Rapid Detection of Subsurface Voids with Ground Penetrating Radar (GPR)

Reveal the layout of subsurface defects in full resolution

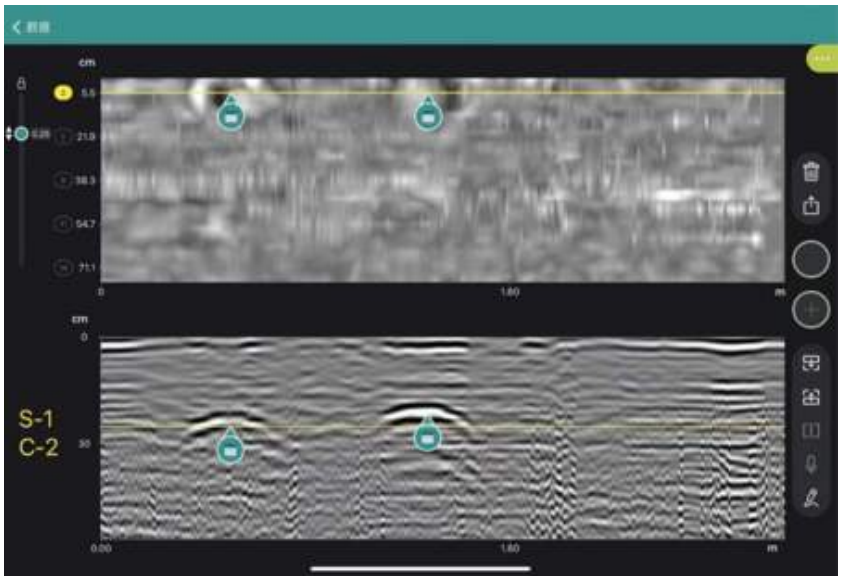
In the field of water conservancy and hydropower projects, accurately detecting the location, structure, and distribution of underground defects caused by termite nests or other natural phenomena is critical to ensuring the stable development of related industries. Traditional detection methods often suffer from insufficient accuracy and the inability to clearly visualize voids or cavities in detail. However, the GS9000 multichannel array step-frequency continuous wave ground-penetrating radar (GPR), developed by Proceq, offers an ideal solution to this challenge, thanks to its exceptional full-resolution imaging capabilities.

GS9000 Full-Resolution Imaging Technology Principle

Compared to other 3D GPRs, the GS9000 adopts a high-density channel array design, breaking through the limitations of traditional single/dual-channel systems. By utilizing a densely arranged antenna layout, it enables simultaneous detection at multiple angles and depths, yielding underground data with significantly higher dimensionality and completeness than comparable products, thereby providing robust data support for precise imaging.

Full-Resolution Imaging Feature Presentation

When using the GS9000 to detect subsurface voids and defects, its full-resolution imaging functionality clearly reveals the unique characteristics below ground.



Radar 3D image slice view of a termite nest (Upper Half) and
radar line scan markers (Lower Half)

In the online scan view, voids caused by a termite nest for example, exhibit an abnormal parabolic shape. The shape, size, and direction of the parabola accurately reflect the extension direction and scope of the nest in the underground space.

Application Value in Water Conservancy and Hydropower Projects

Void detection in water conservancy and hydropower projects

In the prevention of structural damage in water conservancy and hydropower projects, the GS9000's full-resolution imaging technology, with its outstanding visualization capabilities, has become a key tool for detecting subsurface voids, cavities and potential termite nests in advance.

By regularly detecting key areas such as water conservancy facilities, dams, and reservoir surroundings, technicians can precisely locate and promptly take preventive measures before significant structural damage is caused.

The high-definition images provided by full-resolution imaging technology enables technicians to visually understand the location and scale of the void or cavity, enabling them to develop more targeted prevention and control strategies. This effectively provides a solid foundation for the safe operation of water conservancy and hydropower projects.

The GS9000 offers flexible selection between GX1 and GX2 antennas. In structural monitoring scenarios where termite nests typically appear at shallow depths, the GX1 high-frequency antenna with a frequency range of 500–3000 MHz can be selected.

This antenna is equipped with 50 radar antennas, fully leveraging its high-density channel structure and high-frequency step frequency configuration to achieve full-resolution imaging capabilities. It captures minute electromagnetic wave reflection signals underground, providing high-precision data for visualization imaging.

Want to see how the GS9000 could work for your projects? Contact us to arrange a demo.