



SOLUCIÓN PROFESIONAL PARA MAPPING CON DRONES

- Sistema Topodron RTK -PPK -

ATyges

Fabricante de drones / RPAS

Sistemas mutirotor



Sistemas Ala fija

SOLUCIONES COMPLETAS PARA MAPEADO INDUSTRIAL

- > Sistema Topodron con sensores RGB
- > Sistema Agrodron con sensores multispectrales
- > Sistema Thermodron con sensores termográficos

SOBRE PIX4D Y ATYGES

FUNDADO EN 2011
EN LAUSANNE, SUIZA



BASADO EN +10 AÑOS
DE INVESTIGACIÓN
+60 EMPLEADOS

FUNDADO EN 2011
EN MÁLAGA, ESPAÑA



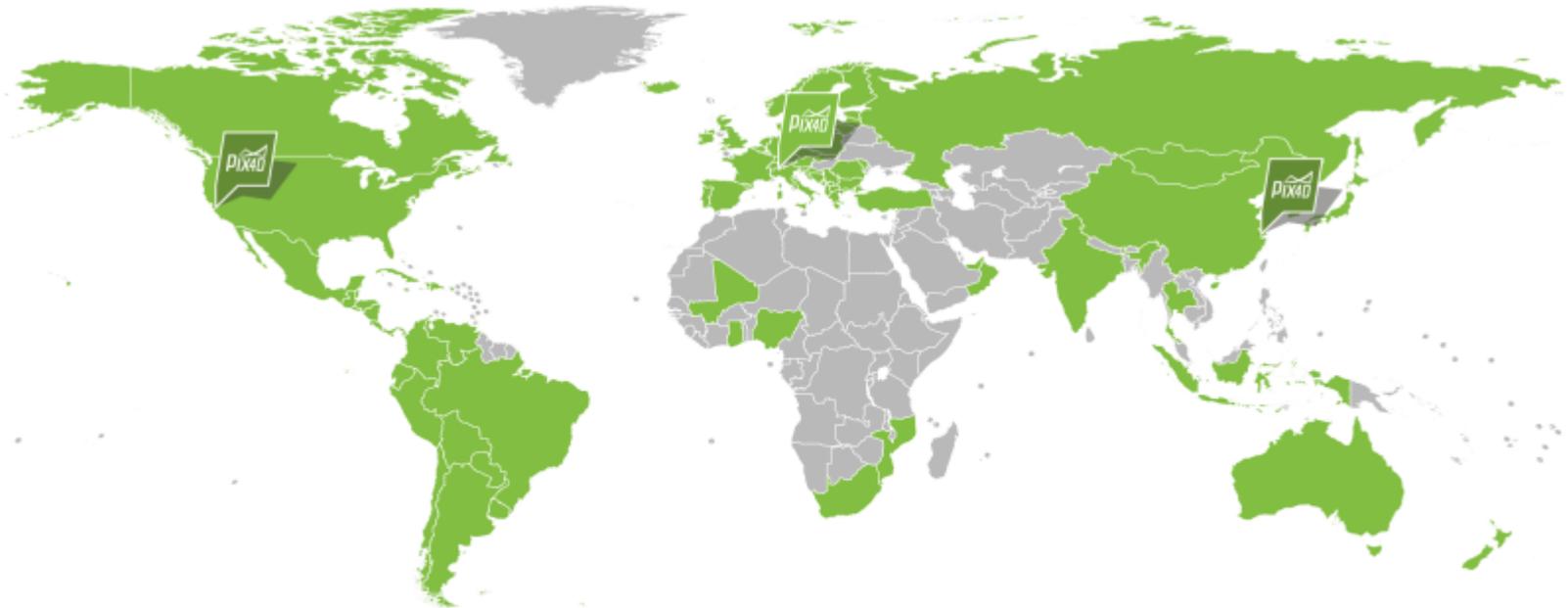
BASADO EN +15 AÑOS
DE INVESTIGACIÓN CON
RPAS

USUARIOS TOPODRON



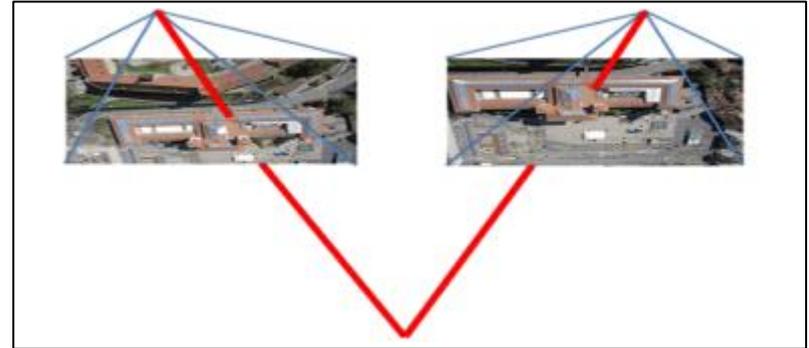
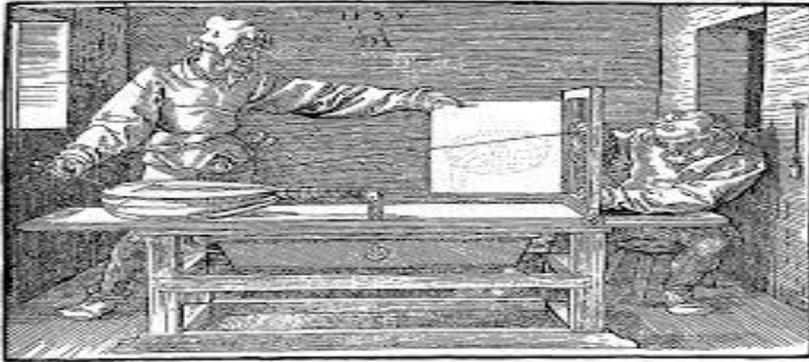
USUARIOS PIX4D

9,000 USUARIOS ACTIVOS AL MES



PROCESANDO 100,000 PROYECTOS/MES (Julio 2016)

PIX4D Y LA FOTOGRAMETRÍA, REINVENTADA

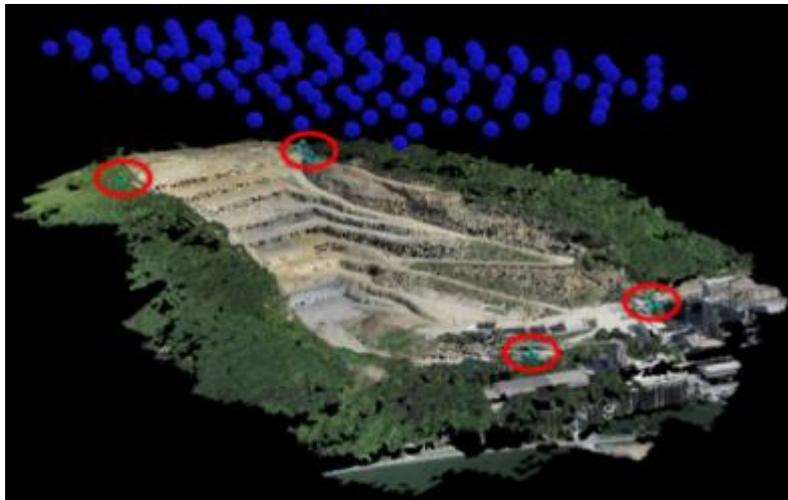


- > La fotogrametría, o ciencia de obtener mapas a partir de imágenes, tiene sus orígenes hace más de 3000 años.
- > La investigación, la aplicación de análisis avanzado de imágenes y el software de calibración de cámaras ha automatizado procesos que anteriormente requerían un intensivo trabajo manual.
- > El aumento de las capacidades de procesamiento y de almacenamiento facilitan el trabajo con gran cantidad de imágenes de alto detalle.

GEOPOSICIONAMIENTO Y PRECISIÓN

Si se emplea posicionamiento de imágenes y Apoyo,
o si se emplea GPS PPK/RTK:

| Posición | Orientación | Escala |
|----------|-------------|--------|
| ✓✓ | ✓✓ | ✓✓ |



Precisión

- Calidad de la imagen
- Solape
- Contenido imagen
- Precisión GCPs / PPK-RTK

Precisión = 1-3 GSD

OBJETIVO: MAXIMIZAR PRODUCTIVIDAD GARANTIZANDO RESULTADOS

MINIMIZAR TRABAJO EN CAMPO

Toma de datos / Riesgo / Errores / Factor humano

OPTIMIZAR EL FLUJO DE TRABAJO

Datos en campo – Procesado – Comprobación calidad –
Entrega a cliente de productos finales

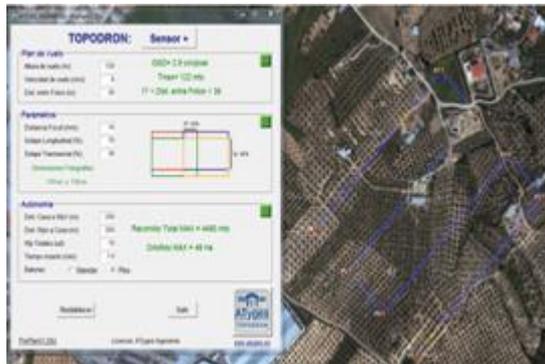
CONTROL DE CALIDAD EN DATOS

Automatizar procesos con control de calidad

OPTIMIZAR RECURSOS

Procesado Cloud / Procesado Desktop

FLUJO DE TRABAJO: Planifica



Precisión deseada

Altura de vuelo

Velocidad de vuelo

Aeronave empleada: FV8,FV6,FV4,FV1

Sensor empleado (múltiples)

Superficie mapeada

Viabilidad real del vuelo

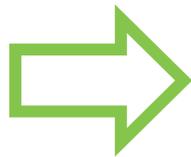
Calidad de la imagen

Solapamiento real

Optimización número de imágenes

FLUJO DE TRABAJO: Vuela

Planifica



Vuela

Vuelo automático

Simulación previa vuelo

Almacena planes de vuelo en el dron

No precisa elementos auxiliares en campo

(no PC, no tableta, no móvil)

Despegue y aterrizaje automático

Capacidad de vuelo en coordenadas absolutas y coordenadas relativas



ATyges FV1



ATyges FV8

The logo for PIX4D, featuring a stylized green and yellow 'X' shape above the text 'PIX4D' and the tagline 'simply powerful' below it.

PIX4D
simply powerful

FLUJO DE TRABAJO: Organiza

Planifica



Vuela



Organiza



30 vuelos días

50 Ha/vuelo FV8

500 Ha/vuelo FV1

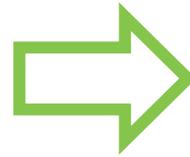
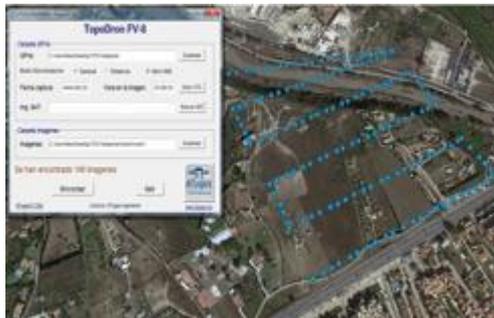
Gran número imágenes

Georeferencia imágenes

Múltiples cámaras

FLUJO DE TRABAJO: Procesa

Organiza

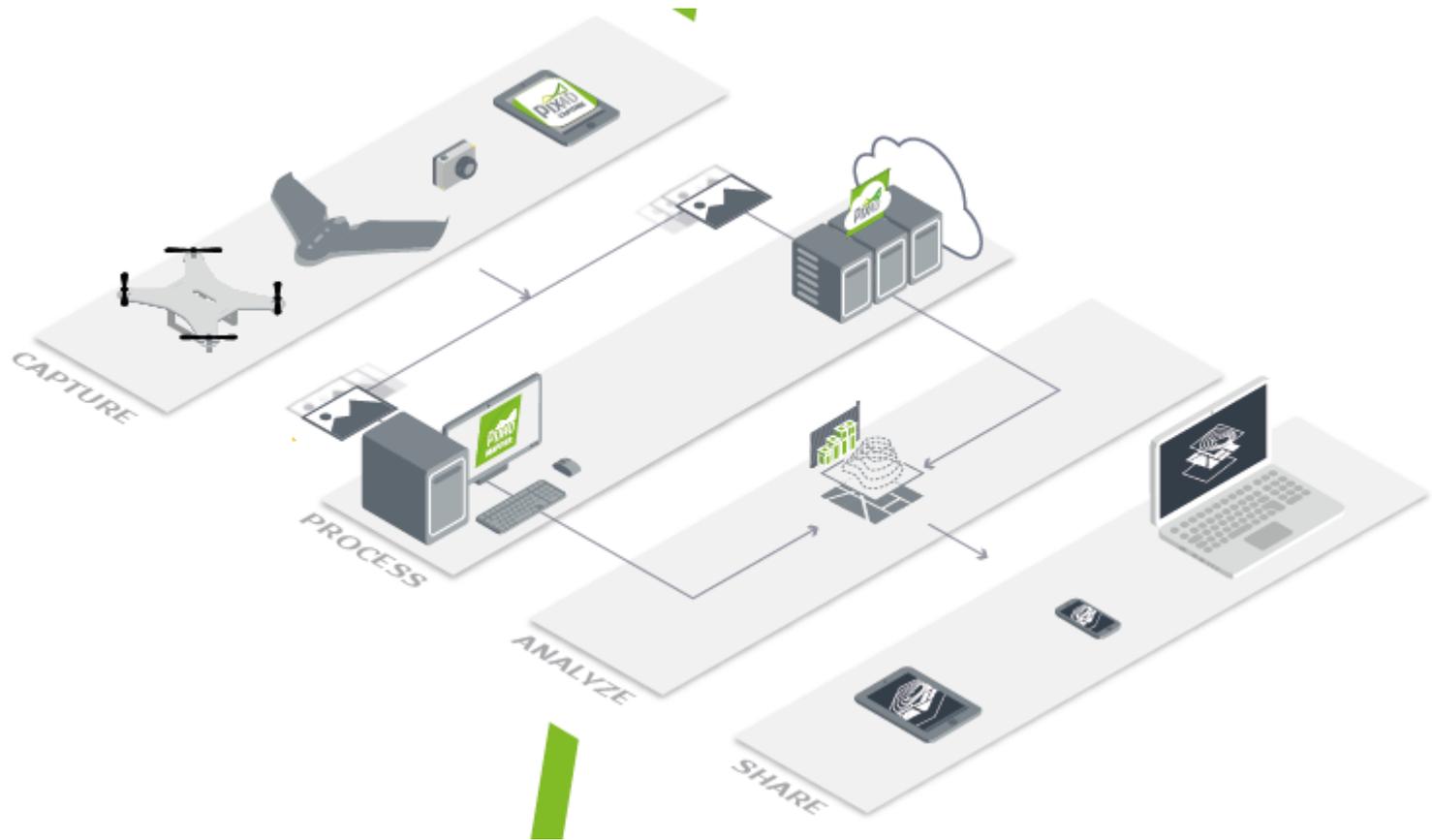


Imagen

Procesado de imágenes



FLUJO AUTOMÁTICO DE TRABAJO



LA IMPORTANCIA DEL RTK - PPK

Simplifica el flujo – AUTOMATIZA con control

Dos opciones disponibles

RTK

Solución en tiempo real

Necesidades:

Conexión a base externa

- GPRS
- Radio modem

PPK

Solución en postproceso

Necesidades:

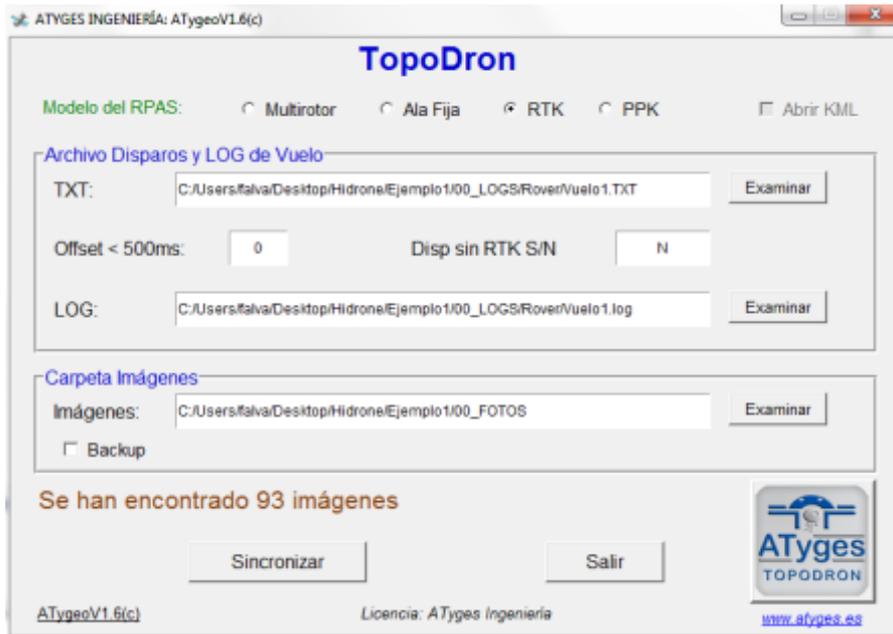
Datos RINEX

- Base pública
- Base propia cliente

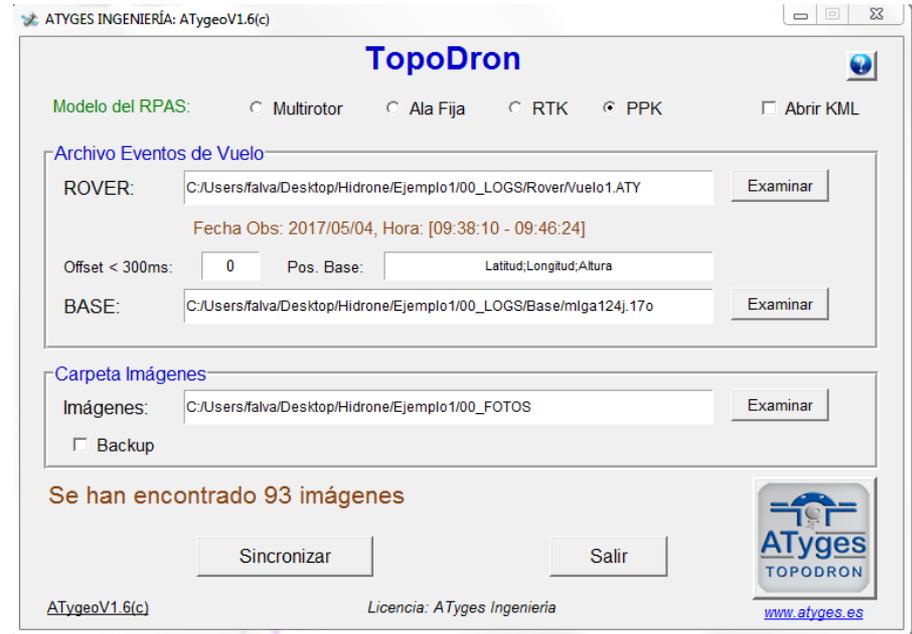
ATYGEO SIMPLIFICA EL TRABAJO

Simplifica el flujo – AUTOMATIZA con control

SI RTK



SI PPK



SALIDAS ATYGEO



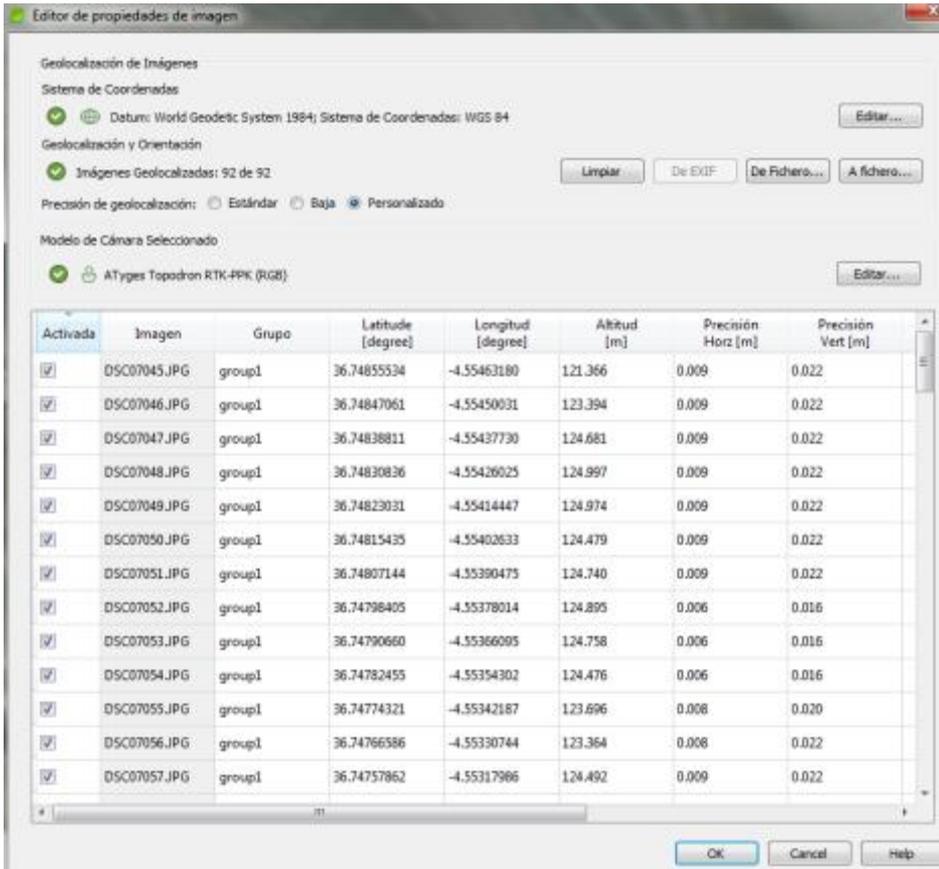
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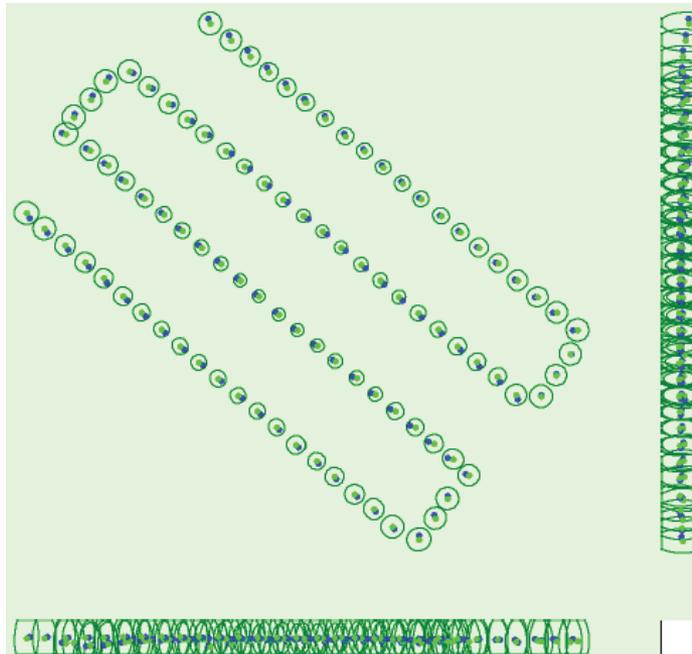
ORGANIZACIÓN AUTOMÁTICA DE VUELOS
 GEOETIQUETADO Y PRECISIONES EN LOS METADATOS
 POSTPROCESADO
 LISTADO DE DATOS

FLUJO AUTOMÁTICO



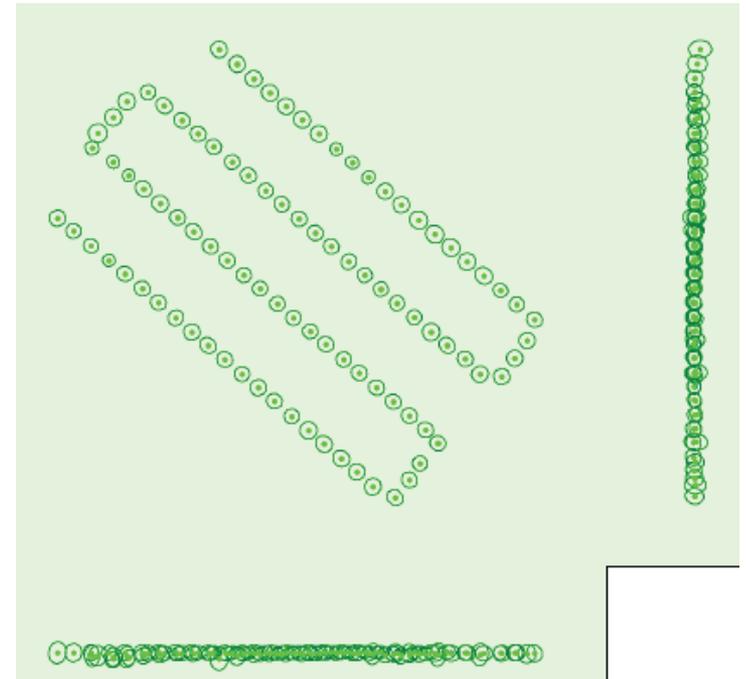
PRECISIONES COMPARATIVA

GPS
STANDAR



Elipsoides de error
Fotocentro imágenes
Magnificado X 10

GPS RTK/PPK
L1/L2



Elipsoides de error
Fotocentro imágenes
Magnificado X 1000

PRECISIONES COMPARATIVA

Varianza absoluta de geoposicionamiento de imágenes

| Min Error [m] | Max Error [m] | Geolocation Error X [%] | Geolocation Error Y [%] | Geolocation Error Z [%] |
|----------------------|---------------|-------------------------|-------------------------|-------------------------|
| - | -15.00 | 0.00 | 0.00 | 0.00 |
| -15.00 | -12.00 | 0.00 | 0.00 | 0.00 |
| -12.00 | -9.00 | 0.00 | 0.00 | 0.00 |
| -9.00 | -6.00 | 0.00 | 0.00 | 0.00 |
| -6.00 | -3.00 | 3.26 | 0.00 | 0.00 |
| -3.00 | 0.00 | 46.74 | 45.65 | 54.35 |
| 0.00 | 3.00 | 50.00 | 51.09 | 45.65 |
| 3.00 | 6.00 | 0.00 | 3.26 | 0.00 |
| 6.00 | 9.00 | 0.00 | 0.00 | 0.00 |
| 9.00 | 12.00 | 0.00 | 0.00 | 0.00 |
| 12.00 | 15.00 | 0.00 | 0.00 | 0.00 |
| 15.00 | - | 0.00 | 0.00 | 0.00 |
| Mean [m] | | -0.000000 | 0.000000 | 0.000000 |
| Sigma [m] | | 1.779937 | 1.604173 | 0.432532 |
| RMS Error [m] | | 1.779937 | 1.604173 | 0.432532 |

GPS
STANDAR

GPS RTK/PPK
L1/L2

| Min Error [m] | Max Error [m] | Geolocation Error X [%] | Geolocation Error Y [%] | Geolocation Error Z [%] |
|----------------------|---------------|-------------------------|-------------------------|-------------------------|
| - | -0.04 | 0.00 | 0.00 | 5.43 |
| -0.04 | -0.03 | 0.00 | 0.00 | 5.43 |
| -0.03 | -0.02 | 0.00 | 0.00 | 5.43 |
| -0.02 | -0.01 | 0.00 | 0.00 | 7.61 |
| -0.01 | -0.01 | 0.00 | 4.35 | 18.48 |
| -0.01 | 0.00 | 55.43 | 38.04 | 13.04 |
| 0.00 | 0.01 | 38.04 | 56.52 | 14.13 |
| 0.01 | 0.01 | 6.52 | 1.09 | 8.70 |
| 0.01 | 0.02 | 0.00 | 0.00 | 6.52 |
| 0.02 | 0.03 | 0.00 | 0.00 | 5.43 |
| 0.03 | 0.04 | 0.00 | 0.00 | 4.35 |
| 0.04 | - | 0.00 | 0.00 | 5.43 |
| Mean [m] | | 0.000013 | -0.000008 | -0.001199 |
| Sigma [m] | | 0.004470 | 0.003357 | 0.021038 |
| RMS Error [m] | | 0.004470 | 0.003357 | 0.021072 |

PRECISIONES COMPARATIVA

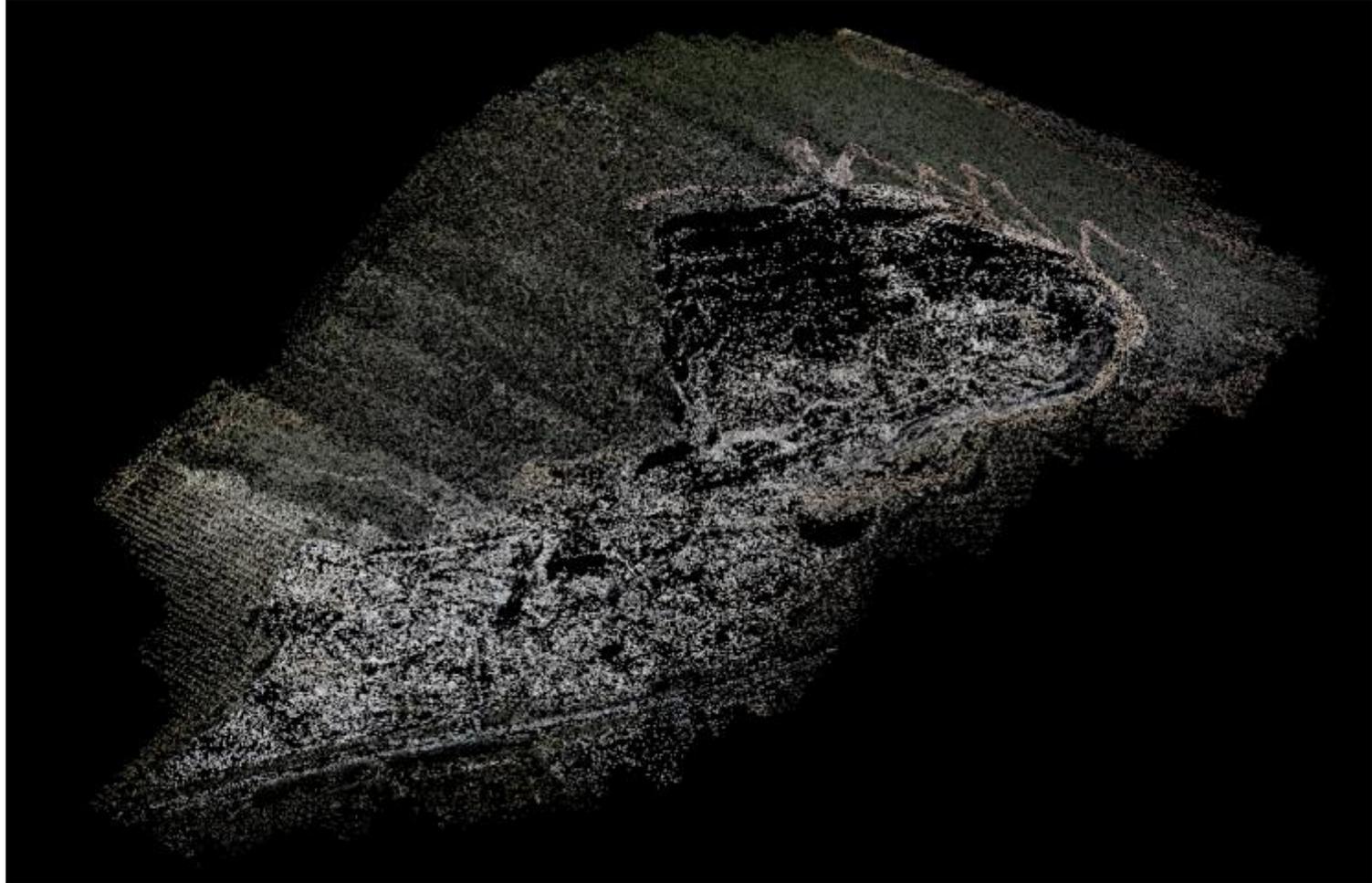
Calidad en Check Point. Sistema ATyges RTK/PPK

0 out of 18 check points have been labeled as inaccurate.

| Check Point Name | Accuracy XYZ [m] | Error X [m] | Error Y [m] | Error Z [m] | Projection Error [pixel] | Verified/Marked |
|----------------------|------------------|-------------|-------------|-------------|--------------------------|-----------------|
| 17 | 0.020/0.020 | 0.033 | 0.034 | 0.012 | 0.406 | 4 / 4 |
| 24 | 0.020/0.020 | 0.034 | 0.005 | -0.007 | 0.431 | 4 / 4 |
| 26 | 0.020/0.020 | 0.057 | 0.022 | 0.002 | 0.466 | 3 / 3 |
| 28 | 0.020/0.020 | 0.039 | 0.017 | -0.004 | 0.527 | 3 / 3 |
| 32 | 0.020/0.020 | 0.035 | -0.055 | 0.005 | 0.134 | 3 / 3 |
| 33 | 0.020/0.020 | 0.059 | -0.028 | -0.049 | 0.131 | 3 / 3 |
| 34 | 0.020/0.020 | 0.053 | -0.035 | -0.022 | 0.595 | 3 / 3 |
| 35 | 0.020/0.020 | 0.039 | -0.018 | -0.042 | 0.404 | 3 / 3 |
| 36 | 0.020/0.020 | 0.033 | -0.020 | -0.079 | 0.637 | 3 / 3 |
| 37 | 0.020/0.020 | 0.035 | -0.048 | -0.006 | 0.429 | 3 / 3 |
| 38 | 0.020/0.020 | 0.026 | 0.031 | -0.056 | 0.553 | 3 / 3 |
| 39 | 0.020/0.020 | 0.011 | -0.014 | -0.016 | 0.375 | 3 / 3 |
| 40 | 0.020/0.020 | 0.008 | -0.003 | -0.028 | 0.296 | 3 / 3 |
| 41 | 0.020/0.020 | -0.014 | 0.025 | -0.005 | 0.420 | 3 / 3 |
| 42 | 0.020/0.020 | 0.005 | 0.035 | -0.029 | 0.200 | 3 / 3 |
| 43 | 0.020/0.020 | 0.004 | 0.020 | -0.047 | 0.579 | 3 / 3 |
| 44 | 0.020/0.020 | 0.001 | 0.009 | -0.022 | 0.326 | 3 / 3 |
| 45 | 0.020/0.020 | -0.003 | -0.003 | -0.047 | 0.237 | 3 / 3 |
| Mean [m] | | 0.025314 | -0.001539 | -0.024454 | | |
| Sigma [m] | | 0.020902 | 0.027358 | 0.024013 | | |
| RMS Error [m] | | 0.032829 | 0.027401 | 0.034273 | | |

SALIDAS

NUBE DE PUNTOS LIGERA



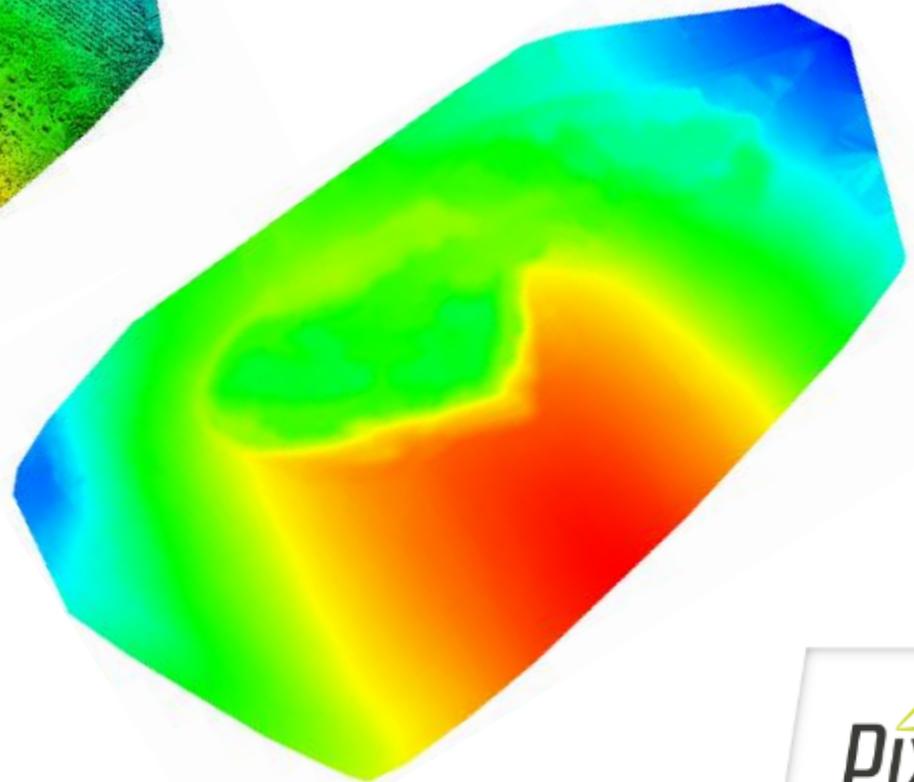
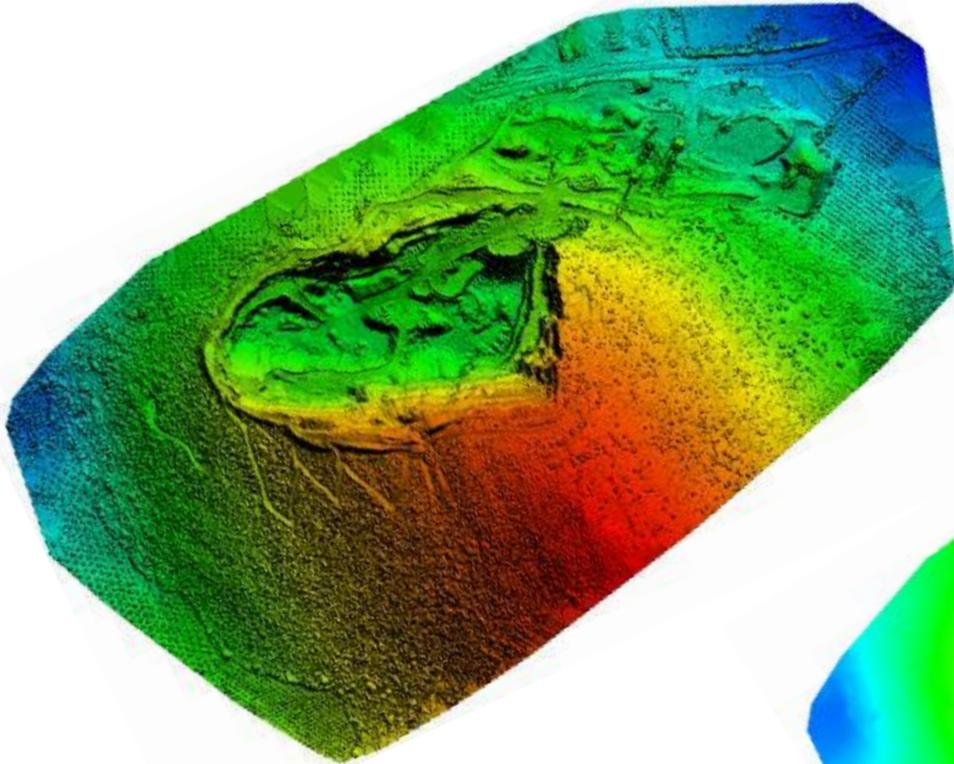
SALIDAS

NUBE DE PUNTOS DENSA

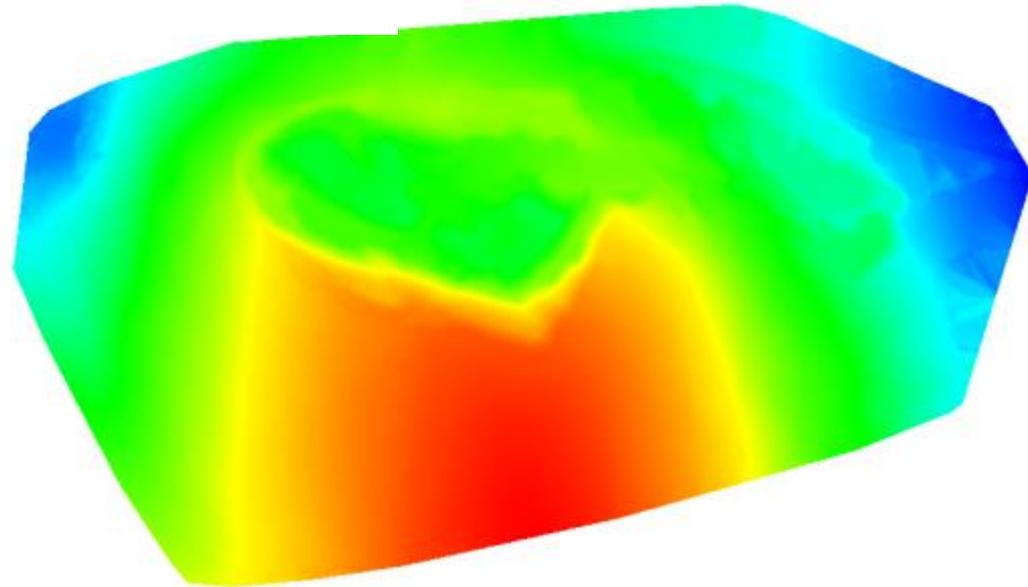
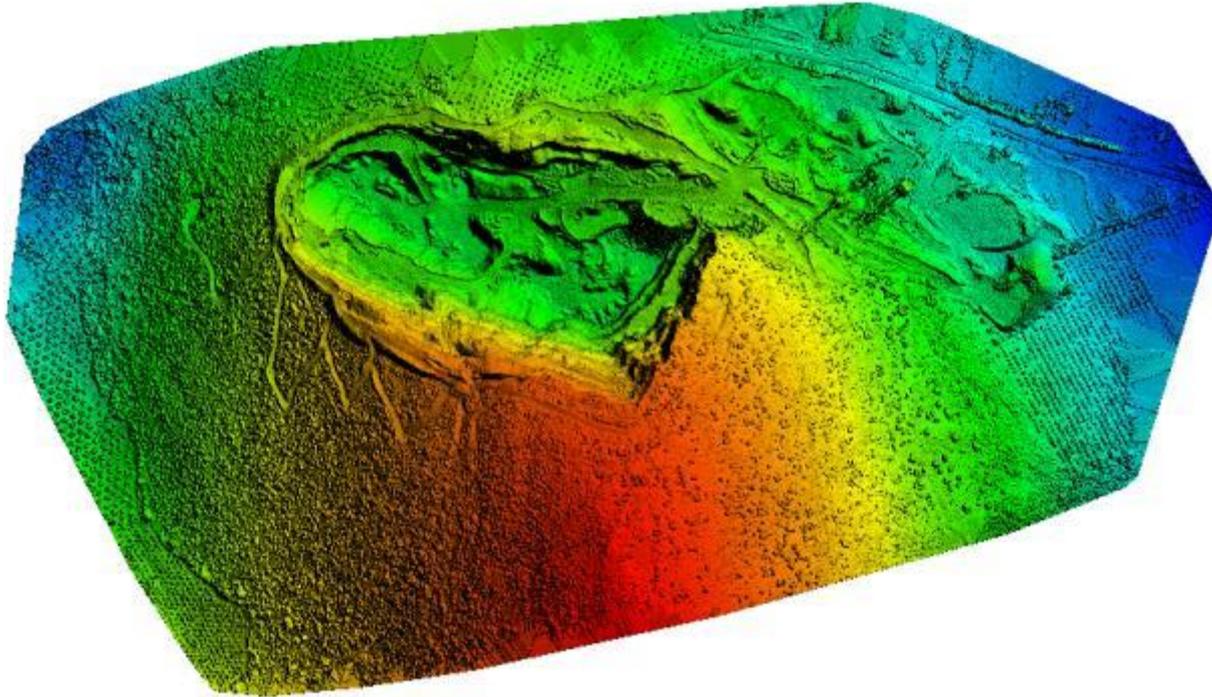


SALIDAS

MODELOS DIGITALES – DE SUPERFICIE / DE TERRENO



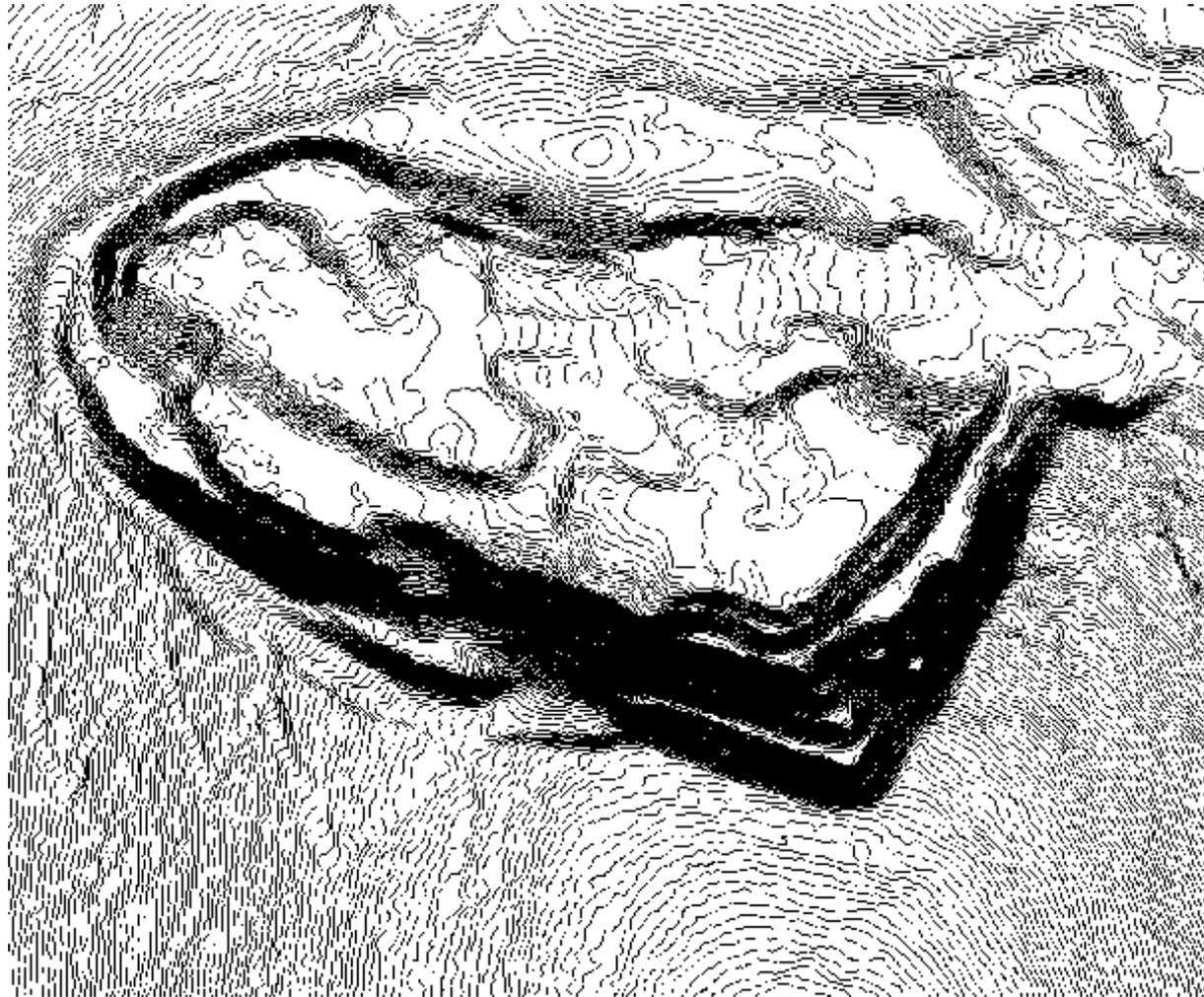
SALIDAS – MODELO DIGITALES



SALIDAS – MODELO DIGITALES

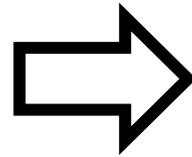


SALIDAS – MODELO DIGITALES



FLUJO DE TRABAJO

PLANIFICA
VUELA
GESTIONA

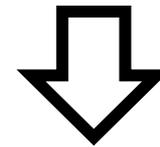


Imágenes

PROCESA



pro
mapper



- Nubes de puntos
- Mallado 3D
- Ortofotos
- MDS/MDT



FORMATOS DE SALIDA

Múltiples formatos de exportación

.(Geo)tiff .las .laz .xyz
.ply .fbx .dxf .obj .shp
...



Propósitos

- Ver/Mostrar a terceros
- Editar y medir datos
- Generar otros soportes de salida
- Específicos: Impresión 3D, Digitalización, etc.



VENTAJAS DEL SISTEMA TOPODRON RTK/PPK

- Alta Precisión
- Sencillez de uso
- Garantía 100 % de uso y funcionamiento
- Fabricación de sistemas electrónicos de control y software 100 % europeo
- Preparado para uso intensivo profesional
- No apoyo en terreno – Flujo automático
- Formación y soporte incluido



PRODUCTOS DE SOFTWARE



Free software to discover maps and 3D models from images



Shareable 3D models from drone imagery



Drone mapping software for precision agriculture



Desktop software for professional drone-based mapping, purely from images



Scalable photogrammetric software for enterprises



PREGUNTAS

Muchas gracias por su atención

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