GroundProbe®

GROUND BREAKING NEWS

OCTOBER 2015

INTRODUCING SSR-SARx

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CEO UPDATE: LAUNCH OF SSR-SARx

GroundProbe now offers all slope stability radar technologies, with the introduction of our synthetic aperture radar, SSR-SARx.

In the mining industry today, safely reducing unit cost is the highest priority for all open cut operations, and slope monitoring plays a role in doing just that. However, no two geotechnical problems are the same, and each radar technology provides nuanced advantages and disadvantages depending on the problem at hand.

I have never believed in a 'one-size-fits-all' approach to solving complex problems, which is why we have developed SSR-SARx to round out our product range, allowing you to find a solution that best fits your needs.

Rather than starting from scratch, we leveraged 12 years of SAR experience by partnering with Italian company LiSALab, the pioneers of GBInSAR who were the first company to bring the technology to market.

We are proud to be the only vendor in the world that offers all slope stability radar technologies, 2D and 3D RAR, and now 2D SAR, all tied in with the same software SSR-Viewer, giving you the competitive edge your operation needs in today's market.

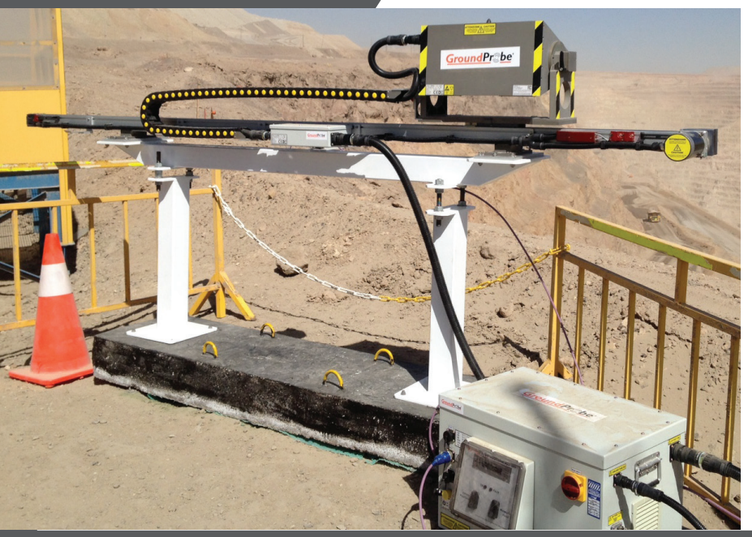
SSR-SARx

OUR LONG-RANGE, LONG-TERM MONITORING SOLUTION WITH A 4.5 KILOMETRE SCANNING RANGE.

We are excited to launch the SSR-SARx—our latest product and our first synthetic aperture radar (SAR). With a 4.5 kilometre scan range, the SSR-SARx is ideal for long-range, long-term monitoring and offers the highest resolution and longest scan range available on the market today.

As the market leader in SAR, the SSR-SARx offers unmatched specifications including advanced long-range technology, stunning resolution and adaptive processing for low bandwidth data at lightning speed.

The SSR-SARx is a sophisticated system that includes a three-metre rail, producing the best resolution of any SAR with pixel sizing at 0.16 degrees and uses SSR-Viewer software, common to all of our radars. Made by the first ground-based interferometric synthetic aperture radar (GBInSAR) company in the world, LiSALab, the SSR-SARx uses fifth-generation hardware and has been widely used in the global landslide market since 2003.



The SSR-SARx offers a range of unique specifications including:

- Unique on board processing at the radar to deliver light data for real-time monitoring or WiFi transfer with no latencies or delays
- Patented, intuitive SSR-Viewer software with advanced signal processing and real-time alarming
- "On the fly" patented algorithm that allows for the fastest SAR scanning available
- In-built camera leveraging GroundProbe's patent portfolio of intuitive visualisation and analysis

The SSR-SARx has been tested at major international mine sites in four continents globally. It combines the world's highest-spec ground-based SAR hardware with the intuitive SSR-Viewer software.

SSR-SARx: A PRODUCT 12 YEARS IN THE MAKING

LiSALab developed their GBInSAR system, LiSAmobile, for deployment in severe weather conditions around the world including countries such as Canada, Japan, Europe and the fjords of Scandinavia. The system is already used globally and has generated the largest recorded data set in the industry where a six-year continuous data has been collected at one of Europe's most active volcanoes, Stromboli, located just off the Sicilian coast in Italy.

LiSALab began developing the LiSAmobile, in 2003, when it was used to monitor natural hazards and manmade structures in Europe. In doing so, they pioneered the technology, becoming the world's first GBInSAR company.

Leveraging LiSALab's 12 years of experience, we have collaborated our industry experience and expertise, and have combined our patented software and hardware to develop the SSR-SARx—a system designed specifically to cater for global mining industry needs.

LiSALab's Chief Executive Officer, Carlo Rivolta explains, "It seems fitting that GroundProbe, the first slope stability radar (SSR) company, has joined forces with our GBInSAR company, allowing our long histories and different applications to come together and create a product unlike any other. LiSALab's System Designer and Developer Davide Leva adds, "Combining the patent portfolios of GroundProbe and LiSALab has strengthened its market leadership."

LiSALab has deployed its systems in over 40 locations, and has established a long history of success—maintaining its market leadership in the landslide industry.

SAR TECHNOLOGY THAT YOU KNOW, JUST BETTER

NO DELAY IN ATMOSPHERE PROCESSING. DATA IS AVAILABLE FROM THE SECOND SCAN AND ARRIVES IN REAL-TIME EVERY 2 MINUTES

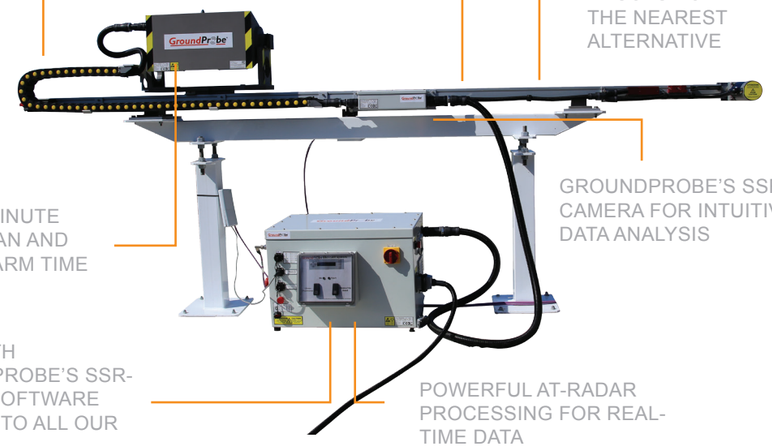
ON BOARD PROCESSING GIVES LOW BANDWIDTH DATA LESS THAN 1/7TH THE SIZE OF THE NEAREST ALTERNATIVE DESPITE HAVING 50% MORE RESOLUTION. THIS GIVES REAL-TIME DATA ON SLOW LINKS.

6TH GENERATION HARDWARE WITH 12 YEARS OF RELIABILITY AND EXPERIENCE

PATENTED "ON THE FLY" SAR DATA ACQUISITION FOR THE FASTEST SAR SCANNING DATA

ROBUST MACHINED HEAD, NOT FOLDED SHEET METAL

3 METRE RAIL GIVES 50% HIGHER RESOLUTION THAN THE NEAREST ALTERNATIVE



GROUNDPROBE'S SSR CAMERA FOR INTUITIVE DATA ANALYSIS

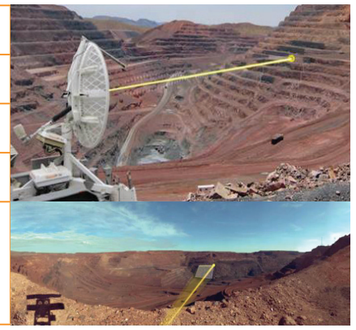
2 MINUTE SCAN AND ALARM TIME

RUNS WITH GROUNDPROBE'S SSR-VIEWER SOFTWARE COMMON TO ALL OUR RADARS

POWERFUL AT-RADAR PROCESSING FOR REAL-TIME DATA

SSR-XT: TARGETED MONITORING SOLUTION

RADAR TYPE	3D – Real Apeture Radar (3D-RAR)
SAFETY CRITICAL	●
MONITORING AREA	◔
RANGE	◔
SPECS	3500m 180° x 60° (26 mins) 30° x 15° (2 mins) Front View Point-and-Click



TARGETED MONITORING

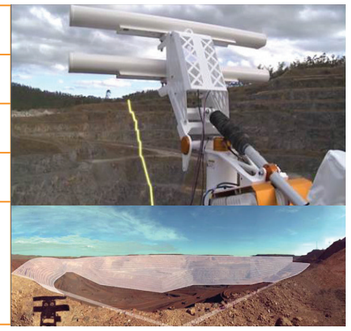
- Tactical approach, critical for monitoring existing slope movements posing a potential or immediate threat to the safety or productivity of mining operations
- Ideal for short period scanning, with critical monitoring and alarming systems
- Radar locations are flexible with high mobility

3D REAL APERTURE RADAR

- Uses a fine pencil beam to provide full 3D imaging

SSR-FX: BROAD AREA MONITORING SOLUTION

RADAR TYPE	2D – Real Apeture Radar (2D-RAR)
SAFETY CRITICAL	◑
MONITORING AREA	●
RANGE	◑
SPECS	2800m 180° x 60° (2 mins) Plan View



BROAD AREA MONITORING

- Strategic approach, helpful to detect “hot spots” of movement activity even in areas that are not critical to current mine operations over longer periods of time (campaign monitoring)
- Aims to maintain background monitoring for geotechnical peace of mind
- Radars are mobile, with pit geometry a factor to consider when determining radar location

2D REAL APERTURE RADAR

- Creates a thin vertical stripe on the wall which can be swept around the pit to cover 180 degrees of a pit in less than two minutes, ideal for detecting new and unknown risks and hazards

SSR-SARx: LONG-RANGE, LONG-TERM MONITORING SOLUTION

RADAR TYPE	2D – Synthetic Aperture Radar (SAR)
SAFETY CRITICAL	◔
MONITORING AREA	◑
RANGE	●
SPECS	4500m 60° x 60° (2 mins) Plan View

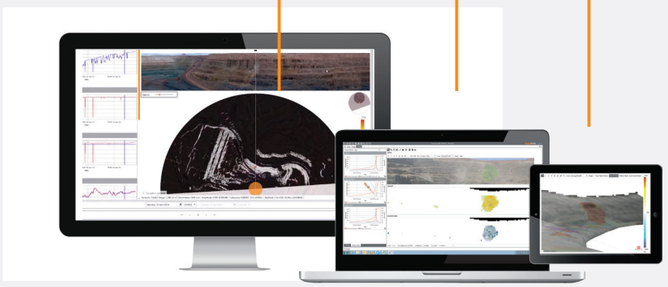
LONG RANGE MONITORING

- Required in large mines where other radar technologies simply cannot effectively image walls at distance out to 4.5km
- Aims to pick up small movements that occur over many months, which may not otherwise be detected by short-term monitoring campaigns
- Radars are permanent after set up, with pit geometry a factor to consider when determining radar location

2D SYNTHETIC APERTURE RADAR

- Generates narrow vertical beams coupled with longer integration time allowing for monitoring of areas at longer ranges
- Synthetically generated data allows for data to be reprocessed over many years to detect small long-term changes

All of our products use the one software package, SSR-Viewer to help you predict a slope failure. SSR-Viewer’s patented front view, plan view and unique 3D view make data analysis intuitive, and our six stackable alarms give you peace of mind that you will be warned of slope movement.



GroundProbe offers a world class global support network. Our Geotechnical Engineers travel extensively, visiting client sites where our products are deployed. On request, they train site personnel, remotely monitor the output of working radars, interpret data and produce regular technical reports. Through their expertise, we design and provide tailored slope monitoring and reporting solutions on any scale.

CASE STUDY

ÅKNES ROCKSLIDE, NORWAY

OUR SAR USED TO MONITOR HIGH-RISK NORWEGIAN ROCKSLIDE FOR ALMOST A DECADE

For the past nine years, LiSALab's ground-based interferometric synthetic aperture radar (GBInSAR) system has successfully monitored Åknes—a highly volatile 54 mil cubic metre rockslide in western Norway. One of the country's four high-risk rockslides, it has the potential to form a devastating tsunami and poses a serious risk to human life. The site is subject to continuous monitoring, and efforts to detect even the slightest movement are critical to protecting local communities, infrastructure and lives.

Since 2006, our SAR system has conducted periodical monitoring campaigns at Åknes, using a LiSALab GBiNSAR radar based in Oaldsbygda. Although abrupt changes in weather and atmospheric conditions typically threaten the quality of radar images in this environment, LiSALab has developed an advanced processing algorithm that allows its radar to provide the most complete picture of displacement in the central part of the landslide—critical data that can be used to improve estimated failure scenarios.

Unlike nearby extensometers, the GBInSAR was able to detect movement associated with a block collapse in 2012, and its measurements (along with visual inspections of collapses and crack developments) remain the primary source of information on change in this area.

Elsewhere in Norway, the GBInSAR method has been used in investigations and for early warning purposes at other high-risk rockslides, including Mannen, Jettan, Flaam, and recently in the latest emergencies in Holmen and Romsdalen.

It has also been used to characterise the present activity of rockslides for risk classification, identify unstable areas along roads, and monitor open pit mines, volcanoes, sinkholes and landslides in more than 70 different locations around the world. Additionally, it has been used to monitor dams and manmade structures.

As LiSALab's Chief Executive Officer Carlo Rivolta explains, "We've developed a powerful tool for evaluating stability, and our GBInSAR technology has been documenting changes in movement since 2003, both in large rockslide areas and in smaller areas prone to rock-fall processes." LiSALab's System Designer and Developer Davide Leva adds, "We're extremely proud that our system provides decision makers with a critical knowledge base that can inform and underpin their ongoing efforts to effectively manage natural hazard risk worldwide."

LEARN MORE ABOUT OUR MONITORING SOLUTIONS IN DETAIL

Scan the QR code to watch the three videos below.

SLOPE FAILURES

OUR SOFTWARE

THREE MONITORING SOLUTIONS

Alternatively, you can visit our website: groundprobe.com/news-and-publications/videos-and-images

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MAKING MINING **SAFER**

FROM THE PRODUCTS WE DEVELOP, TO THE SLOPE MONITORING SOLUTIONS WE TAILOR, OUR VISION IS MAKING MINING SAFER

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