



GROUND  
BREAKING  
NEWS



Happy new year!

In the last twelve months GroundProbe has grown by leaps and bounds in terms of new offerings, services, partnerships, office locations and staff. And we have already locked in a number of big announcements to be made to our customers this year so stay tuned!

In our first edition of 'GroundBreaking News' for 2017, we are excited to tell you about our fully-established partnership with 3vGeomatics (3vG), to deliver satellite-based Interferometric Synthetic Aperture Radar (InSAR) monitoring services to our customers.

In addition this quarter, we highlight our dedicated Geotechnical Support Services (GSS) unit and the value that they can provide to our customers through their range of service offerings.

Enquiries and sales of our most recent product, the SSR-SARx, have been outstripping our expectations and we are proud to see them now fully operational at our customer sites.

GroundProbe would like to thank all our customers, staff and everyone who has supported our business or helped us in any way throughout 2016. We look forward to your ongoing support and another great year!

**John Bevers**

**MD and Chief Executive Officer**

# + Last Year In Review

## NEW BEGINNINGS:

SSR-Viewer 8.4, an Intuitive Update to our Software, Released to Customers



GeoExplorer, NavStar's Data Aggregation Software, Offered to Customers



GroundProbe InSAR Service Launched in Partnership with 3vGeomatics



GSS-Remote Starts Operations Around the World



## HARDWARE RELIABILITY:

**99.25%**

**↑ Global**  
System Reliability  
on Over 300 Radars

**DATA**  
Availability of

**98.53%**

Across Entire  
SSR Fleet

Global Mean Time  
Between Radar  
Breakdowns of

**279**

**DAYS**

## FAST FACTS:



2 Years Without a  
Lost Time Injury



Radars Deployed in  
5 New Countries



14 New Employees  
Globally



New Office  
Opened in Lima



3 Radar Technology  
Solutions

## GroundProbe Unveils Global Satellite-based InSAR Monitoring

### INNOVATION

GroundProbe has partnered with 3vGeomatics (3vG), a leading provider of satellite-based Interferometric Synthetic Aperture Radar (InSAR) monitoring services, to offer our customers access to InSAR deformation data.

An effective tool for detecting and monitoring surface movement, the GroundProbe InSAR service provides monitoring capabilities complementary to GroundProbe's ground-based radar suite.

"InSAR can be used to detect displacements and acceleration phases over large areas with millimetre level precision, providing accurate, high value information that highlights potential risks to safety and production," said Adrian McCardle, 3vGeomatic's President and Founder.

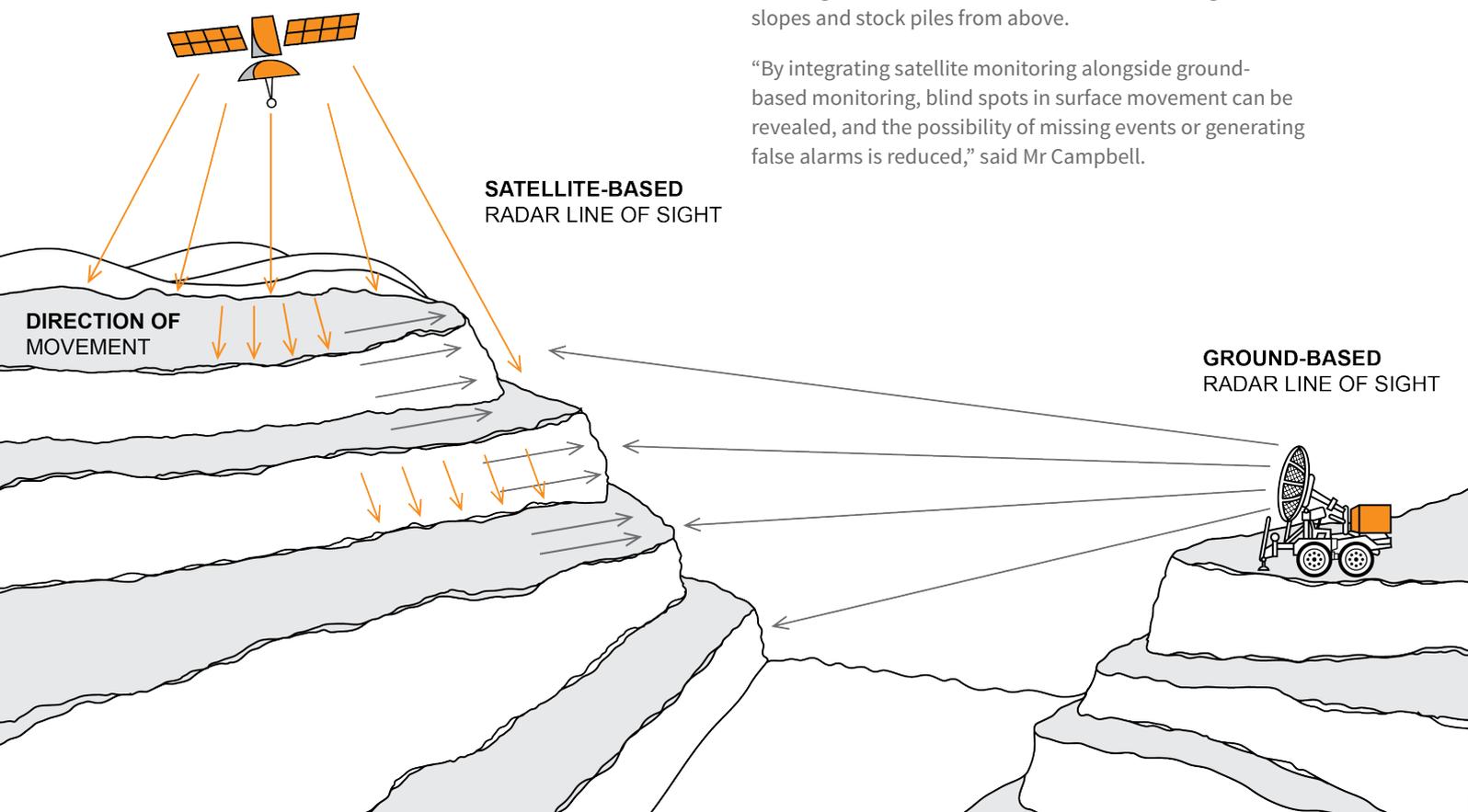
Typically passing over the same location every several days and capable of processing data within 24 hours, imagery of the earth's surface can be obtained from anywhere in the world, independent of weather conditions.

Live data can be seamlessly imported into GeoExplorer for complementary analysis through the InSAR module.

"This means users can compare and analyse InSAR data against data gathered by a range of other monitoring sensors including SSRs, total stations, piezometers, and much more, on the one dashboard," said Lachlan Campbell, GroundProbe's VP of Marketing and Technology.

InSAR can scan an entire mine site, capable of seeing behind the crest of pit walls where ground-based radars cannot; allowing it to monitor critical infrastructure, tailings dams, slopes and stock piles from above.

"By integrating satellite monitoring alongside ground-based monitoring, blind spots in surface movement can be revealed, and the possibility of missing events or generating false alarms is reduced," said Mr Campbell.





# GroundProbe Slope Stability Radar Deployment Options

PRODUCT NEWS

GroundProbe offers two deployment options across our Targeted Monitoring (SSR-XT) and our Broad-Range Monitoring (SSR-FX) radar models; fixed and mobile.

Our fixed deployment radars offer a more cost-effective slope monitoring solution, whilst retaining the same slope stability monitoring features, software and reliability that our customers expect from our mobile deployment models.

Our fixed deployment options are best suited to mine sites where radar mobility is not a priority and the radar will not need to be moved frequently. Fixed radars, particularly the SSR-FX, are also suited for background monitoring when a customer wants to detect very gradual deformation over a long period of time.

In addition, if mine power is available on site, GroundProbe can package a more cost-effective solution with the flexibility of removing the power source.



GroundProbe

Showcase

‘Geotechnical

Support Services’

PRODUCT NEWS

GroundProbe is renowned as the market leader in Slope Stability Radars for global mine sites, with the broadest range of radar technology in the industry. To ensure our radars are always operating at their maximum potential and our customers are getting the most out of their asset, GroundProbe has a team of highly-experienced Geotechnical Engineers, Geotechnical Support Services (GSS).

GroundProbe’s GSS is a world-class global support network that assists our customers with effective slope stability risk management through comprehensive technical support. Made up of 13 Geotechnical Engineers, GSS is one the largest assembled teams of geotechnical professionals for open-cut mining in the world.

GroundProbe’s GSS covers a range of distinct services:



#### GSS-TRAINING

Using the team's expertise, GSS-Training can assist customers with specialised geotechnical SSR training and ongoing development solutions for staff and management through structured, competency-based training, assessment and certification. This can be delivered remotely by online and video conference, or in person at your office or on site.



#### GSS-REPORTING

GSS-Reporting allows advanced reports to be generated and customised to suit customer needs. The reports include detailed data analysis and interpretation of slope deformation and can be produced daily, weekly, monthly, or as often as required.



#### GSS-REMOTE

The GSS-Remote service provides customers with access to a dedicated 24-hour remote monitoring solution for mine sites anywhere around the globe. Our remote monitoring team, all fully-qualified Geotechnical Engineers with extensive radar knowledge and experience, operate 24/7 from a central, remotely-located office.

Providing real-time support, the team monitor live radar data and respond to alarms and wall movement, remaining in close phone and online contact with site-based staff.



#### GSS-LOCAL

GSS-Local sees one or several of our fully-qualified Geotechnical Engineers providing in-person, on-the-ground monitoring. Flying in and out of site as needed, the flexible service can be tailored to suit any mine site across the globe and is fully integrated with existing site processes and procedures.

Being located on site allows the GSS Engineer to remain in close contact with site-based staff to save time, cost and improve reaction time to alarms and wall movements.



#### GSS-ALARMING

GSS-Alarming encourages an iterative approach towards the application of SSR alarms. Offering competency-based on-site training to educate engineers in alarm back analysis, velocity analysis and radar data interpretation, the GSS team can present a detailed and complete methodology to align a mine site's alarms with industry best practice.

Site specific alarm thresholds are also generated from back analysis and site engineers are trained to monitor and track the effectiveness and applicability of these alarms for all situations.





## GroundProbe InSAR Service Features and Benefits

### PRODUCT NEWS

An effective operational monitoring tool in detecting and monitoring surface movement, the GroundProbe InSAR service offers a range of features and benefits.

#### LARGE AREA, HIGH PRECISION MONITORING

Satellite-based InSAR can be used to detect displacements and acceleration phases over large areas with millimetre level precision, providing accurate, high-value information that highlights potential risks to safety and production, allowing for informed decision-making.

#### FASTER REVISITING TIMES AND DATA PROCESSING

The satellites typically pass over the same location every several days and are capable of processing data within 24 hours of the satellite passing overhead, allowing for the monitoring of faster moving areas, detecting subtle motion, and providing up-to-date information.

On request, a package can be tailored for a satellite to pass overhead more frequently, allowing for even faster access to data.

#### HISTORICAL ANALYSIS CAPABILITIES

As well as acquiring new imagery each revisiting cycle, archive imagery of a corresponding area can be obtained, allowing for a retrospective view of surface displacement that has taken place and a deeper analysis of continued displacement over time.

#### INTEGRATED MONITORING

The inherent features of satellite and ground-based radars are complementary, allowing for an integrated, multi-source monitoring solution. Satellite-based radars can cover an entire mine site and will see behind the crest of a pit wall where your ground-based radar can't see, monitoring critical infrastructure, tailings dams, slopes and stock piles from above.

By integrating satellite monitoring alongside ground-based monitoring, blind spots in surface movement can be revealed, and the possibility of missing events or generating false alarms is reduced.

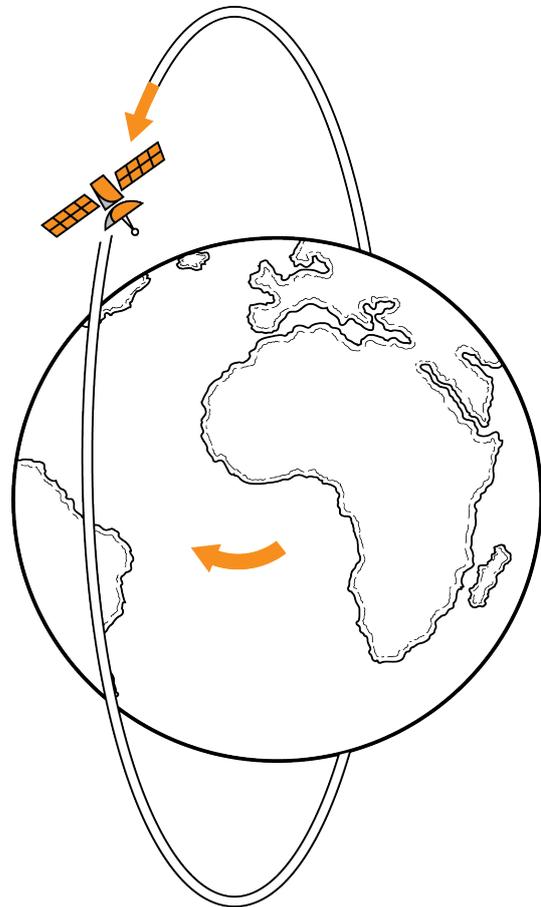
#### LIVE DATA

Through the InSAR module, millions of pixels of satellite data are seamlessly imported into GeoExplorer. The data is live and in near-real time, allowing users to click on any pixel, select any region and chart deformation and velocity with high precision.

#### SIDE-BY-SIDE DATA ANALYSIS

Data is temporally and spatially normalised automatically in GeoExplorer for complementary analysis of data from the different sensors, unlocking the synergy of ground-based and satellite-based interferometric radar.

The colour palettes of each of the sensors can be harmonised and their alarms combined, allowing for the same degree of movement to be visualised in the same way, hot spots to be aligned and for all data types to be handled the same.





## GSS-Remote

### PRODUCT NEWS

Providing 24/7 real-time support, GSS-Remote is an advanced, full-service slope monitoring risk management solution available to GroundProbe customers. This service involves the GSS team operating a 24/7 remote monitoring station that provides round-the-clock monitoring of live radar data, responding to alarms and wall movement.

Available as a 24/7 service or for the hours set by customers, GSS-Remote is a low-cost alternative to site-based radar operators. The additional benefits also include reducing the operational work load of on-site engineers subsequently decreasing staff fatigue, lowering operational down-time, and limiting the risk of a missed collapse.

The features provided under the GSS-Remote service include:

- Real time response to alarm triggers;
- Controlled geotechnical risk management;
- 24 hour geotechnical phone support;
- Alarm trigger validation and data optimisation;
- Real-time collapse forecasting;

On commencement of the service, a project specific Trigger Action Response Plan (TARP) is developed in collaboration with site engineers and management. The TARP is a policy of planned responses to trigger events. The purpose of its development is to define a range of trigger levels, and the associated response protocols to be initiated in the event of a trigger level being exceeded.

A Primary Response Chart is also generated listing all critical site contacts and immediate response requirements to key triggers.



# GSS-Remote Detects Failure on Colombian Road Construction

CASE STUDY

Colombia's Administrative Department of the System of Prevention, Attention and Disaster Recovery have been utilising GroundProbe's GSS-Remote service in order to monitor the construction of the Medellín-Bogotá Expressway. Using an SSR-XT radar, our off-site Geotechnical Engineers were responsible for successfully detecting a potential failure on Thursday 14th January.

The radar and GSS-Remote service was being used to monitor a slope beside the road, where earlier in the week blasting had occurred.

"For periods of time, we had to suspend the work because of the instability of the slope, because of the controlled blasting releasing loose material," said Mauricio Parodi,

Director of the Administrative Department of the System of Prevention, Attention and Disaster Recovery (TRANSLATED).

At 7pm on Thursday, the radar switched from red alert to orange, coinciding with the clearing of all loose material from the descending roadway; suggesting the slope was reasonably stable.

However, just after 7pm the radar switched back to red alert; detecting an imminent slope failure through the tracking of a progressive trend, and the area was successfully evacuated.

"Thanks to the SSR-XT and the constant monitoring of the slope afforded by our GSS-Remote service, the change in slope stability was detected quickly," said Peter Saunders, GroundProbe's Principal Geotechnical Engineer.

"This early detection allowed for our off-site Geotechnical Engineers to contact on-site personnel promptly and alert them of an imminent slope failure."

From the products we develop, to the slope monitoring solutions we tailor, our vision is making mining safer.

## MAKING MINING SAFER

### AN OFFICE NEAR YOU

#### AUSTRALASIA

##### Brisbane, Australia

Head Office and Production  
72 Newmarket Road  
Windsor QLD 4030 Australia  
Tel +61 7 3010 8999  
info@groundprobe.com

##### Perth, Australia

11 Agett Road  
Malaga WA 6090  
Australia  
Tel +61 8 9378 8000  
info@groundprobe.com

#### AFRICA & EUROPE

##### Johannesburg, South Africa

Unit 1, 9 Reedbuck Crescent  
Corporate Park South Midrand,  
1685 South Africa  
Tel +27 11 087 5300  
infoSA@groundprobe.com

#### ASIA

##### Balikpapan, Indonesia

Sentra Eropa Blok  
AA5 No 12-15 Balikpapan Baru  
Balikpapan 76114  
Indonesia  
Tel +62 542 758 1403  
infoPT@groundprobe.com

##### Nagpur, India

Sujyoti India (P.) Ltd.  
“NEXUS POINT”  
2nd Floor, Vidhan Bhavan Square  
Civil Lines Nagpur 440001  
Tel +91 712 6653333  
info@groundprobe.com

##### Nanjing, China

No.33, Dongqi Road,  
Dongshan Street, Jiangning,  
Nanjing 211100 China  
Tel +86 25 84189710  
infoCN@groundprobe.com

#### NORTH AMERICA

##### Tucson, USA

2470 W. Majestic Park Way  
Tucson,  
AZ 85705 USA  
Tel +1 520 393 8287  
infoNA@groundprobe.com

#### SOUTH AMERICA

##### Belo Horizonte, Brazil

Rua Mantena 302  
Bairro Ouro Preto  
Belo Horizonte,  
MG 31.310-430 Brasil  
Tel +55 31 3245 5570  
infoBR@groundprobe.com

##### Santiago, Chile

Alonso de Córdova 5670, oficina  
603 Las Condes, Santiago  
7560875  
Chile  
Tel +56 2 2586 4200  
infoCL@groundprobe.com

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