

GPR Training & Education

Conquest Workshops 2008

Each year Sensors & Software hosts dozens of workshops to educate people on Ground Penetrating Radar. Our Conquest workshops attract concrete cutting & coring companies, locating service companies, structural and civil engineers and others in the NDT (Non-Destructive Testing) field.

Why are Conquest workshops popular? Concrete structures are being built at an unprecedented rate and there are increasingly more objects embedded in concrete (structural elements, electrical, communication cables etc). GPR has quickly become a valuable tool for evaluating concrete structures and its importance will grow in the coming years as contractors and engineers will be required to scan concrete before renovating or modifying a structure.

Many attendees see opportunities to start or expand their businesses; others want some familiarity with the technology before hiring sub-contractors. We also see many existing customers who simply want to keep up with changes in the technology.

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Detect movement of buried victims:

Noggin Rescue Radar

Sensors & Software is pleased to introduce the Rescue Radar system. Based on the proven Noggin GPR technology, Rescue Radar assists search-and-rescue workers to quickly locate

victims trapped in collapsed buildings, landslides or avalanches. Victims are detected through the movement of the body - arms, legs, head or even the subtle changes in chest volume caused by breathing.

Detect the movement of victims buried in soil, rock, rubble or snow.

Noggin Rescue Radar is sensitive to minor movements of arms, legs or even breathing.



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Noggin Rescue Radar (continued from page 1)

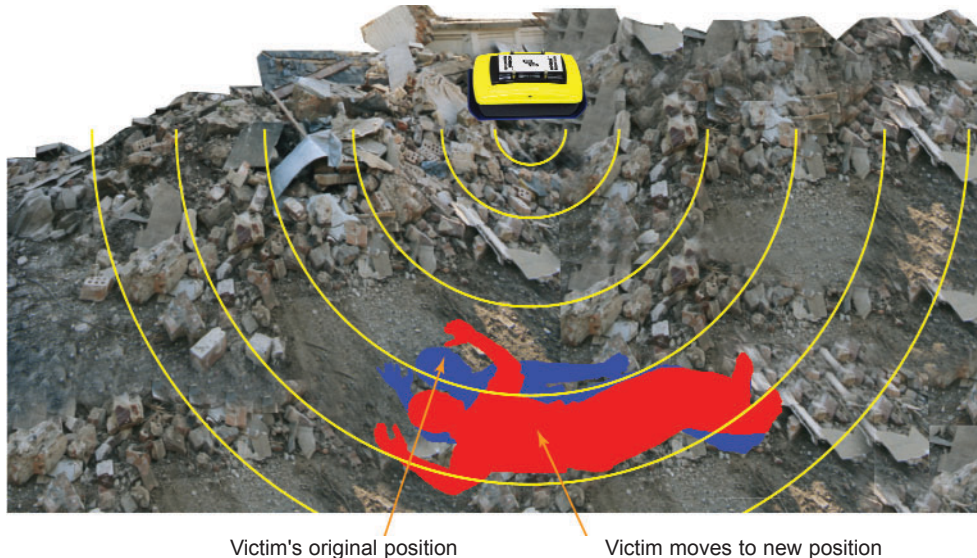


Figure 1: Noggin Rescue Radar collects time-lapse GPR measurements from a fixed location.

Rescue Radar is designed to perform in life and death situations:

- ◆ Rugged for all field conditions - extreme temperatures, rain, snow, dust
- ◆ Self-contained - comes in a single wheeled case that can be carried like luggage
- ◆ Low power consumption - runs for hours on a single 12 volt battery
- ◆ Quick setup - deployed in less than 60 seconds
- ◆ Simple to operate
- ◆ Self-calibrating

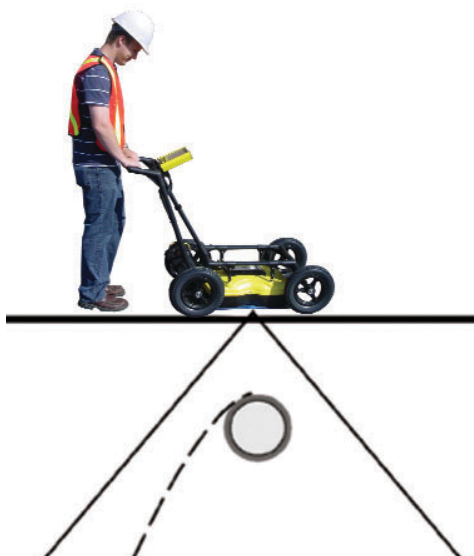
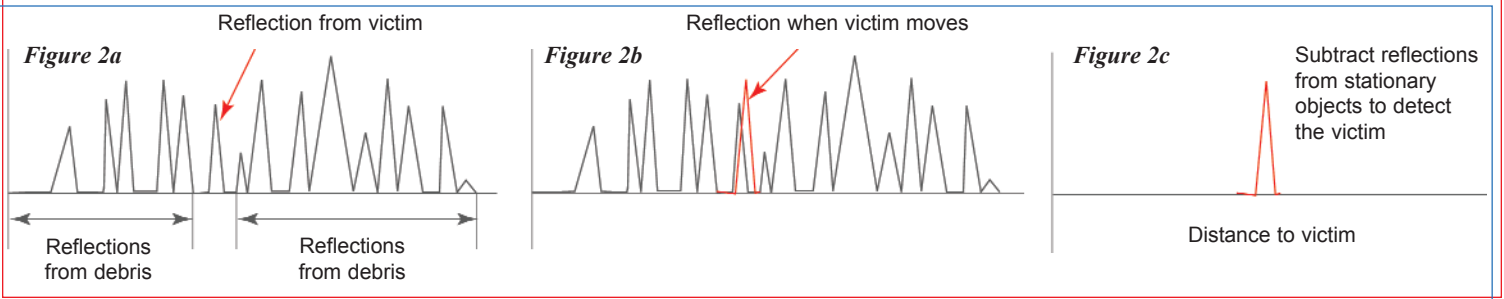


Figure 3: Traditional GPR detects subsurface objects as it moves across them.

Ultra Wide Bandwidth GPR systems like Noggins penetrate into many different materials like concrete, rock, soil, snow and common building materials such as wood and plasterboard. Traditional GPRs are deployed from a moving platform; scanning the ground for targets along survey lines (Figure 3).

Rescue Radar collects time-lapse GPR measurements from a fixed location; typically tens to hundreds of traces are collected per second (Figure 1).

Reflections are recorded from all the objects within the detection range of the GPR. Most reflections are from interfaces associated with debris but some reflections are from the victim. The victim reflection will not be obvious in the

raw data because it blends in with all the other reflections (Figure 2a). However, as the victim moves the reflection pattern changes slightly (Figure 2b). With the Rescue Radar's very stable, digital time-base, advanced processing algorithms and analysis software, these minute changes in the reflections are detected and the distance from the Noggin to the movement is displayed (Figure 2c).

Penetration range varies depending on the materials but typical ranges of 2-3 metres in rubble and 15 m in snow are possible.

For more information about Rescue Radar, contact our Applications Specialists. ■

Conquest Workshops 2008

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The 3 hour workshops provide a hands-on learning experience balanced with theory and software.

Contact us about attending one of these workshops or to find out when we'll be in your area. ■

- ◆ April 15 & 16, 2008 - New York
- ◆ May 14 & 15, 2008 - Illinois
- ◆ June 17 & 19, 2008 - Western Canada
- ◆ July 22 & 24, 2008 - Texas
- ◆ Aug 12 & 14, 2008 - California
- ◆ Sept 16, 2008 - Florida



Ask-the-Expert

With ice making up a greater portion of the soil matrix in permafrost areas, does GPR penetration increase dramatically in frozen clay soils compared to thawed soils?

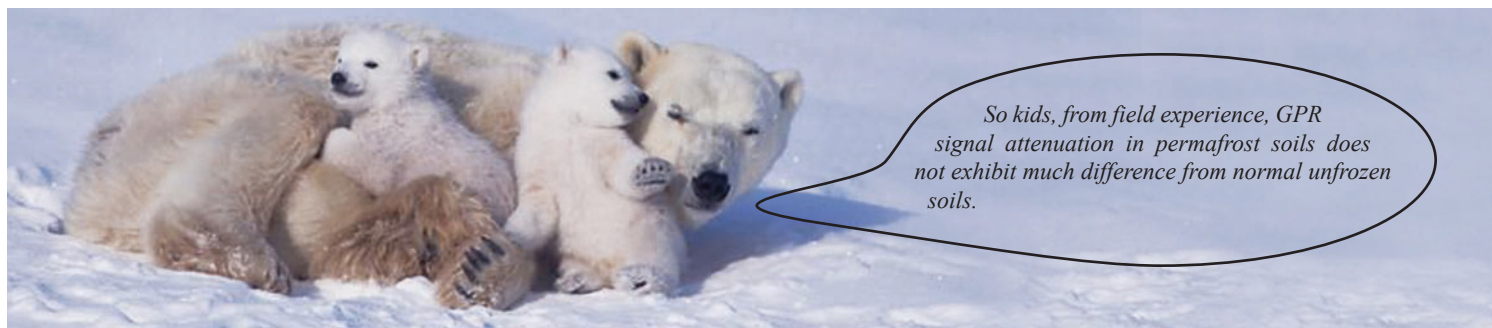
GPR penetration increases as the electrical conductivity of the material decreases. In soils, pore water chemistry, porosity and clay content control the bulk electrical conductivity. Since ice has a lower electrical conductivity than fresh water it makes sense to think that permafrost areas would allow deeper GPR penetration than unfrozen ground.

From field experience, GPR signal attenuation in permafrost soils does not exhibit much difference from normal unfrozen soils. The reason is that pore water does not usually freeze solid when the soil temperature drops below zero degrees C.

In coarse gravel and clean sand the freezing point depression is limited and the pore water freezes only slightly below zero degrees. In these cases GPR penetration may increase, but in most situations these environments are low loss. For fine grained soils like clays, an increasing fraction of water freezes as temperature drops but the tempera-

ture may need to reach -40 degrees C before all water freezes. Lab measurements by CRREL (Cold Regions Research and Engineering Laboratory) in 1970's and later tests by the GSC (Geological Survey of Canada) with TDR (Time Domain Reflectometry) demonstrated this.

With permafrost soils, temperatures are usually only slightly below 0 degrees C. When the freezing depression is taken into account, the impact on GPR response is not nearly as pronounced as the simplified concept of frozen (below 0° C) and unfrozen (above 0° C) might lead one to suspect. ■



So kids, from field experience, GPR signal attenuation in permafrost soils does not exhibit much difference from normal unfrozen soils.

Recent Technical Papers

1. Monitoring of hydrological hillslope processes via time-lapse ground-penetrating radar guided waves
By: G.Cassiani, C. Strobbia, M. Giustiniani, N. Fusi, G.B. Crosta, P. Frattini
2007 **ref 377**
2. An Evaluation of different methods to investigate root system architecture of urban trees in SITU: I. Ground penetrating radar
By: Alexia Stokes, Thierry Fourcaud, Jiri Hruska, Jan Cermak, Nadezhda Nadyezhdina, Valeriy Nadyezhdin, Ludek Praus.
2007 **ref 378**

Upcoming GPR courses

One Day Noggin® Short Course
May 5, 2008
July 7, 2008

Our Noggin® short courses are offered throughout the year to anyone interested in learning more about GPR and subsurface imaging.

One Day Conquest™ Course
May 6, 2008
July 8, 2008

Our Conquest™ courses are offered to anyone interested in learning more about our concrete imaging instrument.

Information Request

Please check off information required below and fax or Email back:

- | | |
|---|---|
| <input type="checkbox"/> pulseEKKO® PRO | <input type="checkbox"/> EKKO_Mapper |
| <input type="checkbox"/> Conquest™ | <input type="checkbox"/> EKKO_View |
| <input type="checkbox"/> ConquestView | <input type="checkbox"/> Rental Information |
| <input type="checkbox"/> Noggin® Systems | <input type="checkbox"/> 3 Day GPR Short Course |
| <input type="checkbox"/> OEM Noggin ^{plus} | <input type="checkbox"/> 1 Day Noggin® Short Course |
| <input type="checkbox"/> RoadMap™ | <input type="checkbox"/> Image Concrete with GPR |
| <input type="checkbox"/> pulseEKKO® Borehole GPR | <input type="checkbox"/> Other (please specify) |

See us at ...

SAGEEP 2008
Philadelphia, PA
April 6 - 10, 2008
www.eegs.org/sageep/index.html

Damage Prevention Conference
Virginia Beach, VA
April 8 - 10, 2008
www.scc.virginia.gov/urs/conf_dp.aspx

Toronto Police Service 22nd Annual Forensic Identification Seminar
Toronto, ON
April 9 - 10, 2008
www.torontopolice.on.ca/forensics/seminar.html

Structures Congress 2008
Vancouver, BC
April 24 - 26, 2008
www.structurescongress.org

PTI 2008
St. Louis, MO
May 4 - 6, 2008
www.post-tensioning.org



For a keen eye in subsurface imaging

Sensors & Software gives you the basics

3 Day GPR Short Course

July 9 - 11, 2008 - Mississauga, Ontario

Our 3-day course is an intensive course covering GPR theory, case studies, survey techniques, data processing and interpretation. A practical day in the field is part of the course.

Interested? Contact us early as space is limited.

training@sensoft.ca



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