricane Katrina. The team used Atom units to collect passive waves with both irregular spacing. and non-linear lines. The team also crossed several roads and driveways, which would have made a traditional, cabled survey difficult to impossible.

The work centered on identifying zones beneath the levees or canal walls having lower shear-wave velocities, corresponding with the saturated, unconsolidated sands and low rigidity clays observed during previous drilling efforts. Soils of this type are more likely to fail during a heavy storm event or, in seismically active areas, during an earthquake (Hayashi et al., 2018).

Craig et al., (2021) investigated multiple levees along the Delta in the San Joaquin and Sacramento valleys in central California. Like the work performed in New Orleans, they used the Atom to collect passive shear wave data in locations of interest along both the crown and toe of the levees. They identified areas of low shear wave velocity – correlated to weak or soft soil – in all three of the tested locations. Subsequent geotechnical borings indicated the presence of organic peat layers in these zones.

GEOMETRICS
Simplify your search

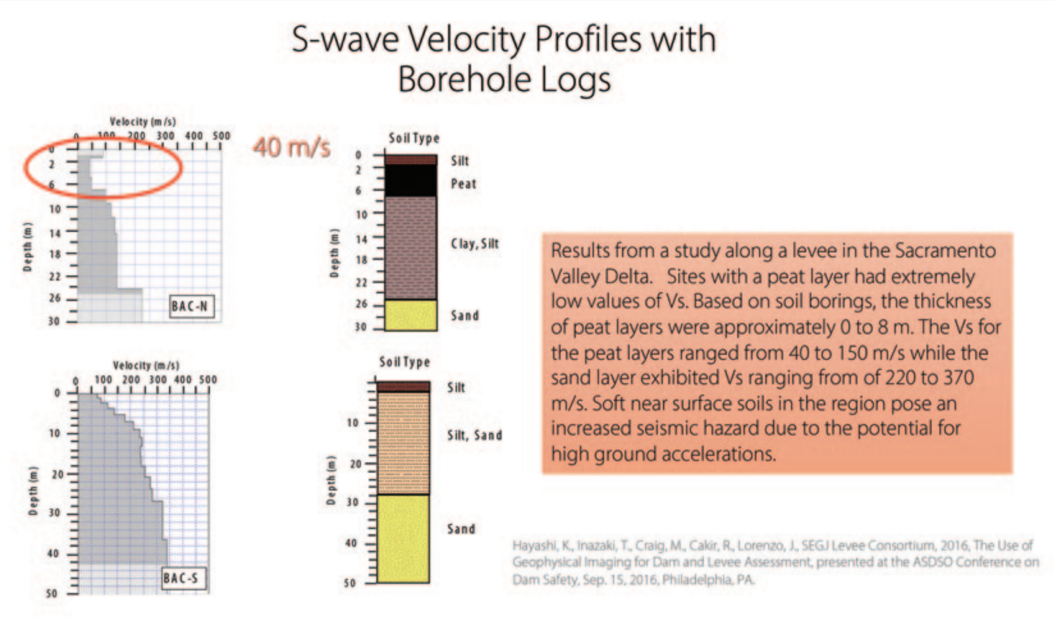
Atom Wireless Seismograph

CASE STUDY

Passive seismic methods are showing great promise as one way investigate earthen dams and levees. The method is non-destructive, can be performed quickly and at a low cost, and when using the Atom, surveys can be specially tailored to each site.

The Atom seismograph is a complete solution, composed of individual acquisition units with 24-bit A/D conversion, GPS-controlled timing, 4 GB of internal data storage and an adjustable sample rate. Each acquisition unit weighs approximately 3.5 pounds and has a battery life of up to 70 hours between charges. The standard 4 GB memory can record for 560 hours. For extended recording, the internal memory is upgradable to 32GB. It is the ideal tool for evaluating subsurface conditions.

Contact us if you would like to learn more about the Atom seismograph or about using geophysics in dam and levee evaluation.



S-wave-profile

References:

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