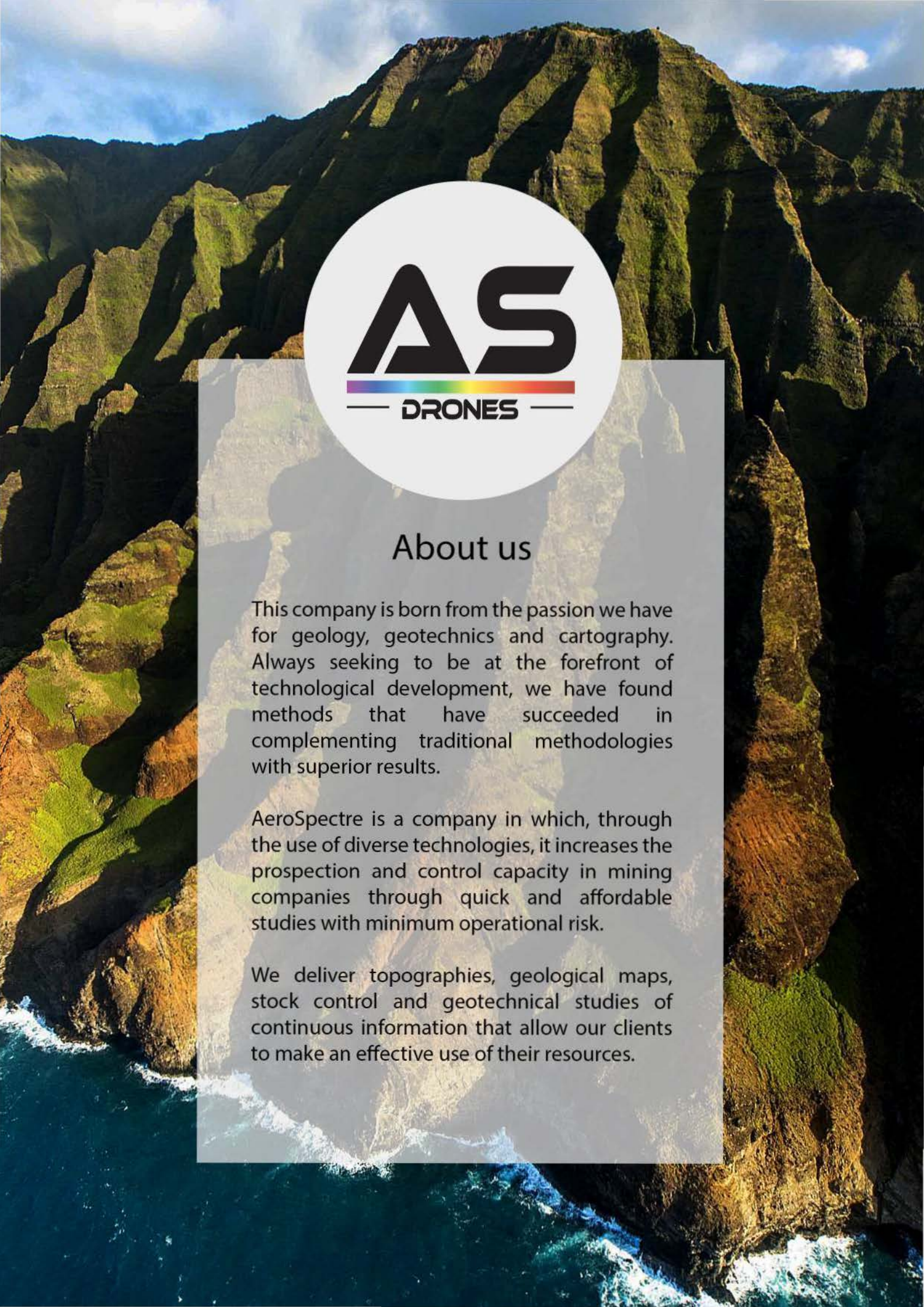
AEROSPECTRE
DRONES

Geology and Engineering

From another perspective

BROCHURE 2019

www.aerospectre.cl
contacto@aerospectre.cl



About us

This company is born from the passion we have for geology, geotechnics and cartography. Always seeking to be at the forefront of technological development, we have found methods that have succeeded in complementing traditional methodologies with superior results.

AeroSpectre is a company in which, through the use of diverse technologies, it increases the prospection and control capacity in mining companies through quick and affordable studies with minimum operational risk.

We deliver topographies, geological maps, stock control and geotechnical studies of continuous information that allow our clients to make an effective use of their resources.

AS DRONES


AEROSPECTRE

WHY US?

PRICING

We want to maximize your exploration and for that purpose, each of our processes is optimized to always offer competitive pricing, with the intention of bringing these hig standard technologies to the small and medium mining operations.

QUALITY

By working with drones and experts in the area, we generate information of a continuous nature. This allows us to minimize the error, the extrapolation of data and increase the reliability of it.

TIME

The meticulous design and optimization of field campaigns is a key part of the workflow in AeroSpectre. This has allowed us to have results in up to 20% of the time it would take to do it with traditional methods.

SECURITY

Compared to traditional methods, AeroSpectre is able to reduce foot traffic by more than 70%. This allows us to keep our team away from geological and enviromental hazards.

EXPERTS

Our geologists, with more than 50 years of experience, validate the technical quality of each of the work done by AeroSpectre, regardless of size, complexity or location.

INNOVATION

Our own innovation team allows us to develop solutions, both hardware and software, customized to the needs of each client. Thanks to this we can offer a wide spectrum of flexible technical solutions regardless of the complexity.

AEROPHOTOGRAMMETRY

"Once you have tasted flight, you will forever walk the earth with your eyes turned skyward"

- Leonardo da Vinci

Drone surveys allow us to obtain a large amount of information, with high precision and in a short amount of time, together with reducing operational risk. In AeroSpectre we offer to deliver orthorectified aerial images, digital terrain models (DTM), precision topography and three-dimensional models, all within the reach of a single flight.

Through the principles of stereoscopy, image processing delivers information in 2 and 3 dimensions, such as topography or MDT, reaching a resolution from 80 up to 5 cm / px or topography with contour lines every 25 centimeters.

The resolution of the aerial orthophoto varies between 15 to 1 cm / px, allowing to observe roughness, structures, infrastructure, vegetation, accesses and all kinds of information from the skies.

PUT IT IN PESPECTIVE...

1,000 hectares with more than 1,000 meters of height difference can take more than 30 days of conventional topographic work; The same work with aerial photogrammetry can be done from 7 to 10 days, at a lower cost and with minimal operational risk.

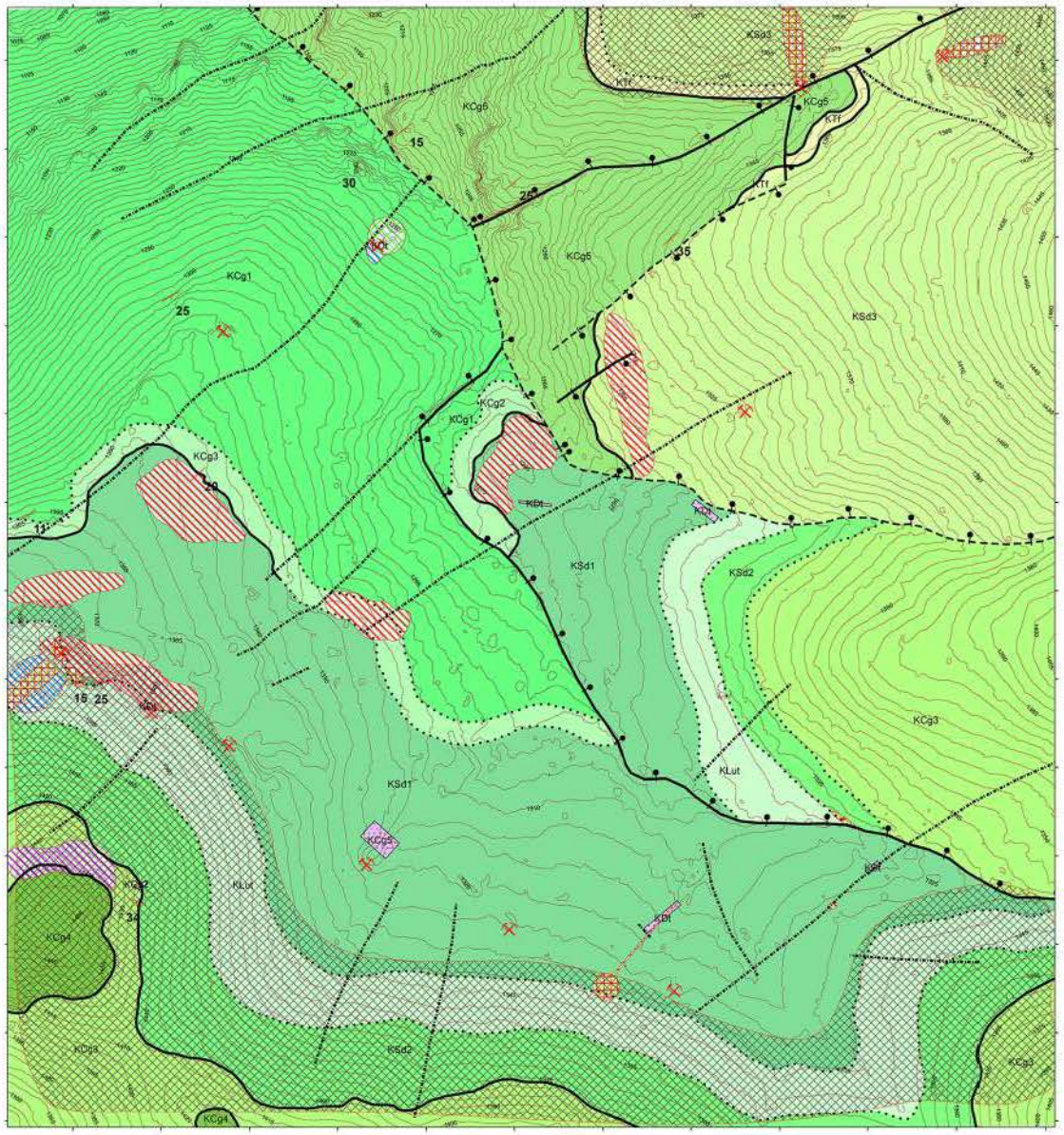
REFERENTIAL VALUES

USD	100 ha	250 ha	500 ha	1000 ha
$/ha	$30	$18	$12	$10.5
TOTAL	$3,000	$4,500	$6,000	$10,500

* The values can vary according to various factors that determine the technical complexity of the project.

Mapa geológico 1:2.000

Exploración minera de mantos mineralizados



LEYENDA

N

Litologías

- Dique microdioritico (KDt)
- Areniscas grises y verdes grano medio (KSd3)
- Tobas vítreas (KTf)
- Conglomerado andesítico muy grueso (KCg5-¿4?)
- Conglomerado andesítico muy grueso (KCg4)
- Conglomerado andesítico grueso (KCg3)
- Areniscas finas (KSd2)
- Secuencias de lutitas, margas y calizas (KLut)
- Secuencias de areniscas finas silicificadas (KSd1)
- Conglomerado andesítico medio (KCg2)
- Conglomerado andesítico grueso (KCg1)

Mineralización y Alteración

Mineralización

- Sulfuros de cobre (Cpy - Bn)
- Oxidos de cobre (Ccl - Mal - Az)
- Manto mineralizado proyectado

Alteraciones

- Calcificación
- Silicificación y hematitización
- Epidotización
- Laboreos

Estructuras

- Contacto Observado
- Contacto Inferido/Cubierto
- Lineamiento estructural
- Falla normal
- Falla normal inferida
- Rumbo y manteo

Base topográfica
Aerofotogrametría a 180 metros P4P

Referencia geodésica
Coordenadas UTM PSAD56 19S

ESCALA 1:2.000

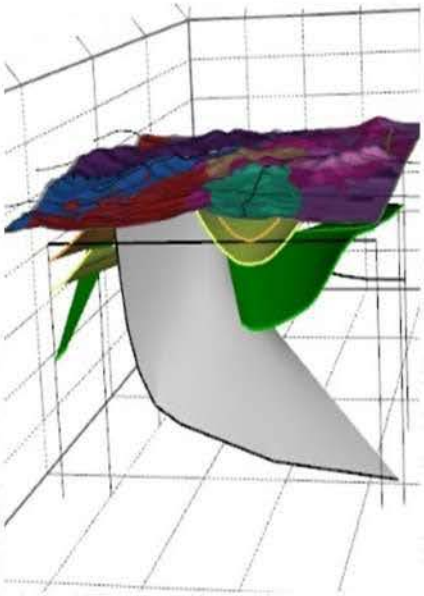
0 90 180 360

Metros

Equidistancia de curvas
5 metros

Exploración de mantos mineralizados
Autores: Perroud, Sebastián & Ulriksen, Carlos
Revisión externa:
Fecha: Noviembre 2018
Escala: 1:2.000
AeroSpectre Ltda.

MINERAL EXPLORATION



"Geological maps encourage audacity. (...) They make everything seem possible."

- Mark Jenkins

In AeroSpectre we have a clear objective: to generate exploration targets based on a solid and precise geological study, with a strong structural approach. We seek to maximize the potential of the remote sensors, in order to optimize the field campaigns and reduce the uncertainty of the surface information.

Within a standardized workflow, we carry out bibliographic and multi-spectral satellite studies, together with a detailed map (1: 1,000) using digital terrain models and images obtained with drone.

The result is simple: a crossed prospectivity map with a structural model of the study area, advising the client on where to invest the exploration resources.

PUT IT IN PERSPECTIVE...

A single 300 meter reverse circulation drilling operation can cost US $ 35,000, this is equivalent to more than 10 km2 of mineral exploration done by AeroSpectre.

REFERENTIAL VALUES

USD	100 ha	250 ha	500 ha	1000 ha
$/ha	$47	$34.4	$29.8	$25.3
TOTAL	$4,700	$8,600	$14,900	$25,300

* The values can vary according to various factors that determine the technical complexity of the project. .

MINE MONITORING

"The best way to present something complex, is through an image that is worth a thousand words."

- Anonimous

AeroSpectre offers complete or partial survey services, so that our clients can monitor changes in the progress of the mining pit or plants. With this information, it is possible to contextualize the operation teams visually and numerically and keep track of changes in a time period.

According to the client's requirements, these monitoring can be daily, weekly and / or monthly. This information is adaptable to processes that present geomorphological changes over time, such as excavations, blasting, landslides and infrastructure construction.

The results are dense point clouds and 3D models that can be used in all mining software, making change control analysis more viable, fast and cost effective.

PUT IT IN PERSPECTIVE...

For a professional it is simple to understand the technical context of a jobsite; But, is it so for all of your team?
Make 100% of the information, reach 100% of your workforce.


STOCKPILE INFO
Area: 171.75 m²
Perimeter: 48.81 m
Cut volume: 57.28 m³
Fill Volume: 0.83 m³
OK

STOCK PILE CONTROL

"Information has no value,

unless it has the potential to change a decision."

- Sam Savage

The photogrammetric techniques used provide both visual and numerical information, allowing to accurately measure areas, perimeters, volumes or relative movements on the surface.
We seek to optimize the time and accuracy of stock pile measurement, facilitating their control.

The lifting of large leach piles, abandoned piles with mineral interest or dumps is simplified using drone surveys, being faster, more precise, with greater reach and without exposing personnel to risks.

Through analysis of digital terrain models and cut and fill tools, the changes in time of the piles and dumps can be easily identified and quantified.

PUT IT IN PERSPECTIVE...

A small pile of 7x4x2 meters and 56 m3 corresponds to at least 160 tons of material. Considering a minimum law of 1 gr / ton, the value of that pile can be worth US $ 6,500.
Do you know how much your stock piles are worth?

INDIRECT GEOTECHNICS

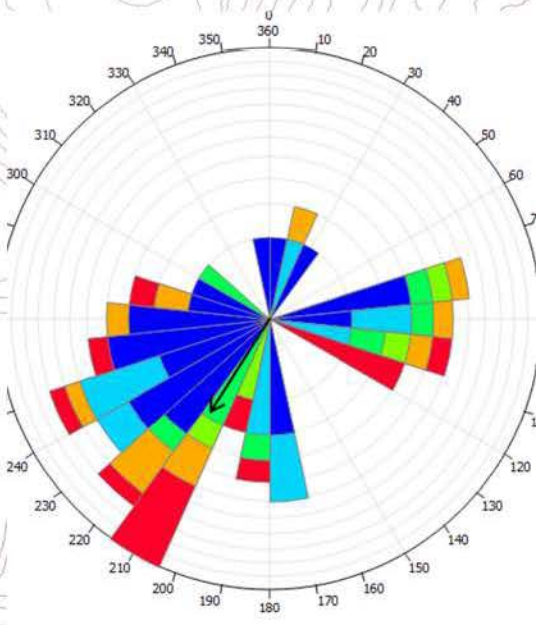
"At the end of the day, the goal is simple: to return home the same way you left: healthy

- Anonymous

With drones we generate dense point clouds of the rock mass or slopes. The combination of a photographic visual control and the 3D model, allows to identify and characterize the rock mass semi-automatically, optimizing time and decreasing the exposure time of the staff under the slope, also allowing to obtain information in sectors without access.

The high resolution 3D model consists of millions of oriented and georeferenced triangular faces, which allows us to measure the main fracture faces and characterize them without exposing the staff to risk factors such as sun, dust and possible rock falls.

The obtained information can be represented graphically in rosetta diagrams and stereographic networks, giving a preview of the geomechanics of the rock mass.



PUT IT IN PERSPECTIVE...

Collecting structural data of an open pit mine implies having personnel walking for several hours, measuring, drawing and obtaining GPS points. What if you could raise 5 times more information in less than a day and without operational risk?

AS

DRONES