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IceMap Monitors the “World’s Largest Skating Rink”

The capital city of Canada, Ottawa, is one of the coldest capital cities in the world. For decades, when the Rideau Canal in Ottawa freezes over in the winter, it becomes the world’s largest skating rink. At a length of over 7 km and including Dow Lake, there is certainly plenty of ice for everyone.

For almost 15 years, the ice on the Rideau Canal has been built, monitored, and maintained by a company named Capital Property Guardians. In 2018, they purchased an IceMap SmartTow GPR system (Figure 1) for measuring the ice thickness. IceMap uses ground penetrating radar (GPR) technology and specialized software to automatically display ice thickness in real-time to provide an easy-to-use solution for ice safety management.



Figure 1: The Rideau Canal Skateway is constructed and monitored using the IceMap system to ensure safety and prioritize maintenance areas.

Early in the season, when the ice in the canal has started to freeze and thicken, IceMap is deployed with a snowmobile to check the ice thickness (Figure 2).



Figure 2: The Rideau Canal Skateway is more than 7 km long, from near the Canadian Parliament Buildings to south of Dow’s Lake. This map shows early season (December 19, 2019) ice thickness data, plotted on Google Earth for a small section of the Skateway, as the ice is still thickening. The ice is less than 25 cm thick and not yet at the safe thickness of 30 cm for trucks, the Zamboni machine, food vendors or skaters to use.

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The goal is for the ice to reach 30 cm thick; thick enough for trucks and an Ice Resurfer machine to move safely on the ice (Figure 3). The Ice Resurfer machine melts the top layer of ice that has been chewed up by skates, adds a thin layer of water and allows the ice to refreeze much smoother. The Zamboni brand Ice Resurfer weighs almost 7 tons when full of water so, for obvious safety reasons, the ice needs to be thick enough to support it. Thirty centimeters of ice is also thick enough to allow food and beverage trailers to be towed onto the ice for the enjoyment of the skaters.

Says Robert Taillefer, owner of Capital Property Guardians:

"The IceMap system allows us to measure the ice thickness and flood the thin areas with water to quickly increase the thickness. This allows us to thicken all the ice to the point where it can support the Zamboni. The earlier we can get the Zamboni on the ice, the earlier we can work on making the ice smooth for skaters and the longer the skating season will be (Figure 4). Before we had IceMap, we needed to drill many holes to confirm that the ice was thick enough to support the Zamboni and there was always a concern that a thin spot was missed that could result in a serious accident. IceMap minimizes that uncertainty."



Figure 3: Zamboni ice resurfacing machines are used to smooth the ice for skaters.

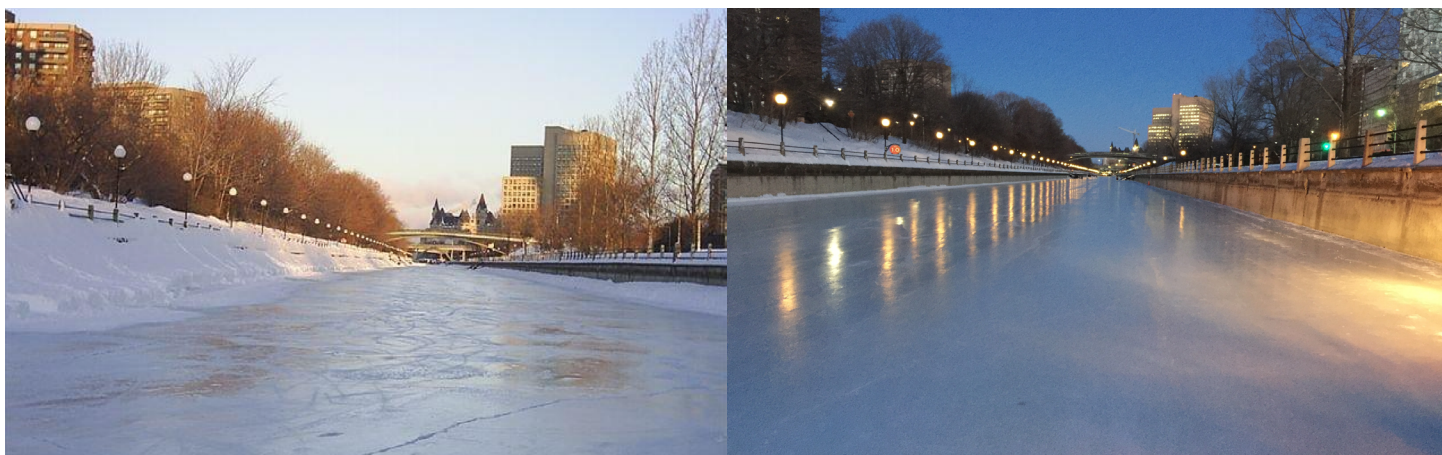


Figure 4: Photos of the ice surface early in the season (left) and shortly after opening day (right). IceMap allows the Zamboni machine to get on the ice as early as is safely possible, so skaters have as long a season as possible with smooth ice.

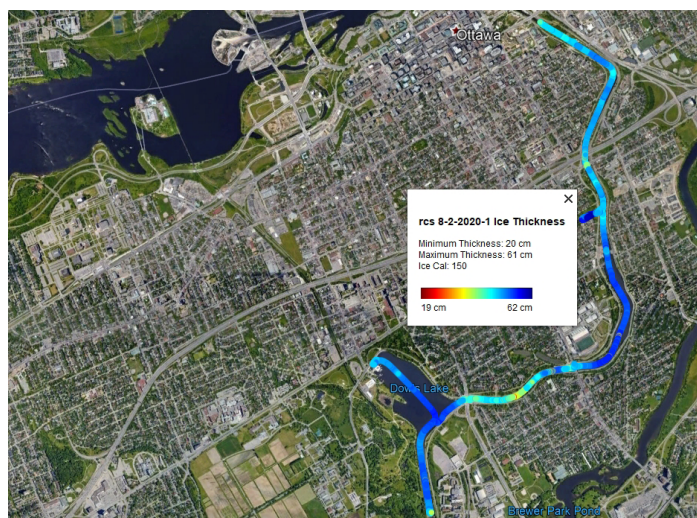


Figure 5: Map of ice thickness for the entire skating rink on February 8, 2020, plotted on Google Earth. The ice averages more than 40 cm thick with a few thinner spots are indicated in yellow and red.

His customer, the National Capital Commission, loves the simple report he gives them; a Google Earth image that shows where the ice is greater than 30 cm thick in blue and, the places where the ice is less than 30 cm thick in red (like Figure 5). This allows them to quickly see where the work must be done to flood the ice and make it thick enough for safety.

IceMap is a unique technology and most people are not used to seeing it or know what it is used for. What is the oddest question that Robert has ever been asked while scanning the ice with IceMap in the middle of the night? Someone once stopped him and asked if he was the coroner removing a body from the ice! The IceMap sled is about 6 feet long and covered to protect the IceMap system electronics so it is not surprising that this question arose!

Further Reading: <https://www.macleans.ca/news/canada/smooth-operator-2/>

IceMap data courtesy of Robert Taillefer, Capital Property Guardians

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Powerful, new visualizations in EKKO_Project V6 - Coming Soon

Since 2012, EKKO_Project software has been the foundation for organizing, viewing and analyzing GPR data and generating impressive deliverables that suit your project requirements. The latest software update, version 6, continues to improve EKKO_Project by adding powerful visualization tools for data analysis and reporting.

What's New in EKKO_Project V6?

PhotoSlicer allows the user to easily overlay depth slice images onto a photo. Depth slices generated on the display unit in the field, or from EKKO_Project's [SliceView](#) software module, are stretched or squeezed to fit onto the photo in the proper position and with the proper perspective. Then, the user can scroll through the depth slices to create stunning visualizations of the GPR data. PhotoSlicer is available in the base version of EKKO_Project.

PhotoSlicer images are powerful additions to the GPR Summary Report and presentations (Figure 1) to convey the position of objects found with GPR, in the context of the survey site.

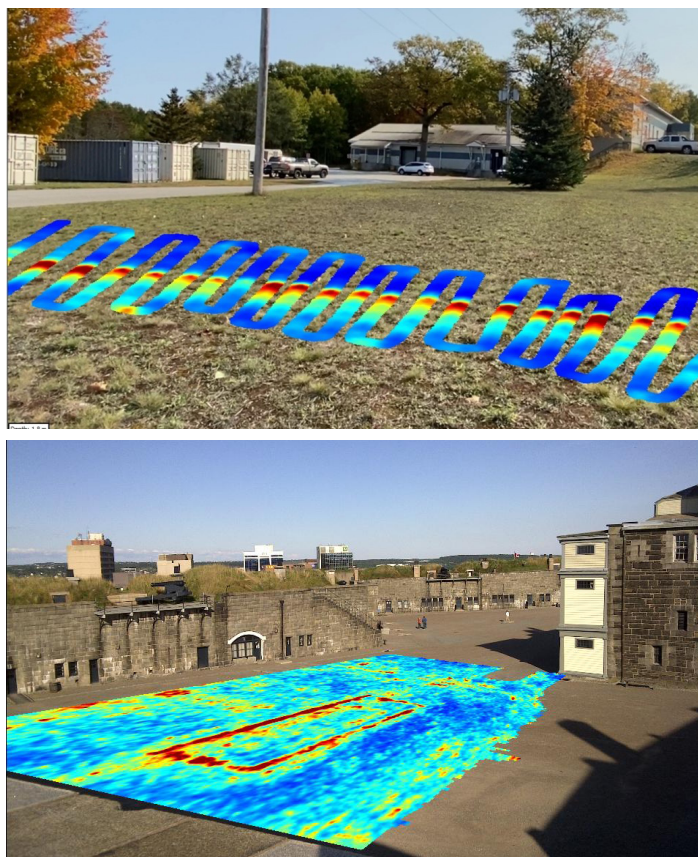


Figure 1: PhotoSlicer places depth slices on photographs of the survey site. Top – Random walk data processed into depth slices using the SliceView-Lines module. A high amplitude (red) utility line is shown on a photo of the site. Bottom – Grid data processed into depth slices using the SliceView-Grid module. The foundations of a rectangular buried structure are shown on a photo of the site.

Automatic 3D display in Voxler: Seeing a 3D image of your GPR results is a great way to visualize data and adds a professional flare to your results. You can now export, in a single click from SliceView-Grid, the files needed to visualize your data in the 3D tool, Voxler. Voxler is third-party software for 3D visualization. When SliceView-Grid users save a Grid Scan to 3D, the Voxler program now launches and automatically generates 3D images with pre-set parameters for the following types of 3D displays:

- **Volume Render (Volrender)** displays the whole cube of data and allows the user to modify the transparency to highlight GPR reflections of certain signal strength. For example, it is common to make weak GPR reflectors transparent and only display the strongest reflections in the data.
- **ClipPlanes** slice through the cube of data, like depth slices but with the advantage of slicing at any angle through the data cube.
- **Isosurfaces** show all the points of a single, user-defined GPR amplitude value in the cube with all other data transparent; great for showing the strongest reflectors in the data (Figure 2).

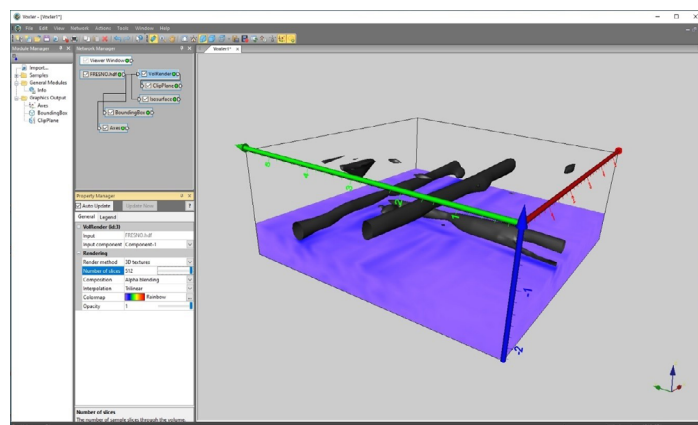


Figure 2: GPR grid data automatically displayed in 3D in Voxler as a volume render (purple cube), a clip plane (top of purple cube) and an isosurface (grey, linear objects).

The user can then easily edit the display properties and optimize the 3D image.

This seamless new capability eliminates the need to generate 3D images in Voxler from scratch and gives users a head-start on making impressive 3D displays of their GPR grid data.

Generate Animation Files: EKKO_Project users can now easily create GIF animations. These animations can be used to help spot features in your GPR data as part of analysis, as a marketing tool on your website, or as a value-add deliverable to send to your clients along with the PDF Summary Report and Google Earth Files.

GIF animation files play on standard, pre-installed Windows programs such as Windows 10 Photo Viewer making them easy deliverables to share with others.

Animations can be created from 3D Preview, where the user can select the X lines, Y lines or depth slices to animate while the other two dimensions remain fixed on a user-selected image (Figure 3). Animations can also be created from MapView to animate one or more depth slices with interpretations, background images, lines, GPS path, and flags also visible (if desired).

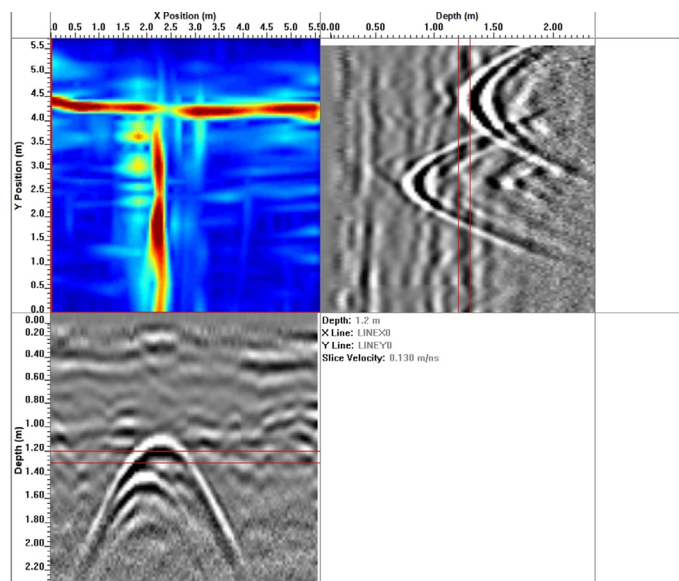


Figure 3: One frame of a 3D preview GIF animation showing utility data.

Multi-media Flags: Flags are added to GPR data in the field and post-processing to mark the position of surface features or objects in the GPR data to assist with the data interpretation, positioning and data documentation. An example is flagging the position when the GPR system moves from one type of surface material to a different type (for example, grass to pavement) because this change can affect the GPR response and impact the interpretation of the data.

EKKO_Project V6 adds a new feature to the Interpretation module: multi-media flags, which combine flags and multi-media file attachments. EKKO_Project already allows GPR users to attach auxiliary data files such as photos, videos, audio files and field notes to grids, individual GPR lines or to the project but associating them with a specific location in the GPR data could not be done. With this new feature, users can now attach photos, videos, and audio files to a flag, creating a multi-media flag with the appropriate icon on it (Figure 4). This provides an easy way to transfer field notes to a specific location in your data and provides a complete archive of your results to be used when analysing your data.

Examples of the use of multi-media flags are attaching a photo or video to a flag to show a surface feature you passed while collecting data or attaching a voice memo providing more information about the flag.

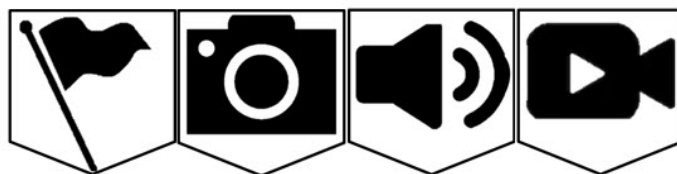


Figure 4: Flag icon followed by the new multi-media flags indicating that a photo, audio, or video file is attached to the flag.

Clicking on the flag automatically opens the file attached to it; Figure 5 shows an example of a photo flag.

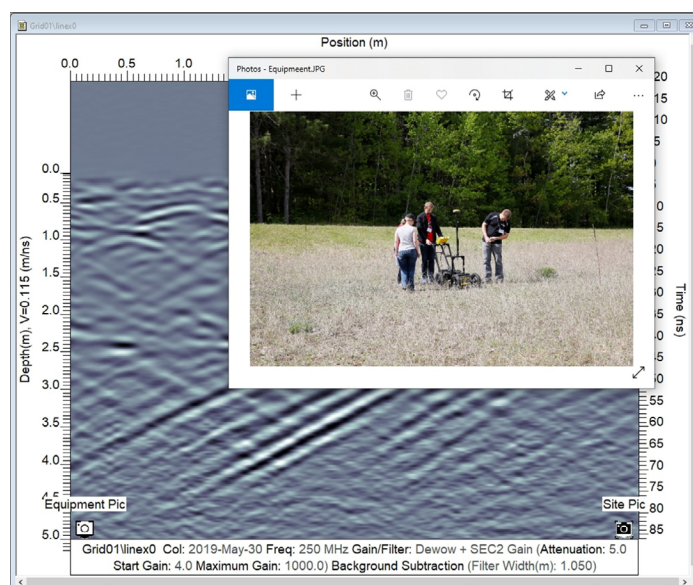


Figure 5: Clicking on a flag with the photo icon on it, opens the attached photo for viewing.

Grid Editing: For various reasons, GPR grid data often needs to be edited; whether you want to merge multiple grids collected over a large area into one large grid for data processing or combine parallel Line Scans into a grid for SliceView-Grid processing, or perhaps you need to correct a mistake made during field collection. You can now do so quickly in EKKO_Project. Grid editing (Figure 6), formerly the GFP_Edit utility, is now part of EKKO_Project with the three most common types of edits available:

- Create a new grid from a series of lines
- Edit an existing grid and
- Add lines (including another grid) to a grid.

By combining your data into grids, you can make use of SliceView-Grid data visualization tools.

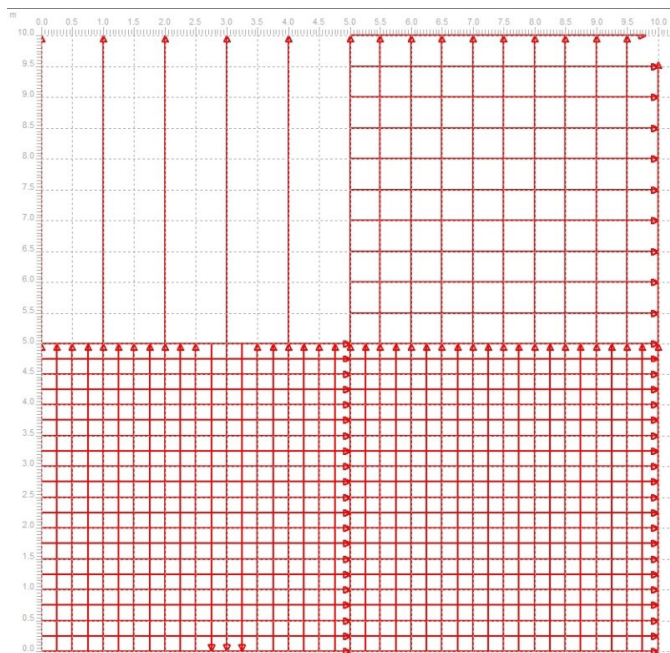


Figure 6: Editing grids includes adding grids together, adding lines to a grid, moving lines in a grid, changing the direction of a line, and changing the line spacing.

Data Export to point cloud: Third-party point cloud software can be used for plotting very large scientific data sets. Originally developed for LiDAR, 3D Laser scans and photogrammetry, point cloud visualization software can be a useful tool for visualizing GPR data collected with GPS. EKKO_Project now includes a new point cloud CSV file export option so GPR data can easily be imported into point cloud software. For example, Figure 7 shows a GPR line zigzagging over two utilities (indicated by hyperbolas) plotted in CloudCompare, a free to use 3D point cloud processing software.

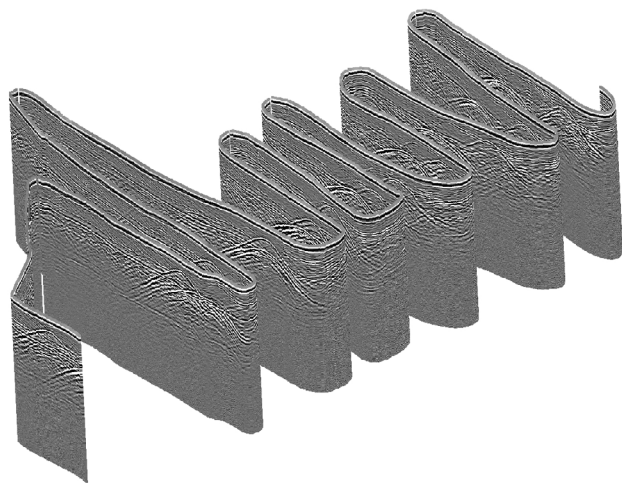


Figure 7: GPR line data plotted in third-party point cloud software called CloudCompare.

These are some of the new features in EKKO_Project Version 6. To learn more about EKKO_Project, including upgrading or purchasing, [contact us](#).

Sensors & Software + Radiodetection - What does it mean for you?

On November 12, 2020, Sensors & Software was acquired by SPX Corporation and is now part of the Radiodetection business unit. This acquisition builds on the ten-year partnership Sensors & Software and Radiodetection have had together and opens many new opportunities for both organizations.

Radiodetection is a worldwide leader in damage prevention and is highly renowned for their Precision Locators & Cable Avoidance Tools for the utility, construction & infrastructure markets.

Since the acquisition was announced, we have received several questions from our customers along the lines of “What does this mean for Sensors & Software’s non-utility GPR systems?” Let us assure you that there is no reason for concern. SPX Corporation & Radiodetection are focused on growth, and the purchase of Sensors & Software is a strategic move to build capability and open new markets for the company. One of the reasons that Sensors & Software was an attractive acquisition for Radiodetection is that we operate in areas beyond their current markets, and Radiodetection is committed to maintaining and growing the company’s overall presence in these markets.

Joining the larger SPX family of companies allows us to combine technical expertise in robotics engineering, inspection camera capabilities, GPS mapping technologies, software development, precision locating and ground penetrating radar technology. All of which enable exciting opportunities for future product innovation across many industries.

Although Sensors & Software has always been a global company, with customers and partners all over the world, this acquisition exponentially expands our presence and allows us to take advantage of new reach and resources provided by Radiodetection and SPX Corporation. Should you have any questions about our products, how to apply GPR to your specific application areas, or just want to share how you are using our GPR solutions, please contact us. The same team you have always worked with is here to provide you with the high level of customer service that you have come to expect from us over the years.

We are all very excited about this relationship and the possibilities it provides for our employees, our business, our future product innovations, and most importantly, you, our valued customers.

If you have questions or concerns, [contact us](#)!

SensoftU - Online Training

SensoftU is our **new** interactive online learning platform, which takes our GPR training courses to a new level. Rather than just watching videos or static presentations, SensoftU features true interactive courses where the user is engaged, learning, interacting, and answering questions along the way. Visit www.SensoftU.com for the course catalog.

New IceMap Course

We are pleased to announce the addition of an online training course for IceMap users!

Using slides, videos and interactions, participants will learn how to setup, configure, and collect data using IceMap. There are questions throughout the course to ensure quality learning and retention of key concepts.

This course is suited for anyone who is new to ice profiling, as well as those who may need refresher training (especially after a long break since the last ice season!).

Topics covered include:

- Importance of continuous ice measurements
- GPR reflections
- Setting up the IceMap hardware and software
- Collecting data
- Doing an Ice Calibration
- Data Interpretation
- Case examples

Upon passing the final test, users will receive a certificate of course completion.

Visit SensoftU and start learning.



Upcoming Courses

[GPR: Principles, Practice & Processing](#)

- January 26, 2021 - Online 9:00am to 5:00pm EST

[Webinar in association with Nulca - Interpreting GPR Utility Data: Tips & Tricks](#)

- February 10, 2021 - Online

GPR Course - SAGEEP 2021

- March 19, 2021 - 1/2 Day Online, Registration details coming soon

[Utility Locating with GPR course part of Damage Prevention Week](#)

- March 24, 2021 - Online, Full day, Instructor-led

Upcoming Events

- [Transportation Research Board \(TRB\) Show](#) - Online, January 25-29, 2021

Sensors & Software Inc.

1040 Stacey Court
Mississauga, ON
Canada L4W 2X8

+1 905 624 8909
+1 800 267 6013
www.sensoft.ca

**subsurface
imaging
solutions**